The Effects of Real Exchange Rate, External Finance and Economic Integration on Employment and Trade

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To my Murshid Dr. Mahboob Alam Qureshi and my family whose prayers and encouragement are always with me.

Abstract

This thesis focuses on three issues. First, it investigates the impact of fluctuations in international trade competitiveness on employment in the UK manufacturing sector over the period 1999 to 2010. We find statistically significant effects of a shock to international trade competitiveness on the level of employment. We suggest that the adjustment process in employment mainly works through job creation. We also find that compared to large firms, small firms contribute more towards job creation than job destruction. Our results show that changes in GDP growth rate and average wages are significantly related to employment, suggesting that the UK labor market responds significantly to market forces. Finally, we find that the effect of changes in the real exchange rate on both job creation and job destruction differs for exporting and non-exporting firms.

Second, the thesis empirically examines the impact the financial dependence, specifically during the 2007-2009 financial crisis, on the UK exports using monthly data over the period January 2002 to September 2011. We find that the UK exports are highly sensitive to the fluctuations in the cost of capital. The UK tends to export relatively less in the sectors which depend more on external finance than the sectors which are less dependent of external finance. **These effects became stronger during the 2007-2009 financial crisis. We also find that adverse credit conditions affect both the supply and demand sides of exports and play a significant role in determining the supply and demand for UK exports. We find that along with the financial conditions in the trading partners, the volume of GDP and capital labor ratios of the importing countries are the main factors in determining the demand for the UK exports, whereas the supply of the UK exports is driven by financial conditions, GDP and the capital-labor ratio of the UK.**

The third issue examined in the thesis is the impact of the 4^{th} and 5^{th} extensions in European Union (EU) on the trade flows of member and non-member countries. Specifically, the thesis tests whether 4^{th} and 5^{th} extensions EU causes trade diversion or trade creation. Moreover, we test that whether the trade creation and trade diversion effects of these extensions are same across the extensions and across the new members joining in these two extensions. Applying the correctly specified fixed effect gravity model on the data of imports and exports of the EU countries spanning from 1988 to 2008, our results show that, in most of commodity groups, the EU boosts trade among member countries at the cost of lowering the trade with non-member countries. However, the increase in trade with member countries is more than the decrease in the trade with non-member countries. Moreover, we found that

trade creation and trade effects vary across the extensions in the EU, across the commodity groups and across the members joining the EU in 4^{th} and 5^{th} extensions of the EU.

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Chapter 1

Introduction

1.1 Motivation and Research Questions

World economies are endowed with several different socio-economic resources which they use for the welfare of their people. However, the welfare of a country mainly depends on efficient allocation and use of these resources. The interdependence of world economies makes the efficient allocation and use of economic resources among countries indispensable to achieve the goal of welfare maximization. In this context, international trade has played a key role in promoting the efficient allocation of resources. Therefore, a great deal of attention has been paid to facilitating international trade, both at the global and country level. As a result, global trade has increased tremendously. Specifically, over the last three decades, reductions in tariff and non-tariff barriers to trade have led to a fivefold increase in the volume of world exports (WESS, 2010). Similarly, WTO (2011) reports that volume of global trade in 2010 is $14, 855 billion worth. Moreover, Makwana (2006) reports that trade accounts for around 55% of global economic growth, and as much as 75% of GDP growth in the EU.

The advocates of trade argue that global trade increases the incomes of nations by increasing efficiency of the productive resources through specialization and transfer of knowledge and technology from one country to another country. In addition, they say that trade adds to the welfare of nations by providing a wide range of products to consumers at relatively lower prices. However, along with the benefits, international trade also has some disadvantages, which may reduce the net benefits of the trade. In fact, international trade requires the redistribution of productive resources among different sectors depending on the comparative advantage of the country. This trade-led redistribution of the resources may lead to the loss of some productive resources which is one of the main disadvantages of international trade. Specifically, labor market adjustment costs are very prominent and may end up in net loss of employment in trading partner. Workers who become unemployed in contracting sectors may not get employment in expanding sectors. As a result, the net benefits of international trade may fall.

The adjustment process during the trade-led redistribution of the resources highlights the importance of the adjustments in the labor market due to the fluctuations in real exchange rate. Therefore, in Chapter 2, we examine the impact of real exchange rate on the UK labor market and test whether in response to variations in real exchange rates employment adjusts through job creation or job destruction. Moreover, we check whether

the effect of the real exchange rate of the UK relative to the EU and non-EU trading partners on the employment is the same. Finally, we test whether the impact of the real exchange rate on employment in exporting and non-exporting industries differs.

Different economic and non-economic factors impede trade flows. For example, fluctuations in the real exchange rates, access to trade credits, custom duties, rules and time required to enforce a contract in a country, and custom procedures in a country may affect trade flows significantly. The availability and ease in accessing trade credit plays an important role in the growth of trade. Unexpected events happening in the financial markets may also cause a severe damage to the cross border flows of the goods and services. In particular, small and financially constrained firms' exports are at stake during periods of financial crisis as their access to funds from formal banking channels is considerably reduced. In this context, WTO (2010), reports that unfavorable financial conditions during the financial crisis of 2007-2009 led to a 12% decrease in the overall volume of trade. Similarly, Berman and Héricourt (2010) and Manova et al. (2011) have shown that financial constraints hinder trade flows significantly. Moreover, the intensity of the decline in trade flows caused by the financial constraints increases during financial crisis (Chor and Manova, 2011). In fact the drop in international trade exceeded the drop in real GDP during the financial crisis of 2007-2009. According to WEO (2010) annualized quarter-over-quarter drop in the global real GDP averaged under 6% from the last quarter of 2008 to the first quarter of 2009, whereas the drop in global real imports was five times as large and averaged over 30% during the same time period. Baldwin (2009) reports that imports and exports collapsed for the EU27 and 10 other nations that together account for three-quarter of global trade, was more than 20% from second quarter of 2008 to second quarter of 2009 and trade flows of many of them fell by 30% or more during this period. Similarly, Mora and Powers (2009) reports that nominal global merchandise exports dropped by 32% between the second quarter of 2008 and second quarter of 2009. In the words of Jacks et al. (2009) the largest trade collapse in the last 150 years occurred between the early 2008 to mid 2009.

Mora and Powers (2009) consider the decline in trade financing as the major contributor towards the decline in the world trade during the second half of 2008 and early 2009. Summarizing the findings of the 6 surveys of international banks, suppliers, and government agencies Mora and Powers (2009) point out that trade financing is the number two cause of the decline in the global trade after falling international demand. In these surveys, among international suppliers, 30 % consider reduced supply of trade financing as a key factor in lowering foreign sales, and 57 % of the banks reported that lower credit availability contributed to trade decline between the second half of 2008 and early 2009. Banks reduced the supply of trade financing in last quarter of 2008 and the value of letters

of credit fell by 11% in this quarter. Furthermore, the global impact of the crisis on trade financing peaked in the first half of the 2009.

Similarly, quoting the surveys of International Monetary Fund (IMF) and the Bankers Association for Finance and Trade (BAFT) now merged with International Financial Services Association (BAFT-IFSA), Chauffour and Malouche (2011) reports that about 40 percent of trade finance was bank intermediated whose prices increased considerably during the 2007-2009 financial crisis. Mora and Powers (2009) report that the price of letter of credit increased by 70 base points and the price of export credit insurance increased by 100 base points during the crisis. The trade cost on average increased by about 11% between second quarter of 2008 to the first quarter of 2009 (Jacks et al., 2009). This rise in the costs of the trade in general and the increase in the cost of trade finances in particular played their role in the collapse of global trade. Thus, it appears that the reduction in the availability of the trade finance, and the rise in the cost of the trade finance resulted in the fall of the global trade. So, it is worthwhile to analyze whether trade finance was indeed a major factor driving the fall in UK trade during the recent financial crisis.

Therefore, in Chapter 3 we explore how firms dependence on external finance affects the UK exports. Particularly, we test whether the effect of financial dependence on the UK exports became stronger during the financial crisis of 2007-2009. Moreover, we also examine whether financial dependence affects the exports of different sectors differently, particularly during the 2007-2009 financial crisis. In doing this, we use four different proxies for financial dependency and two different proxies for the cost of the capital. To examine how financial crisis affects the impact of financial dependence on exports, we use an interaction term between financial dependence, cost of capital and the financial crisis dummy.

The proponents of the trade always favor trade liberalization. Their idea of free trade is based on efficiency of the market outcomes and on the principle of comparative advantage. Theoretically free trade adds to the welfare of trading countries only if domestic markets are working efficiently and are not distorted. But in the real world, markets do not work efficiently and are distorted through different kinds of policy interventions. Different kinds of economic and non-economic factors such as custom duties, international environmental and labor standards impede the movement of factors of production and goods and services across the borders. Therefore, instead of global free trade, regional free trade is flourishing very quickly.

Several years ago, Viner (1950) presented the concept of the regional trade liberalization which is known as the theory of the Second Best in the trade literature. This theory presents analysis of the regional integration. Indeed, regionalism has become a key development in international trade relations. As of January, 2012, 511 Regional Trade

Agreements (RTAs) have been notified to the World Trade Organization (WTO) web site, of which 319 RTAs are in force. Most trade takes place among countries that are associated with these RTAs. Clarete et al. (2003) reports that 97 percent of the world trade in the year 2000 was among the countries that have joined at least one RTA. Asia-Pacific Economic Co-operation (APEC) economies account for 44 percent of world trade and the European Union (EU) accounts for 17 percent of global trade (EUCOM, 2009).

The rapid growth of RTAs in the world and an unprecedented increase in the share of global trade taking place among the members of these RTAs induce researchers to analyze the impact of an RTA on trade flows of member and non-member countries. The empirical studies mainly test the hypothesis of whether an RTA creates or diverts trade. Most of the existing studies have estimated the effect of an RTA on trade flows with reference to a single commodity or single sector or with regard to aggregate trade. However, findings are mixed. Furthermore, the analysis based on a single commodity or single sector may not give clear picture of the impact of an RTA on trade flows. Hence, generalization of the findings of such analysis may lead to wrong policy implications. Therefore, it is important to know how does an RTA affect the trade flows of different commodity groups.

In the context of RTA, the European Union members have initiated Single European Market (SEM) program to promote intra-EU trade and to create a competitive environment for firms operating in the EU member countries. In this program member countries have agreed on free flow of goods, persons and capital among the member countries. They also have agreed to adopt a common external tariff. These measures may enhance intra-EU trade volume and raise the welfare of the people living in the EU. However, they may prove detrimental for the welfare as well as trade flows of the rest of the world.

Thus differing from the existing studies, in Chapter 4 we analyze the effects of the 4^{th} and 5^{th} extensions in European Union (EU) on member and non-member countries trade flows. Specifically, we test whether the 4^{th} and 5^{th} extensions in EU creates or diverts trade from the member countries. We also test whether 4^{th} and 5^{th} extensions in EU increase trade among members without affecting trade with non-member countries. Furthermore, we test from the new members joining the EU in 4^{th} and 5^{th} extensions how many members increase trade with members at the cost of decreasing trade with non-members. Finally, we test whether 4^{th} and 5^{th} extensions in EU creates trade in all the commodity groups.

1.2 Aims and Objectives of the Thesis

This thesis is initiated with the following objectives.

Keeping in view trade-led redistribution of the productive resources, and in order to

formulate a comprehensive and effective labor policy to mitigate the distress of labor generated by trade-led fluctuations in employment, this thesis aims to estimate labor adjustment costs resulting from expansion of international trade. Particularly, in this study we look into the adjustments costs generated by fluctuations in international trade in the UK labor market. In addition, we are keen to determine whether the changes in global trade led to job creation or job destruction in the UK manufacturing sector.

The relationship between the financial resources available to firms and international trade flows provides the basis for another objective of this thesis, which is, to explore the impact of the 2007-2009 financial crisis on the UK exports. We intend to estimate the effects of the 2007-2009 financial crisis on UK sectoral exports to determine which sector's exports were severely damaged during the crisis time period. For this purpose, we take into account both the demand side as well as the supply side of UK exports while estimating the impact of the 2007-2009 global financial crisis on UK sectoral exports.

Regional integration or free trade within the bloc and restricted trade outside the bloc is rapidly growing in the world. So, one more objective of the thesis is to estimate the impact of an RTA on trade flows of member and non-member countries. Specifically, we test the hypothesis that whether the 4^{th} and 5^{th} extensions in the European Union creates trade or diverts trade taking into account all ten sectors classified by the Standard International trade Code (SITC).

1.3 Methodology

To estimate the impact of fluctuations in real exchange rates on the UK labor market, we use a modified version of the Moser et al. (2010) framework, which is a reduced form of the Klein et al. (2003) model. The modified framework enables us to examine the impact of fluctuations in real exchange rates in the European Union and non-European Union markets simultaneously on job flows (job creation, job destruction, net job flows and gross job flows) in the UK manufacturing sector. In order to compute job flows (job creation, job destruction, net job flows and gross job flows) at the industry level we have followed the procedure adopted by Davis et al. (1996). Following Moser et al. (2010) we have used a real exchange rate based on trade weighted hourly wage costs. Finally, we apply the Generalized Method Moment (GMM) to estimate the empirical model.

To examine the impact of financial dependence on the UK exports during the 2007-2009 financial crisis (in Chapter 3) we modify the Chor and Manova (2011)'s empirical model that considers only the supply side of exports. However, our modified version takes into account both demand and supply of the exports. We use four different proxies, namely external finance, buyer-supplier trade credit, tangible assets and leverage for the financial

dependence of the firms of external resources, and two proxies: the lending interest rate and the overnight interbank rate for the cost of capital. We calculate proxies for financial dependence at the firm level and then match these with the sector level where we take the median of all the firms operating in a sector because our analysis is at the sector level. We use fixed effects and instrumental variable techniques to estimate the parameters of the model to control for unobservable sector specific effects.

To estimate the impact of the 4^{th} and 5^{th} extensions in the European Union on trade flows of member and non-member countries, we apply the correctly specified gravity model. Specifically, we use the modified version of the correctly specified gravity model used by Kandogan (2005) to estimate the impact of extensions in the European Union on trade flows. We estimate the empirical model by applying the Ordinary Least Square (OLS) method and control importer, exporter, time and bilateral fixed effects by using dummy variables.

1.4 Summary of the Thesis Results

With regard to the impact of competitiveness on labor markets we find that the competitiveness significantly affects employment in the UK manufacturing sector. We find that an appreciation of the real exchange rates distorts the competitiveness of goods in international markets and significantly reduces employment. We also observe that adjustments in the labor market work through job creation rather than job destruction. Moreover, our findings suggest that the response of job creation and job destruction to fluctuations in real exchange rates is different. The real exchange rate affects job creation negatively and significantly but job destruction negatively and insignificantly.

In Chapter 3, we find that financial dependence significantly determines UK exports. Specifically, the impact of financial dependence on UK exports is negative and statistically significant. Moreover, our findings show that the negative relationship between financial dependence of a firm on external resources and its ability to export became relatively strong during the 2007-2009 financial crisis. We also find that sectors that rely more on external finance, have limited access to buyer-supplier trade credit and lower collateralizable assets, export less relatively. Our findings are robust and do not change when we change the proxy for financial dependence or change the proxy for the cost of capital.

With regards to the impact of 4^{th} and 5^{th} extensions of the European Union on the trade flows of member and non-member countries, we have the following observations: The results provide evidence that the effects of the 4^{th} and 5^{th} extensions of the EU on trade flows are mixed. In some product groups the EU creates trade among members without affecting their trade with non-member countries and in some other product categories EU diverts trade from the

rest of world to member countries. Specifically, we find that both the 4^{th} and 5^{th} extensions of the EU cause import diversion. After the 4^{th} and 5^{th} extensions of the EU, the member countries have decreased their imports from non-member countries and have increased their imports from the member countries. However, the decrease in imports from non-member countries is lower than the increase in imports from member countries. Moreover, we find that trade creation and trade diversion effects of the extensions in the EU vary across the extensions, across the new members joining the EU in these extensions and across the commodity groups. In addition, we found that the geographical distance between importer and exporter country's significantly affects the trade flows of the EU member countries.

With regard to new members joining the EU in the 4^{th} and 5^{th} extensions, our findings indicate that from new members joining the EU in the 4^{th} extension in 1995 Austria and Sweden led to import diversion and Austria and Finland cause the export diversion. Similarly, from the countries who became members of the EU in the 5^{th} extension of the EU in 2004, Cyprus, Hungary, Lithuania Malta and Slovenia increase their imports from member countries but decrease their imports from non-member countries. Moreover, after joining the EU in 2004, Cyprus, Estonia, Hungary, and Slovenia have decreased their exports to non-member countries and their exports to member countries have increased. Finally, in this chapter, we show that the major share of "food and live animal" products is imported from non-member countries and the EU is the net importer of the food and agriculture products. Furthermore, the analysis shows that "machinery and transport equipments", "chemical and related products" and the "manufactured goods chiefly classified by material" are the major contributors in the excellent export performance of the EU.

1.5 Structure of the Thesis

The rest of the thesis is organized as follows. Chapter 2 presents the analysis of the impact of the trade competitiveness on the UK labor market. Specifically, this chapter analysis is based on how real exchange rate led variations in the competitiveness of the UK goods affect employment in the UK manufacturing sector. Chapter 2 also determines how the adjustment process in employment works, whether it works through job creation or through job destruction. Finally, Chapter 2 presents this analysis for exporting and non-exporting industries of the UK manufacturing sector.

Chapter 3 presents the analysis of the impact of the financial dependence on the UK exports, particularly during the 2007-2009 financial crisis. Chapter 3 also presents a brief

review of the 2007-2009 financial crisis. This chapter employs four different proxies for financial dependence and two different proxies for the cost of capital to check the sensitivity of the results. Finally, Chapter 3 determines which sector exports were severely damaged during the financial crisis.

Chapter 4 examines the impact of the 4^{th} and 5^{th} extensions in the European Union on the trade flows and determines whether 4^{th} and 5^{th} extensions in EU results in trade creation or in trade diversion. Chapter 4 also provides details of the commodity groups in which the EU increases trade among member countries without affecting the trade with non-member countries and commodity groups in which the EU increase trade with non-member countries. Furthermore, Chapter 4 provides a brief history of the EU.

Finally, Chapter 5 presents the summary of the thesis results and key conclusions of the thesis. Chapter 5 also presents some policy implications based on our results.

Chapter 2

Trade Competitiveness and Employment: Job Creation or Job Destruction ?

2.1 Introduction

Over the last three decades, reductions in tariff and non-tariff barriers to trade have led to a fivefold increase in the volume of world exports. The global export of goods and services grew at an average rate of 6.3 percent per year from 1980 to 2008 (World Economic and Social Survey WESS (2010)). The proponents of international trade claim that international trade positively contributes to the welfare and income of nations by exploiting economies of scale through specialization, enhancing the efficiency of the productive resources, and the sharing of the knowledge and technology across countries. Further, they argue that trade increases the choices available to consumers by providing them with a broader range of products at relatively lower prices. As a consequence, countries are opening their borders through the multilateral trading system, by signing regional trade agreements or by exposing their economies to international competition as a part of their reform programs.

However, the potential benefits of trade are obtained through the re-allocation of resources to their most productive uses. But the redistribution of productive resources is not free, different types of adjustment costs are involved in it. These adjustment costs reduce the net benefits linked with international trade. Therefore, while assessing the advantages of trade openness, one should keep in mind the size of the adjustment cost arising from it. A prominent trade-led adjustment costs is adjustments in the labor market arising from changes in employment and wages (Klein et al., 2003).

One source of trade-led labor adjustment costs is the frequent changes in real exchange rates. Klein et al. (2003) describe how movements in the real exchange rates affect employment both within and between industries. Large swings in real exchange rates change the relative prices of internationally traded goods by changing their demand and comparative advantage in international markets. As a result the firms or industries, those are supplying these products in international markets, adjusts their production. Consequently, employment adjustment occurs in those industries in which these commodities are produced. However, the response of employment to a shock to the exchange rate varies across industries because trade patterns and the degree of openness to trade vary significantly across industries.

In the context of the impact of exchange rate shocks on trade, Krugman (1987) presents businessmen's views regarding competition which imply that a temporary shock, such as

swings in the real exchange rate, can have a permanent effect on trade. He says that a nation can be driven out of some of its businesses in response to temporary real exchange rate shocks. This loss of the business generates unemployment. Thus, Krugman suggests that the change in real exchange rates generates labor adjustment costs.

Moreover, shocks to the real exchange rate generate labor market adjustment costs in the form of job flows in different sectors of the economy which may end with net losses/gains in employment by changing the incentives to produce tradable versus non-tradable goods. Actually, the change in incentives to produce tradable versus non-tradable goods changes the relative prices and demands for tradable and tradable products which in turn generate fluctuations in output and employment. As a result some sectors expand and some other sectors contract. Workers losing their jobs in a contracting sector do not necessarily get employment immediately in the expanding sectors due to a lack of information and difference in skills required to fill the jobs in the expanding and contracting sectors. This mismatch in available opportunities and skills required to fill the vacant posts creates spells of temporary unemployment. Consequently, welfare gains linked with trade fall. Thus, governments may wish to intervene to reduce the massive job destruction.

Another important aspect of exchange rate-led labor costs is how the adjustment process in the labor market works. It is important to understand whether the process works through job creation or through job destruction because each of them has different welfare impacts. If labor markets adjust through job creation, then it only reduces the jobs for new entrants and the adjustment may be less detrimental to overall welfare. However, if the labor market adjusts through job destruction, then not only does it reduce jobs for new entrants but the adjustment also forces existing workers out of jobs, increasing the extent of welfare loss. So, when estimating the labor market adjustment costs in response to a shock to the real exchange rate, it is very important to analyze the process of adjustment in labor markets.

In this chapter, we investigate the effects of exchange rate shocks to international competitiveness on the UK labor market. Specifically, we explore the response of employment to real exchange rate led shocks to international competitiveness using panel data for the UK manufacturing sector. In addition, we examine whether the adjustment process of employment works through job creation or job destruction. In other words, we explicitly look into how job creation and job destruction respond to real exchange rate led shocks to international competitiveness and, through this analysis, we determine whether the effect of international trade competitiveness is asymmetric on job creation and job destruction. Finally, we bifurcate our analysis into exporting and non-exporting firms, and to European and non-European trading partners of the UK.

The results show that a shock to international competitiveness significantly and asym-

metrically affects employment in the UK manufacturing sector. We find that an appreciation of the real exchange rate distorts international competitiveness of goods in international markets and reduces the employment significantly. We observe that this effect is relatively more intensive in more open firms. We also find that the adjustment in employment works through job creation rather than job destruction. Finally, our findings suggest that the response of job creation and job destruction to changes in the real exchange rate is asymmetric.

The rest of the chapter is organized as follows. Section 2.2 presents a brief literature review followed by the methodology in Section 2.3. Section 2.4 discusses the results. Section 2.5 provides the conclusions.

2.2 Literature Review

Many studies in the literature have analyzed the dynamics of labor markets. As a result, several channels have been identified through which various economic factors influence employment levels. In this section, we review the papers that have focused on examining the impact of real exchange rates on employment.

Real exchange rates have exhibited large fluctuations over the post-Bretton Woods era. It is well known that shocks to the real exchange rate affect employment in an open economy. However, the magnitude of changes in employment and the speed of adjustment in employment in response to a shock to the real exchange rate depend on the structure of the underlying labor market, the degree of the firms' openness to international trade and on the degree of substitutability of foreign goods for domestic goods.

To understand the impact of movements in the exchange rate several authors have modeled fluctuations in employment in response to exchange rate shocks. Most of them measure the effects of exchange rate shocks on flows of workers. For example, Burgess and Knetter (1998) evaluated the impact of an exchange rate shock on the net change in industrial employment for G-7 countries, and found that the employment responds to the shocks to exchange rates and adjusts slowly in the long run. Similarly, Greenaway et al. (1999) estimated the impact of trade fluctuations on the net changes in flows of workers in the UK and found that the import penetration significantly decreases the employment in the UK. However, the net flows of workers underestimate the total impact of changes in employment because exchange rate shocks destroy jobs in some sectors and generate jobs in the other sectors. So the net change in employment may be zero but the gross change is not. Hence, to determine the impact of shock to real exchange rate or any other international factor on employment, net flows of the worker may not give a clear picture of job turnover (Klein et al., 2003).

Keeping in view the above drawback of net flows, a number of recent studies have used

the gross flows of jobs to measure the impact of swings in the real exchange rate. Their measures of gross flows of employment increase the magnitude of labor adjustment, because, in these studies, gross flows of workers include both the movement of workers across the firms and the movement of the worker within the firm (see for instance, Moser et al. (2010), Gomez-Salvador et al. (2004)). Specifically, Moser et al. (2010) consider movement of labor from one department to another department within a firm as job creation and job destruction instead of calculating job creation and job destruction from the movements of labor across the firms. Consequently, the size of job reallocation becomes large across the firms because reallocation of jobs may occur without changing the employment level in the firm.

Frequent changes in the real exchange rate produce labor adjustment costs associated with trade because the volatility of the real exchange rate significantly decreases exports (Chit et al., 2010). Thus, firms have to adjust their output and employment. Fluctuations in the real exchange rate produce changes in relative prices which alter demand for exports and ultimately change the pattern of trade which re-allocates productive resources. Consequently, once resource redistribution starts, firms have to bear the adjustment cost. However, these adjustment costs vary from sector to sector and from industry to industry depending on the degree of openness of the industry to international trade competition (Knetter, 1989). With regard to the magnitude of change in relative prices in response to an exchange rate shock, Campa and Gonzalez (2006) report that the pass-through rate differs across industries in the short run and its magnitude is less than one. However, they cannot reject the hypothesis of full pass through across industries and across countries in the long run. Knetter and Goldberg (1997) report similar results.

In general, previous studies claim that a shock to the real exchange rate is an important element in the set of variables that generates international labor market adjustment costs. Specifically, researchers point out three potential channels through which movements in the real exchange rate influence the labor market: export exposure, import competition and cost exposure through imported inputs, see for example Campa and Goldberg (2001). **In the export channel, appreciation in the real exchange rate increases the prices of goods for foreign customers which leads to a decrease in export demand. Now firms producing goods being sold have two choices when they face a decrease in export demand. One, they produce same level of output and increase their inventories and stocks. Firms will go for increasing the stock if they expect that appreciation in real exchange rate is just for a short period of time or ready to give up a part of their profit. In this case there will be no change in employment. Second, if firms expect that appreciation in real exchange rate is not for a short period of time or they already facing a loss,**

or not ready to reduce their profit then they will reduce their output level when the demand for their products decrease in international markets due to appreciation in the real exchange rate. In this case, employment will fall. In import channel, appreciation of the real exchange rate makes foreign good relatively cheaper for the domestic consumers. So they increase the demand for imported goods and decrease the demand for domestically produced goods. Here again domestic firms have two choices either to decrease the output or to increase their stock. In the first case employment decreases and in second case there will be no change in the employment. In the import channel employment in response to appreciation in the real exchange rate decreases in the firms whose products are close substitutes of the imported goods. In the case of the imported inputs channel, appreciation of the real exchange rate makes imported inputs cheaper and firms may reduce their cost by importing the inputs they use to produce their products and reduce prices of their products. This will increase the demand of their products in foreign and domestic markets leading to increase in employment. Through these channels swings in the real exchange rate alter the relative prices of internationally traded goods and services, and hence, distort their competitiveness in the international market. In contrast, non-traded goods are less responsive to fluctuations in the real exchange rate (Engel, 1999). However, the magnitude of exchange rate pass through is not similar across industries (Knetter and Goldberg, 1997).

A substantial part of the recent literature argues that the speed of exchange rate pass-through is slow and alters the composition of the exports which leads to reshuffling of productive resources. Gust et al. (2010) and Corsetti et al. (2008) report that US imports are less responsive to exchange rate volatility over the last two decades and exchange rate pass through remains incomplete both in the short run and in the long run. However, Campa and Gonzalez (2006) find that the pass-through rate differs across industries in the short run and its magnitude is less than one. Moreover, they cannot reject the full pass through across industries and countries in the long run. With respect to a change in the composition of exports, Auer and Chaney (2009) predict that low quality good prices are more sensitive to a shock to the exchange rate than prices of high quality goods. In addition, their findings suggest that an appreciation of the local currency shifts the composition of exports towards higher quality and more expensive products. So, the existing literature establishes the fact that fluctuations in exchange rates change the relative prices of internationally traded goods, and alter their competitiveness in international markets.

Exchange rate-led gain or loss in competitiveness changes the demand for internationally traded goods and services, and accordingly, firms adjust their production and

employment (Greenaway et al., 1999). However, exchange rate related adjustments in production and employment differ across firms within an industry or across the industries depending on their exposure to international competition and other institutional factors. Industry characteristics like competitiveness in terms of prices of their products, composition of its labor force and production process also play their role in determining the size of labor market adjustment costs in response to exchange rate fluctuations (Campa and Goldberg, 2001). Thus, shocks to the exchange rate indirectly influence employment levels.

Many researchers have quantified the magnitude of the labor market adjustment costs resulting from changes in the real exchange rate and other international factors like quotas, tariffs and preferential trade agreements. Their findings suggest a negative relationship between changes in the real exchange rate and exports, employment and wages (Revenga, 1992). In addition, they indicate that the size of labor market adjustment costs in response to fluctuations in the real exchange rate differs widely from country to country (Burgess and Knetter, 1998), because domestic firms vary in their exposure to international competition (Buch et al., 2009). The findings of recent studies regarding the adjustment process of labor markets in response to the exchange rate shocks also differ. Moser et al. (2010) identified that adjustment process works through job creation in Germany. In contrast, Klein et al. (2003) found that the adjustment process works through job destruction in the United States. However, the magnitude of the labor adjustment cost in response to changes in exchange rates in Germany is low as compared with the United States.

The literature also debates the responses of job creation and job destruction to fluctuations in real exchange rate shocks to determine whether job creation and job destruction react symmetrically. Moser et al. (2010) reported that shocks to the real exchange rate do not foster job destruction but hinder job creation in Germany. Similarly, Abowd et al. (1999) found that job creation is more sensitive to shocks than job destruction in France. Likewise, Gourinchas (1999) suggested that real exchange rate fluctuations disturb job creation more as compared to job destruction. In the light of this evidence we can say that the reaction of job creation and job destruction to real exchange rate shocks is asymmetric.

Overall, the existing literature indicates that the loss/gain in international competitiveness caused by swings in the real exchange rate is not identical across the board. Its magnitude varies from firm to firm depending on their exposure to international competition. Moreover, the adjustment costs associated with loss/gain in international competitiveness differ from country to country because the comparative advantage and institutional factors that affect trade, output and employment vary across countries. Additionally, the adjustment process in the labor market is not alike in all countries. Therefore, the results of one country may not be generalized to other countries because the degree of openness to

international trade, characteristics of labor markets and other institutions that influence trade and trade related adjustment costs vary across countries.

Most of previous studies focus on the United States, Germany and other European countries. In the UK case, the existing literature exploring the impact of real exchange rate led shocks in international competitiveness on employment is very limited and is silent with regard to the adjustment process in the labor market in response to fluctuation in trade, whether it works through job destruction or job creation. Recently, Hijzen et al. (2011) have analyzed workers turnover in response to trade for the UK. But Hijzen et al. (2011) emphasize on the job flows in those firms of the UK that trade in services only. Furthermore, Hijzen et al. (2011) focus on the employment in the firms that imports services inputs. However, employment in the UK firms that export their products in other countries are also important. In fact the UK economy is more open as compared to other European countries, employment protection legislation in the UK is not as strong and labor unions are weak especially since 1980. Therefore, it is worthwhile to explore the effects of shocks to international competitiveness arising from changes in real exchange rates on the UK labor market.

This paper contributes to the literature in three ways. First, it investigates the impact of real exchange rate led loss/gain in international competitiveness on employment in UK manufacturing sector. Second, it examines whether the adjustment process in employment works through job creation or job destruction. And finally, it determines whether the effects of a loss/gain in international competitiveness in EU and non-EU markets on employment in the UK are similar or different.

2.3 Empirical Model and Methodology

2.3.1 A Model of Job Flows and the Real Exchange Rate

In the literature many researchers have empirically analyzed the impact of trade and trade affecting variables on job flows in different countries. For example Klein et al. (2003) analyzed the job flows in US manufacturing sector, Hijzen et al. (2011) and Greenaway et al. (1999) investigated the job turnover in the UK, Moser et al. (2010) looked into to job flows in Germany, Abowd et al. (1999) analyzed job flows in France and Burgess and Knetter (1998) examined cross country analysis of job flows for G-7 countries. In this section we present theoretical model based on the Klein et al. (2003) framework which serves our purpose in the best way to show how job creation and job destruction in the UK manufacturing sector react to a real exchange rate shock. Primarily, changes in the real exchange rate generate job creation and job destruction simultaneously by changing the real wage rate which firms must pay. However, the extent of the effect of a given change in real exchange rate on job flows depends on the openness of the industry. This

framework provides a base for our empirical estimation.

We derive the theoretical model using the procedure adopted by Klein et al. (2003). In fact, we reproduce the theoretical model of Klein et al. (2003). However, the model we derive here differs from that of Klein et al. (2003) in terms of definitions of the real exchange rate and openness. Klein et al. (2003) define the real exchange rate as the ratio of the price of the products of the firm to the domestic currency price of potential substitute products produced by its foreign competitors. We base our definition of the real exchange rate on trade weighted hourly wage costs in UK manufacturing sector relative to the trade weighted hourly wage cost in UK's trading partners. We think that it is more appropriate to define real exchange rate based on wage costs to explore the impact of real exchange rate on job flows.

Regarding openness, Klein et al. (2003) define openness as the average of the ratio of imports plus exports to total sales, whereas we define openness as the average of the ratio of total exports to total sales the period t and $t-1$. We define openness in this way because we lack the data on industrial imports.

Let us assume that the cost function of p^{th} firm in industry i is given by:

$$C(W_p, H_p; Q_P) = W_p^{\alpha} H_p^{1-\alpha} Q_p \tag{2.3.1}$$

where W_p is the wage cost, H_p is the non-labor cost and Q_p is the output of p^{th} firm in industry i. Since the partial derivative of the cost function with respect to input prices gives input demand, the demand for labor can be obtained by taking the partial derivative of the cost function with respect to wages:

$$L_p = \frac{\partial C(W_p, H_p; Q_P)}{\partial W_p} = \alpha W_p^{\alpha-1} H_p^{1-\alpha} Q_p \tag{2.3.2}$$

Taking the total derivative of the logarithm of the above equation, we obtain the following:

$$\widetilde{L}_p = -(1-\alpha)\widetilde{W}_p + (1-\alpha)\widetilde{H}_p + \widetilde{Q}_p \tag{2.3.3}$$

where $X, \widetilde{X} = dlnX$. Equation (2.3.3) gives labor demand conditional on the output produced by the firm. How much this firm will produce depends on demand for its product in domestic as well as in international markets. So, we assume that the demand for product of the firm in industry i is

$$Q_p = A_p Y^{\beta} \Pi_{j=1}^{k} [E_j^{-\mu\Omega_i} Y_j^{*\beta\Omega_i}] w_j^i \tag{2.3.4}$$

where A_p is an idiosyncratic demand shock facing this firm, E_j is the real exchange rate with country j. Y is domestic income and Y^* is income of the country j. We assume that w_j^i and Ω_i, $\Omega_i(with\ 0 \leq \Omega_i \leq 1)$, are trade weights and openness parameters respectively, and both are common to all the firms in industry i. The product of the w_i and Ω_i, $w_i\Omega_i$, gives the openness of the industry i with respect to trade with country j. Now we take the total differential of the logarithm of equation (2.3.4), which gives us equation (2.3.5).

$$\widetilde{Q}_p = \widetilde{A}_p + \beta\widetilde{Y} - \mu\Omega_i \sum_j w_j^i \widetilde{E}_j + \beta\Omega_i \sum_j w_j^i \widetilde{Y^*}_j \tag{2.3.5}$$

To simplify we define the difference in logarithm of the trade weighted exchange rate for all firms in industry i as $\widetilde{E}_i = \sum_{j=1}^{k} dw_j^i \widetilde{E}_j$ and the difference in trade weighted foreign output as $\widetilde{Y^*}_i = \sum_{j=1}^{k} dw_j^i \widetilde{Y^*}_j$. Substituting equation (2.3.5) into equation (2.3.3) yields the labor demand equation for the p^{th} firm.

$$\widetilde{L}_p = -(1-\alpha)\widetilde{W}_p + (1-\alpha)\widetilde{H}_p + \widetilde{A}_p + \beta\widetilde{Y} - \mu\Omega_i\widetilde{E}_j + \beta\Omega_i\widetilde{Y^*}_j \tag{2.3.6}$$

This equation shows that other things remaining constant, a depreciation of the trade-weighted real exchange rate increases labor demand because $\widetilde{E}_i < 0$.

However, other things will not remain constant because a depreciation of the real exchange rate will increase demand for labor in the whole industry and as a result of the industry-wide rise in demand for labor, the wages that this particular firm must pay will rise as well. To incorporate this we assume that all firms in the industry i pay the same wage rate w_i. In other words $w_p = w_i$. Moreover, we assume that workers can move from industry i to the rest of the economy. It means that some substitutability among the workers of industry i and the workers in the rest of the economy exists. With these assumptions, the labor supply function which firm p in industry i faces becomes:

$$L_p = (\frac{W_i}{\Gamma^\epsilon})^\gamma \tag{2.3.7}$$

where Γ is the wage rate prevailing in the rest of the economy, γ represents labor supply elasticity and ϵ shows the cross elasticity of the labor supply between industry i and the rest of the economy. Moreover, $\gamma > 0$ and $\epsilon < 0$. With this specification, the total differential of the log of labor supply function of the firm p is

$$\widetilde{L_p} = \gamma(\widetilde{W_i} - \epsilon\widetilde{\Gamma}) \tag{2.3.8}$$

Now for simplicity and to focus on the role of the real exchange rate, assume that $\widetilde{H_p}$, $\widetilde{Y}$ and $\widetilde{Y_i^*}$ are equal to zero. Further, all firms in industry i pay the same wage W_i. When we insert these values into equation (2.3.4), the labor demand function of the firm p becomes:

$$\widetilde{L_p} = \widetilde{A_p} - (1-\alpha)\widetilde{W_i} - \mu\Omega_i\widetilde{E_i} \tag{2.3.9}$$

To get industry-wide change in labor demand, let us assume that an industry i has n firms and relative employment size of the p_{th} firm of the industry i is φ_p^i, where $\Sigma_{p=1}^i = 1$. This specification gives industry-wide change in employment as:

$$\widetilde{L_i} = \sum_{p=1}^{n} \varphi_p^i \widetilde{L_p} \tag{2.3.10}$$

Similarly, define the weighted average of the proportional change in demand shock among the n firms in industry i, $\widetilde{A_i}$, as:

$$\widetilde{A_i} = \sum_{p=1}^{n} \varphi_p^i \widetilde{A_p} \tag{2.3.11}$$

Putting the value of $\widetilde{L_p}$ in equation (2.3.10) gives industry-wide change in labor demand, which is expressed as follows:

$$\widetilde{L_i} = \widetilde{A_i} - (1-\alpha)\widetilde{W_i} - \mu\Omega_i\widetilde{E_i} \tag{2.3.12}$$

Now set labor demand in the ith industry equal to labor supply in that industry to get $\widetilde{W_i}$ in terms of $\widetilde{E_i}$, $\widetilde{\Gamma}_i$ and $\widetilde{A_i}$. For this we substitute equation (2.3.8) in equation (2.3.12) and rearrange the resulting equation we get the following expression:

$$\widetilde{W_i} = \frac{\widetilde{A_i}}{(1-\alpha)+\gamma} + \frac{\gamma\varepsilon\widetilde{\Gamma}}{(1-\alpha)+\gamma} - \frac{\mu\Omega_i\widetilde{E_i}}{(1-\alpha)+\gamma} \tag{2.3.13}$$

Now we insert the value of $\widetilde{W_i}$ in equation (2.3.12) to get the final equation for $\widetilde{L_p}$ which shows the change in demand for labor of p^{th} firm in the i^{th} industry as a result of a shock to real exchange rate along with other shocks to the industry.

$$\widetilde{L_p} = (\widetilde{A_p} - \kappa\widetilde{A_i}) - \kappa\gamma\varepsilon\widetilde{\Gamma} - (1+\kappa)\mu\Omega_i\widetilde{E_i} \tag{2.3.14}$$

where $\kappa = \frac{(1-\alpha)}{(1-\alpha)+\gamma}$ and $1 \geq \kappa \geq 0$. This equation shows that p^{th} firm exhibits job creation if $\widetilde{L_p} > 0$ and job destruction if $\widetilde{L_p} < 0$. Furthermore, the solution shows that job creation or job destruction in a particular firm depends on an idiosyncratic shock specific to the firm, an aggregate shock to the industry which the firm belongs to, and a shock to other aggregate variables, such as $\widetilde{E_i}$ and $\widetilde{\Gamma}$. Equation (2.3.14) exhibits the likelihood that a rise in the real exchange rate increases job destruction while decreases in the real exchange rate boost job creation.

Equation (2.3.14) describes the relationship of job creation and job destruction to the real exchange rate and other idiosyncratic shocks for a single firm. To change this relationship for the entire industry we need job creation and job destruction rates for the

entire industry. Following Davis et al. (1996), we define job creation and job destruction rates for the whole industry as the size-weighted average rates of job creation and job destruction for all firms in that industry. Let S^+ be the set of firms that expand employment in a given period of time and S^- is the set of firms that contract employment in a given period of time. Also, define ϕ_+ as employment share of all the firms that expand employment in a given period of time relative to employment in the whole industry, and ϕ_- as employment share of all the firms that contract employment in a given period of time relative to employment in the industry.

$$\Phi_+ = \sum_{p \varepsilon S^+} \varphi_p \tag{2.3.15}$$

and

$$\Phi_- = \sum_{p \varepsilon S^-} \varphi_p \tag{2.3.16}$$

where $\Phi_+ \geq 0$, $\Phi_- \geq 0$ and $\Phi_+ + \Phi_- = 1$. Now using equation (2.3.14) and equation (2.3.15) we get job creation for the entire industry, which is

$$JC_i = \sum_{p \varepsilon S^+} \varphi_p[(\widetilde{A_p} - \kappa\widetilde{A_i}) - \kappa\gamma\varepsilon\widetilde{\Gamma} - (1+\kappa)\mu\Omega_i\widetilde{E_i}] \tag{2.3.17}$$

Further simplification of this equation gives

$$JC_i = -\Phi_+(\kappa\widetilde{A_i} + \kappa\gamma\varepsilon\widetilde{\Gamma} + (1+\kappa)\mu\Omega_i\widetilde{E_i}) + \sum_{p \varepsilon S^+} \varphi_p\widetilde{A_p} \tag{2.3.18}$$

This equation shows that all else remaining constant, a depreciation in the real exchange rate decreases job creation.

Similarly, job destruction for the entire industry is

$$JD_i = -\sum_{p \varepsilon S^+} \varphi_p[(\widetilde{A_p} - \kappa\widetilde{A_i}) - \kappa\gamma\varepsilon\widetilde{\Gamma} - (1+\kappa)\mu\Omega_i\widetilde{E_i}] \tag{2.3.19}$$

Further simplification of equation (2.3.19) gives

$$JD_i = \Phi_+(\kappa\widetilde{A_i} + \kappa\gamma\varepsilon\widetilde{\Gamma} + (1+\kappa)\mu\Omega_i\widetilde{E_i}) - \sum_{p \varepsilon S^+} \varphi_p\widetilde{A_p} \tag{2.3.20}$$

This equation shows that other things remaining the same, a depreciation in the real exchange rate increases job destruction.

Overall equations (2.3.18) and (2.3.20) suggest that fluctuations in the real exchange rate are associated with job flows. Holding other factors constant, appreciation of the real exchange adds to job creation and diminishes job destruction. Further, these equations suggest that the effect of exchange rate shocks on job creation and job destruction is more pronounced in more open industries.

2.3.2 Empirical Model

The theoretical model presented in the previous section gives a general framework for the econometric specification of our model. This section deals with the way to get a specific econometric specification of the model which allows us to test employment fluctuations in response to changes in the real exchange rate. The reduced form of the general framework with some modification gives the model we estimate to get empirical results regarding the effects of loss or gain in competitiveness in EU and non-EU markets on UK employment. Our empirical model is similar to that used by Moser et al. (2010), which is a modified reduced form of the Klein et al. (2003) model. **Moser et al. (2010) in their empirical model treat 32 trading partners of the Germany as one group while calculating the real exchange rate, whereas we treat 32 trading partners of the UK as one group while calculating the real exchange rate. In addition, we have bifurcated these 32 trading partners into European and non-European trading partners of the UK and have calculated the real exchange rate for each group. This bifurcation of the trading partners into European and non-European trading partners gives us an opportunity to check the impact to fluctuations in the real exchange rate of UK with European and non-European trading partners individually as well as in a group on employment in the UK manufacturing sector. Moser et al. (2010) use a real exchange rate based on trade weighted relative wage cost and have calculated by considering 32 trading partners as a one group their empirical model specification. Following Moser et al. (2010), in our analysis, we also use a real exchange rate based on trade weighted relative wage costs. However, we calculate a real exchange rate for three groups. This grouping is based on the trading partners of the UK and defined as under:**

- **First, we consider all 32 trading partners of the UK as one group to calculate the real exchange rate.**
- **Second, we consider only European trading partners of the UK as a group to calculate the real exchange rate.**
- **Third, we consider only non-European trading partners of the UK as a group to calculate the real exchange rate.**

Specifically, we can write the empirical models as follows.

$$\begin{aligned} Workerflow_{it} = {} & \beta_0 + \beta_1 Jobcreation_{it-1} + \beta_2 Jobdestruction_{it-1} + \beta_3 Avgwage_{it} \\ & + \beta_4 GDPgrowth_t + \beta_5 Salesgrowth_{it} + \beta_6 Competitiveness_{it} \\ & + \beta_7 Size_{it} + \mu_t + \epsilon_{it} \end{aligned} \tag{2.3.21}$$

where $i = industry$ and $t = time$

$Workerflow \in$ {Job Creation, Job Destruction, Net Flows, Gross Flows}

Since UK trade with European Union countries is free, whereas trade with non-European, especially with poor countries, is subject to various tariff and non-tariff barriers, therefore, the impact of exchange rate fluctuations on the trade of the UK with EU member countries and non-member countries is likely to differ. Moreover, real exchange rates can vary only with respect to European countries or only with respect to non-European countries and remain fixed with other countries. Therefore, the impact of loss/gain in competitiveness in European and non-European markets on the UK labor market may differ. Thus to model these situations, first, we divide the 32 trading partners into two groups, European trading partners and non-European trading partners, and instead of using competitiveness of the UK goods in the markets of 32 trading partners of the UK, in the above model, we use competitiveness of UK goods in the European market only as an independent variable to estimate the impact of the real exchange rate on employment in the UK manufacturing sector. The resulting model will estimate how employment in the UK manufacturing sector responds to the variations in real exchange rate of the UK with only European trading partners of the UK. In simple words, the new model will allow us to estimate the impact of real exchange rate changes on employment in the UK under a situation in which the UK only trades with the EU countries. Second, instead of using competitiveness of the UK goods in the markets of 32 trading partners of the UK in the above model we use competitiveness of UK goods in only non-European market as independent variable to estimate the impact of the real exchange rate on employment in the UK manufacturing sector. The resulting model will estimate how employment in UK manufacturing sector responds to the variations in real exchange rate of the UK with only non-European trading partners of the UK. In this case the new model will allow us to estimate the impact of the real exchange rate on the employment in the UK under a situation in which UK only trades with the non-EU countries. Third, instead of using competitiveness of the UK goods in the markets of 32 trading partners of the UK in the above model we use competitiveness of UK goods in European markets and non-European markets as independent variables to estimate the impact of the real exchange rate on employment in the UK manufacturing sector. Thus, in this case, the new model will allow us to estimate the impact of the real exchange rate on employment in the UK under a situation in which the UK trades with the EU

and non-EU countries at a time, but we assume that the fluctuations in the exchange rates of UK with EU countries do not affect the trade with non-EU countries or the other way round. In this case the empirical model takes the form as written below in equation (2.3.22)**.**

$$\begin{aligned} Workerflow_{it} = {} & \beta_0 + \beta_1 Jobcreation_{it-1} + \beta_2 Jobdestruction_{it-1} \\ & + \beta_3 Avgwage_{it} + \beta_4 GDPgrowth_t + \beta_5 Salesgrowth_{it} \\ & + \beta_6 Competitiveness(EU)_{it} + \beta_7 Competitiveness(non-EU)_{it} \\ & + \beta_8 Size_{it} + \mu_t + \epsilon_{it} \end{aligned} \tag{2.3.22}$$

In fact, world trading markets are interlinked with each other and the effects of a shock in one market may be transmitted to other markets. The linkages between the different markets may change the pattern of job flows in trading economies in response to a shock to the real exchange rate. In the same vein, a shock to UK trade with EU countries may change the volume of UK trade with non-EU countries or the other way round. Thus, we add an interaction term of EU and non-EU competitiveness in model (2.3.22) to capture the interaction between the EU and non-EU markets and their combined effect on changes in employment in UK manufacturing. The model (2.3.22) changes to equation (2.3.23) given below.

$$\begin{aligned} Workerflow_{it} = {} & \beta_0 + \beta_1 Jobcreation_{it-1} + \beta_2 Jobdestruction_{it-1} \\ & + \beta_3 Avgwage_{it} + \beta_4 GDPgrowth_t + \beta_5 Salesgrowth_{it} \\ & + \beta_6 Competitiveness(EU)_{it} + \beta_7 Competitiveness(non-EU)_{it} \\ & + \beta_8 Competitiveness(EU)_{it} \times Competitiveness(non-EU)_{it} \\ & + \beta_9 Size_{it} + \mu_t + \epsilon_{it} \end{aligned} \tag{2.3.23}$$

2.3.3 Construction of Variables

We use a procedure similar to that of Davis et al. (1996) to calculate job flows: job creation, job destruction, gross job flows and net job flows. Let the level of employment in a firm in period t is e_{ft} and Δe_{ft} is the change in employment between the period t and $t-1$. S^+ and S^- are the groups of firms with $\Delta e_{ft} > 0$ and $\Delta e_{ft} < 0$ respectively, in industry S. To get job creation, we add up all the changes in employment in S^+ group. For job destruction, we sum all the changes in employment in S^- group. The size of the firm x_{ft} is measured as the average employment between the period t and $t-1$, i.e. $x_{ft} = 0.5(e_{ft} + e_{ft-1})$. Accordingly, industry size is obtained by summing up average firm employment across the industry, i.e. $X_{st} = \sum x_{ft}$

With regard to job flow rates, job creation, and job destruction flow rates are calculated as the size-weighted average of the change in employment, using the formula given below.

$$JC_{st} = \sum_{f \epsilon S^{+}} g_{ft} \frac{x_{ft}}{X_{st}} \tag{2.3.24}$$

$$JC_{st} = \sum_{f \epsilon S^{-}} g_{ft} \frac{x_{ft}}{X_{st}} \tag{2.3.25}$$

where $g_{ft} = \frac{\Delta(eft)}{xft}$ is the growth rate of employment in firm f at time t. The sum of the job creation (JC) and job destruction (JD) gives total job reallocation or gross job flows (GFR) in the industry S and the difference of JC and JD gives net changes in the employment or net job flows (NFR) in the industry S.

Following Moser et al. (2010), we employ a real exchange rate index based on the wage cost of the firm as the explanatory variable in the model to capture how fluctuations in real exchange rates affect firms' employment decisions. The real exchange rate is measured as the UK's average hourly wage cost in manufacturing relative to the trade-weighted average hourly wage cost across the UK's trading partners as below:

$$\text{Real Exchange Rate} = (\text{Wage Cost})_t = \sum_{j \subset C} \frac{(\text{Hourly Wage Cost in UK})_t}{(\text{Hourly Wage Cost})_{jt}} \times \frac{(\text{Exports})_{jt}}{\sum_{i \epsilon C} (\text{Exports})_{it}}$$

In our analysis, a shock to the real exchange rate means a large increase/decrease in the hourly wage average cost in the UK manufacturing sector relative to the trade-weighted average wage cost across the UK's trading partners. Fluctuations in the real exchange rate affect employment through three channels namely the export channel, import channel and imported inputs channel. Note that, a rise in the real exchange rate means a rise in the cost of the production and reduction in the profitability of a firm if the prices of the products which it produces remain constant. The rise in real exchange rate may have no impact on the employment if a firm is ready to reduce its profit and does not increase the prices of its product when it faces the rise in relative wage cost. The firm may not increase the prices of its products if it expects that the rise in the real exchange rate is not permanent. But if a firm shifts all or a portion of the rise in the cost of production to the prices of the product it produces, then, the rise in the real exchange rate may lead to a reduction in employment. This reduction in employment in response to a rise in the real exchange rate can occur through any or all three channels given above.

In the export exposure channel, a rise in real exchange rate increases the prices of exports and reduces the demand for goods being sold in interna-

tional markets. Now firms have two choices: first, they can go for piling up their stocks and inventories and keep on producing their products at the level at which they were producing before the rise in real exchange rate. Second, if they do not increase their stocks and inventories and opt to reduce their output when they face a reduction in demand for their products in international markets. In the first case there will be no impact of a rise in the real exchange rate on employment but in the second case a rise in the real exchange rate reduces the employment. So the export exposure channel have negative impact of fluctuations in real exchange rate on employment. In the import exposure channel, a rise in the cost of production due to a rise in real exchange rate increases the prices of domestic products and makes imported products relatively cheaper. This again leads to a decrease in the demand for goods produced locally and increases the demand for imported goods. Particularly, the demand for goods whose cheaper imported substitutes are available will decrease leading to a decrease in output and employment of the domestic firms. So, the import exposure channel have negative impact of fluctuations in real exchange rate on employment.

In the imported input channel, a rise in real exchange rate makes the imported inputs cheaper. The firms can control the cost of production by using the imported inputs. In this case impact of a rise in real exchange rate on employment can be positive depending on the proportion of the imported inputs being used in the production process.

So the net effect of fluctuations in the real exchange rate on employment depends on the magnitudes of these three effects. However, in this chapter, we focus only on the export exposure channel of the impact of the fluctuations in the real exchange rate on employment because we do not have data on industry level imports and the use of imported inputs.

Although the fluctuations in the real exchange rate affect employment through three channels given above, we focus only on the export channel while estimating the impact of real exchange rate on employment in the UK manufacturing sector because we do not have the data on industry-level imports and the data on use of industry-level imported inputs.

The wage cost(real exchange rate) and job creation move in opposite directions. However, wage cost and job destruction move in the same direction. Therefore, we expect that an appreciation of the real exchange rate decreases the job creation rate and increases the job destruction rate. In addition, the real exchange rate as measured in the above formula indicates that for a given shock to the real exchange rate, employment fluctuates more in

the firms that have a higher export share. Thus, we expect that labor employed in the more open firms is more exposed to external shocks, such as swings in real exchange rates. Changes in the real exchange rates alter the relative prices and consequently, the competitiveness of firms in international markets changes. So, to calculate the competitiveness of the industry in the global market, we have interacted openness of the industry with changes in the real exchange rate from year t to $t-1$.

$$\text{Competitiveness}_{it} = \triangle(\text{Wage Cost})_t \times \text{Openness}_{it}$$

where, openness is defined as the average share of exports in total revenues in year t and $t-1$, and it is calculated by using the formula given below

$$\text{Openness}_{it} = \frac{1}{2} \sum_{\tau=t-2}^{t-1} \frac{\text{Exports}_{it}}{(\text{Total Revenues})_{it}}$$

We expect a positive coefficient of competitiveness for job creation and a negative coefficient for job destruction. Regarding the coefficients of competitiveness for gross and net job flows, we make no prior judgment. In the case of GDP growth rate and sales growth rate, we expect a positive coefficient for job creation and a negative coefficients for job destruction.

The other variables used in the analysis are defined as follows:

Hourly wage costs: Hourly compensation costs for production workers in U.S. dollars in country j in year t.

Exports: Exports from the UK to country j in year t. We use total UK exports to calculate real exchange rate. To calculate openness of the industry, we use firm level exports.

Real GDP growth: Nominal GDP growth in the UK in year t, deflated by consumer the price index.

Sales growth: Growth of total revenues from year $t-1$ to t.

Avg. wage: Total wage sum in reporting year t divided by total employment in year t.

2.3.4 Data Sources

The data used in this Chapter are taken from various sources. To calculate job creation, job destruction, gross job reallocation and net change in employment, firm-level data on employment are obtained from the Financial Analysis Made Easy (FAME) on-line data base. Firm level exports, sales, capital and wages and salaries are also extracted from the same source. **Researchers point out some problems with FAME data set, for example Harris and Li (2007) compared the Annual Respondents Database**

(ARD) and FAME data sets and report, the FAME database is unrepresentative of small- to medium-sized enterprises and therefore cannot produce results that can be generalized to the UK level. In pointing out that FAME is biased towards large enterprises Harris and Li (2007) define a firm as a small firm if it employs less than 13 employees, a firm as a medium firm if it employs between 13 and 66 employees and a firm as a large firm if it employs more than 66 employees. However, if we use the European Union definition of firms classification then FAME data gives a good representation of the small, medium and large firms. According to the European Classification of firms, a firm is termed as a small firm if it employs less than 50 people, a firm is termed as a medium firm if it employs 50 to 249 people and a firm is termed as a large firm if it employs 250 or more people. Moreover, many researchers like Faggio et al. (2010), Greenhalgh and Rogers (2006), Bridges and Guariglia (2008), Liu et al. (2000), Girma et al. (2008), Draca et al. (2008) and Greenaway et al. (2007) have used the data extracted from FAME database for their firm-level studies for the UK. Our sample size consists of firms of twenty two industries of the UK manufacturing sector. These 22 industries give a good representation of small, medium and large firms. Table 1 and Figure 1 show distribution of the firms into small, medium and large in each industry. Table 1 shows that the share of small and large firms are almost similar in most of the industries. Only in the cases of industries 16, 34 and 35 are the shares of large firms much higher than the share of small firms. However, the total number of firms in these industries is low, particularly in industry 16 the total number of firms is just 161. The share of medium sized firms in each industry is higher than the share of small and large firms in all the industries except in industry 16 in which the share of large firms is the higher than the share of medium and small firms.

The firm-specific information available at FAME gives us an opportunity to extend our analysis for exporting and non-exporting industries. To accomplish this purpose, we define an exporting industry as a group of firms in an industry who sell their product in international markets. In contrast, we define non-exporting industry as a group of firms in an industry who sell their products only in domestic markets. More precisely, the FAME data set allows us to capture the behavioral response of firms who are involved in international trade, and the firms who sell only in the domestic markets, to an exogenous shock.

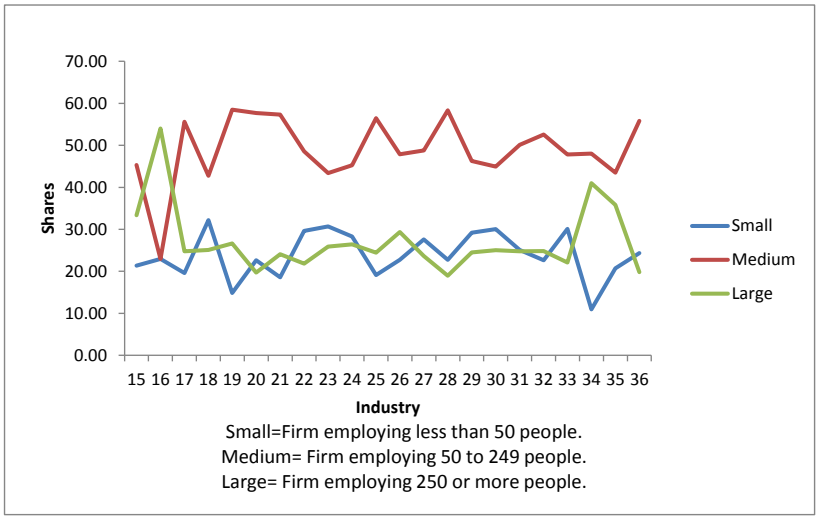
Another important variable which affects the decisions of firms regarding employment is the hourly wage cost. This is taken from the United States Bureau of Labor Statis-

Table 1: Distribution of Firms in 22 Industries of the UK Manufacturing Sector

	No. of Firms				Shares		
Industry	Total	Small	Medium	Large	Small	Medium	Large
15	12553	2682	5686	4185	21.37	45.30	33.34
16	161	37	37	87	22.98	22.98	54.04
17	3774	740	2099	935	19.61	55.62	24.77
18	2157	694	922	541	32.17	42.74	25.08
19	728	108	426	194	14.84	58.52	26.65
20	2986	676	1722	588	22.64	57.67	19.69
21	3727	692	2137	898	18.57	57.34	24.09
22	13454	3983	6534	2937	29.60	48.57	21.83
23	661	203	287	171	30.71	43.42	25.87
24	11296	3194	5115	2987	28.28	45.28	26.44
25	7630	1457	4309	1864	19.10	56.47	24.43
26	4298	978	2057	1263	22.75	47.86	29.39
27	4087	1128	1993	966	27.60	48.76	23.64
28	18416	4187	10743	3486	22.74	58.34	18.93
29	11525	3364	5334	2827	29.19	46.28	24.53
30	2264	680	1017	567	30.04	44.92	25.04
31	7739	1942	3879	1918	25.09	50.12	24.78
32	4217	954	2217	1046	22.62	52.57	24.80
33	5898	1775	2820	1303	30.09	47.81	22.09
34	3385	371	1626	1388	10.96	48.04	41.00
35	3059	633	1331	1095	20.69	43.51	35.80
36	14403	3509	8044	2850	24.36	55.85	19.79

According to European Classification of firms, a firm is termed as a small firm if it employs less than 50 people. a firm is termed as a medium firm if it employs 50 to 249 people and a firm is termed as a large firm if it employs 250 or more people.
UK SIC 2003 classification is used for industry classification coding. See Table A.7 in the Appendix A for industry code explanation.

Figure 1: Share of Firms in 22 industries of UK Manufacturing Sector



tics (BLS). BLS provides hourly wage costs for 32 countries from four different regions: Americas, Europe, Asia and Oceania. We have divided these 32 countries into two major

groups: European and non-European to measure how changes in wage costs in the UK relative to other countries affect employment in the UK manufacturing (see Table 2 for UK trading partners).

Table 2: The UK Major Trading Partners

No	European Trading partners	No	non-European Trading Partners
1	Austria	1	United States
2	Belgium	2	Brazil
3	Czech Republic	3	Mexico
4	Denmark	4	Australia
5	Finland	5	China, P.R: Hong Kong
6	France	6	Israel
7	Germany	7	Japan
8	Hungary	8	Korea Republic of
9	Ireland	9	New Zealand
10	Italy	10	Philippine
11	Luxembourg	11	Singapore
12	Netherlands	12	Sri Lanka
13	Norway	13	Canada
14	Poland		
16	Portugal		
17	Spain		
18	Sweden		
19	Switzerland		

Also note that the data on hourly wage costs are available only for these 32 countries. Further note that more than 80 percent of UK exports flow to these countries (see Table 3). More than 96 percent of UK total exports to European markets goes to the countries we have included in our sample. Similarly, more than 59 percent of total UK exports to non-European countries goes to the countries we have selected as non-European trading partners of the UK.

We have exploited hourly wage costs to calculate real exchange rates for the UK with other European and non-European countries and the competitiveness of the exports of the UK in European and non-European countries' markets. Details of the construction of the real exchange rate and competitiveness are given in the variable construction section. Other macroeconomic variables used in this study are the GDP growth rate and CPI. The data on GDP growth rate and CPI are extracted from World Development Indicator (WDI) 2009. Similarly, data on UK exports to her various trading partners are taken from the United Nations on-line data base; UN COMTRADE. This analysis covers the time period from 1999 to 2010.

Table 3: UK Export Share to EU and non-EU Countries

Year	EU Countries	non-EU Countries	Selected 32 Countries	Selected EU Countries	Selected non-EU Countries
1999	63.66	36.34	86.72	97.65	67.59
2000	62.06	37.94	86.61	97.49	68.80
2001	59.91	40.09	84.30	97.52	64.55
2002	61.36	38.64	85.13	97.33	65.77
2003	59.28	40.72	83.17	96.97	63.08
2004	57.93	42.07	81.54	96.82	60.52
2005	57.63	42.37	80.85	97.02	58.85
2006	60.81	39.19	81.83	96.83	58.56
2007	60.58	39.42	81.90	96.71	59.14
2008	59.78	40.22	80.84	96.54	57.51
2009	58.23	41.77	80.89	96.50	59.14

Note: See Table 2 for EU and non-EU trading partners of the UK.
All figures are in percentage.

2.3.5 At First Glance

Although our data cover only 12 years from 1999 to 2010, a relatively short time period, our variables of interest including the real exchange rate, GDP growth rate, employment, exports and sales exhibit considerable variations. Below we explain how the real exchange rate of the UK have behaved throughout the sample period and then we present the summary statistics of the other variables included in the model.

According to Cobham (2002) in the presence of separate currencies with variable exchange rates for different countries, the exchange rate is seen as an important adjustment mechanism and an important policy tool in transmitting/absorbing the effects of an external shock under the flexible exchange rate regimes. However, other researchers like Buiter (2000) point out that the exchange rate itself is a source of external asymmetric shocks therefore he prefers fixed exchange rate regimes and favors the fixed exchange rate and giving up the adjustment mechanism that works through flexible exchange rates.

The UK is a good example of the flexible and fixed exchange rate regimes because to be the part of European Monetary System (EMS) the UK entered into the European Exchange Rate Mechanism (ERM) program in October 1990 and adopted the fixed exchange rate system. However, the UK left the ERM program within two years in September 1992 and came back to flexible exchange rate regime because the pound sterling came under the pressure of speculators.

As the exchange rate of a country appreciates or depreciate and adjusts

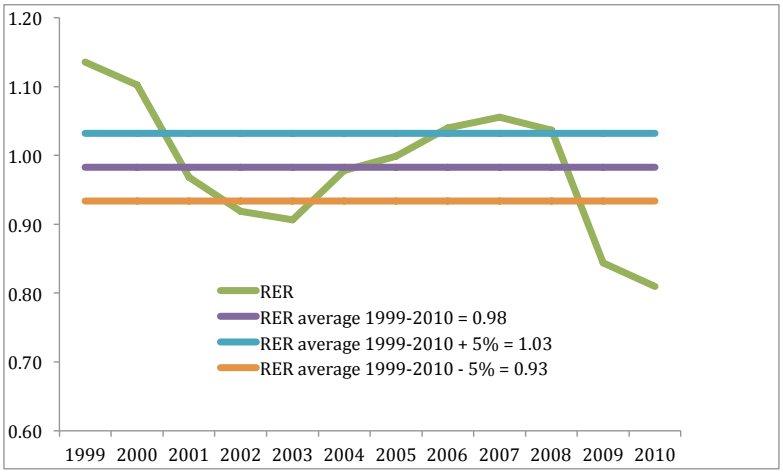
in short-run under the flexible exchange rate mechanism in response to the nature of an external shocks such as portfolio shock therefore it automatically move towards some long-run equilibrium. The overvalued valued currencies depreciate and undervalued currencies appreciate and move along their long-run equilibrium values. The large fluctuations in the values of a currency in terms of other currencies in which substantial deviations from the average value occurs are termed as the shock to the exchange rate.

Fluctuations in nominal exchange rates: value of currency of the country in terms of currency of another country, brings about changes in the real exchange rate: cost of foreign goods in terms of domestic goods. According to Cobham (2002) for UK, in short-run the causality runs from nominal exchange rate to real exchange rate and has marked the period of 1975 to 2000 as a period of strong depreciations in the nominal exchange rate of the UK. Moreover, he marked the trends of appreciations in the real exchange rate of the UK over the period from 1979 to 1981 and over the period from 1996 to 1998. During this period the fluctuations in the real exchange rate were similar to the changes in the nominal exchange rate, however, the changes in real exchange rates were preceded by the fluctuations in nominal exchange rates.

Since our objective is to measure the impact of the fluctuations in the real exchange rates on the employment in the UK manufacturing sector, therefore, we use the real exchange rate based on trade-weighted labor cost in UK manufacturing sector relative to labor costs in the manufacturing sectors of the trading partners of the UK. Figure 2 shows the wage costs in manufacturing sector based real exchange rate of the UK over the period of the 1999 to 2010. The trends in real exchange rate suggests the large overvaluation during the period from 1999 to 2001 and the large undervaluation during the period from 2008 to 2010. Wren-Lewis and Britain (2003) and Cobham (2006) reported that pound sterling was 16 percent overvalued against euro and 10 percent overvalued against the dollar in 2002. Furthermore, Cobham (2006) points out that these overvaluations of the sterling had an adverse impact on the tradable sector. Overall, Figure 2 and Figure 4 suggest that overvaluations of the sterling from 2006 to 2007 had adversely affected the UK exports. Similarly, the trends in real exchange rate also suggests the small undervaluation during the period from 2002 to 2003 and the small overvaluation during the period from 2006 to 2007. Overall, Figure 2 suggest that real exchange rate of the UK had been oscillating around its average value of the whole sample

period. The movements in the real exchange rate of the UK during 1999 to 2010 can be divided into three segments: first, the period of depreciation from 1999 to 2003, second, the period of appreciation from 2003 to 2007 and third, again the period of depreciation from 2007 to 2010.

Figure 2: Real Exchange Rate based on the Wage Costs in Manufacturing Sector of the UK from 1999 to 2010



However, Figure 3 shows that trade-weighted real exchange rate of the UK was relatively less volatile and had oscillated within the band of five percent around the mean value of the real exchange rates for the period starting from 1999 to 2008. The trend in trade weighted real exchange rate indicates the large undervaluation from 2008 and onward. According to Cobham (2002) the real exchange rate based on wage costs in manufacturing sector reflects the variations in the mark ups that affect the competitiveness of the UK goods traded in the global markets, therefore, the trends in real exchange rates shown in Figures 2 and 3 may indicate that the fluctuations in the competitiveness of the UK goods in international markets, which in turn affects the exports, output and employment.

Figures 4, 5, 6 and 7 show variations in real exports, real exchange rate with 32 trading partners, real exchange rate with non-EU trading partners and real exchange rate with EU trading partners.

Figures 4, 5, 7 and 18 in Appendix A show real exchange rate of the UK with 32 trading partners, with non-EU trading partners, with EU trading partners and with top 5 UK trading partners. Figures 4, 5 and 7 suggest that total exports and real exchange rate with 32 trading partners and real exchange rate with EU trading partners move in opposite directions. However, Figure 6 seems to suggest that total exports and the real exchange rate with non-EU trading partners move in same direction. This may be driven by the

Figure 3: Trade-weighted Real Exchange Rate of the UK from 1999 to 2010

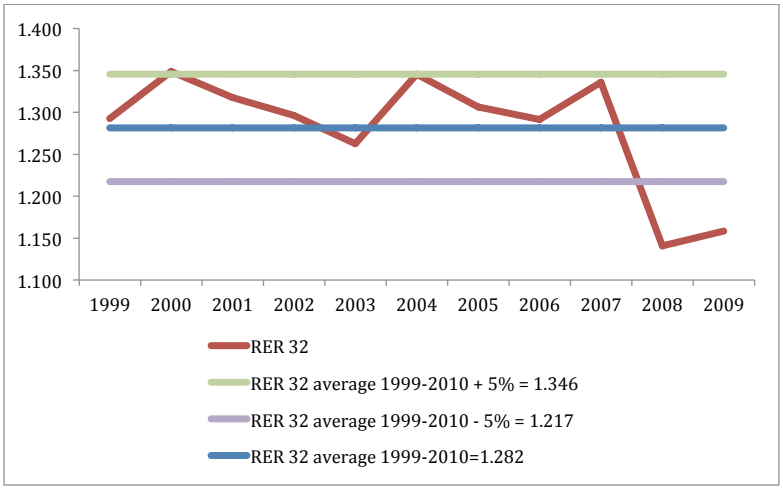
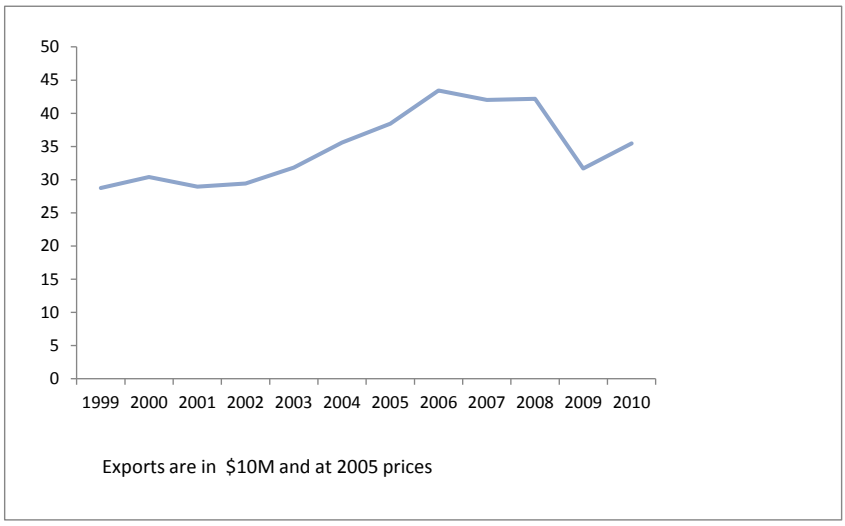


Figure 4: Total Exports of the UK from 1999 to 2010



fact that labor compensation cost in UK manufacturing sector is relatively low as compared to the EU and non-EU trading partners. Our measure of real exchange rate is based on compensation cost which in fact has risen over the time but remained less as compared to EU and non-EU trading partners of the UK. Figures 8,9 and 10 shows that compensation costs of the UK and its 5 major trading partners. The trend in these Figures shows that the UK is relatively a low cost country. Figure 10 shows that before 2003, hourly labor compensation cost in the UK was low as compared to compensation costs in non-EU trading partners but higher as compared with the compensation costs in EU trading partners. From 2003 to 2007 labor compensation cost in UK was similar to its trading partners but after 2007 it has become higher in both EU and non-EU trading partners of the UK. Comparing Figures 5, 6, 7 in the main text and Figure 16 in Appendix A suggests that the real exchange rate and average

Figure 5: UK's Real Exchange Rate with selected 32 Trading Partners from 1999 to 2010

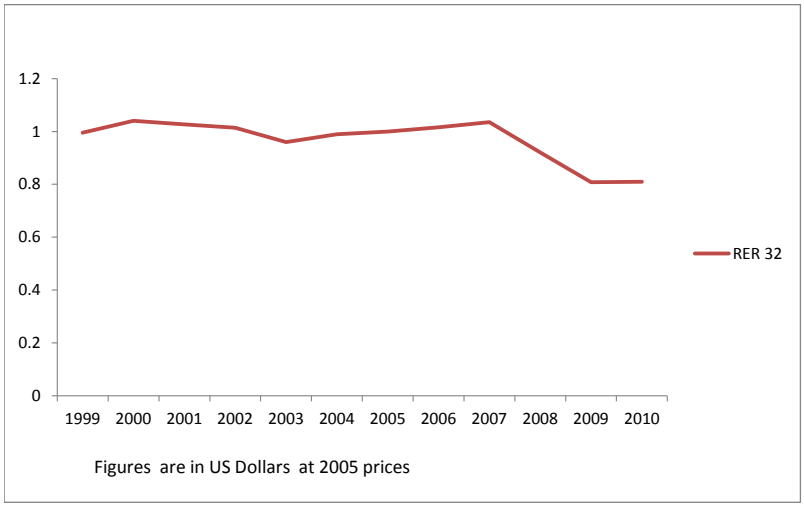
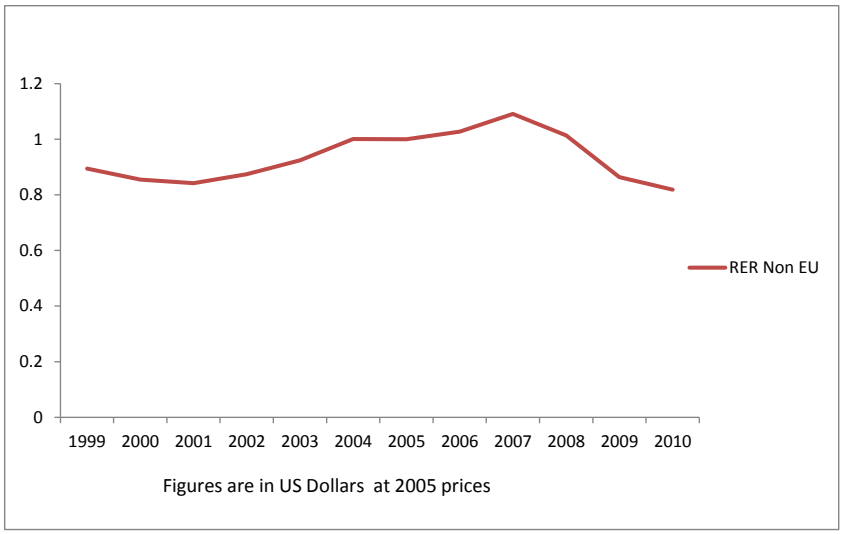


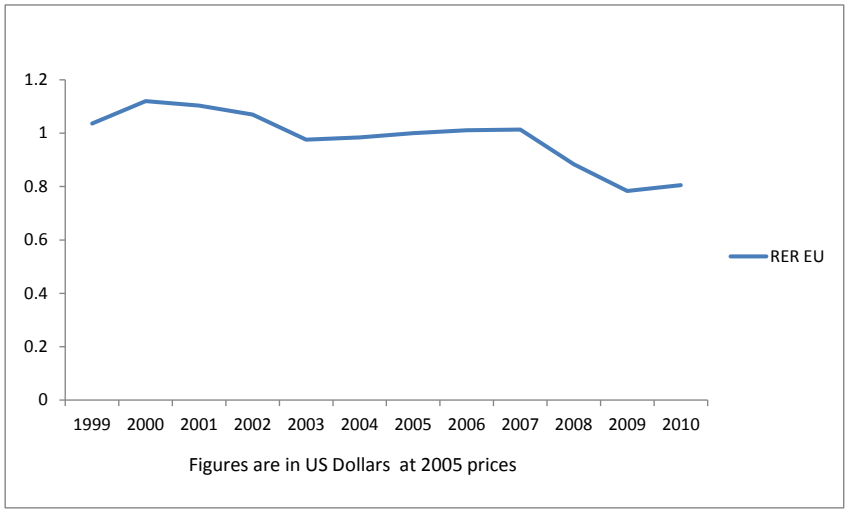
Figure 6: UK's Real Exchange Rate with selected non-EU Trading Partners from 1999 to 2010



export shares in total sales move in opposite directions, and that the real exchange rate appears a prominent variable in explaining current export shares in total sales. The trend in the real exchange rate and export shares in total sales suggests that real exchange rate fluctuations precede changes in export shares in total sale. So, in the light of these figures we can say that UK manufacturing industries may sign future export contracts on the basis of the current real exchange rate.

Figure 17 in Appendix A displays average employment in the UK manufacturing sector. In the light of Figure 17 in the Appendix A, we can see that average employment in this sector steadily decreased over time. Specifically, the continuous downward trend in average employment in the last decade seems to suggest that average employment is uncorrelated with the real exchange rate. However, when we split the manufacturing sector

Figure 7: UK's Real Exchange Rate with selected EU Trading Partners from 1999 to 2010



into exporting and non-exporting industries, the trends in average employment shows its linkages with the real exchange rate more clearly. For instance, the appreciation in the real exchange rate in the late nineties is escorting the decline in employment in exporting industries and the rise in employment in non-exporting industries in 2000.

Table 4: Summary Statistics (All Industries)

Year	Total Employment	GDP Growth	Sales Growth	Export Share	Job Creation	Job Destruction	Net Flows	Gross Flows
1999	375320	3.47		27.54				
2000	388528	3.92	17.84	27.66	6.37	15.61	-9.24	21.99
2001	403820	2.46	18.46	19.67	5.03	9.41	-4.39	14.44
2002	390478	2.10	0.37	20.50	4.59	9.37	-4.78	13.95
2003	370680	2.82	12.19	19.67	3.20	8.62	-5.43	11.82
2004	352289	2.76	1.29	22.26	4.09	6.42	-2.33	10.52
2005	339726	2.17	6.85	17.58	4.75	6.97	-2.22	11.72
2006	333018	2.85	0.62	19.77	4.96	6.09	-1.13	11.05
2007	326934	2.56	4.42	18.24	4.91	5.66	-0.74	10.57
2008	325298	0.55	13.42	17.74	5.82	5.00	0.82	10.81
2009	270298	-4.92	-141.54	31.30	2.34	7.19	-4.85	9.53

Note: See Table 2 for EU and non-EU trading partners of the UK.
All figures except total employment are in percentage.

Figure 8: Average Hourly Compensation Cost in Manufacturing Sectors of the UK and UK's top 5 Trading Partners from 1999 to 2010

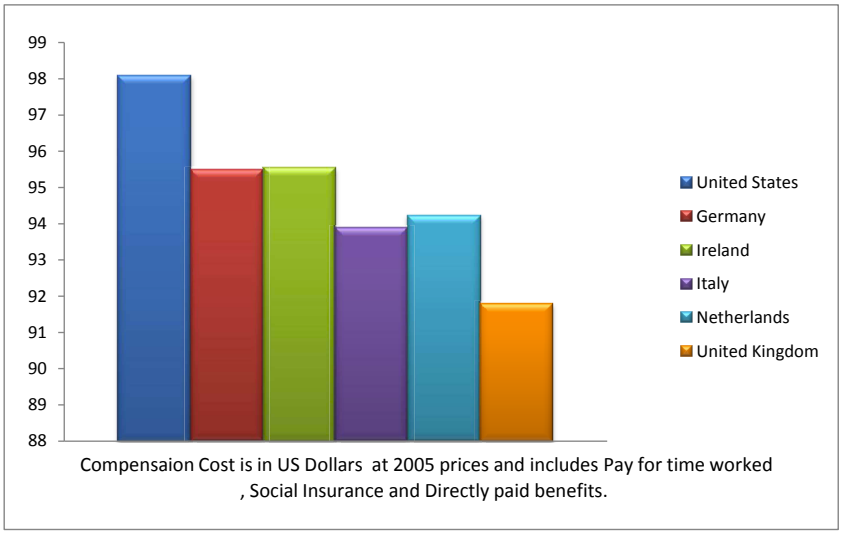


Figure 9: Hourly Compensation Cost in Manufacturing Sectors of the UK and UK's Trading Partners from 1999 to 2010

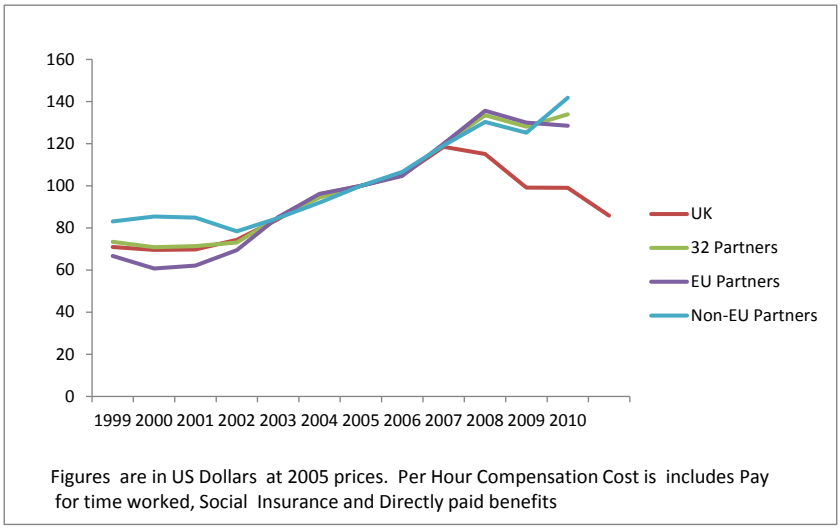


Figure 10: Hourly Compensation Cost in Manufacturing Sectors of the UK and UK's top 5 Trading Partners from 1999 to 2010

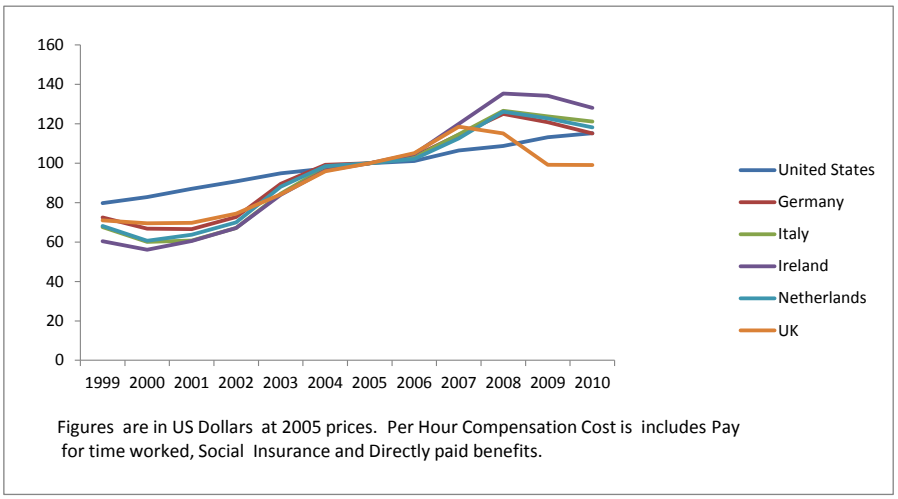


Table 5: Summary Statistics (Exporting Industries)

Year	Total Employment	GDP Growth	Sales Growth	Export Share	Job Creation	Job Destruction	Net Flows	Gross Flows
1999	190213	3.47		48.21				
2000	217847	3.92	14.32	49.34	7.30	7.47	-0.16	14.77
2001	199208	2.46	-15.68	45.95	4.54	8.57	-4.02	13.11
2002	206181	2.10	8.87	47.01	7.48	11.08	-3.59	18.56
2003	196554	2.82	-133.17	48.48	3.63	6.66	-3.03	10.29
2004	188833	2.76	7.74	49.40	3.36	6.91	-3.55	10.27
2005	184639	2.17	-54.86	48.25	5.05	5.12	-0.07	10.17
2006	174848	2.85	1.57	50.94	5.18	5.33	-0.15	10.51
2007	171241	2.56	0.16	50.77	5.60	3.78	1.82	9.38
2008	165619	0.55	4.88	52.55	5.68	4.26	1.42	9.95
2009	161019	-4.92	-6.65	56.78	2.97	7.41	-4.44	10.39

Note: See Table 2 for EU and non-EU trading partners of the UK.
All figures except total employment are in percentage.
Note that we define an exporting industry as the group of firms in an industry that sell all or a portion of their output in foreign markets. Moreover, if a firm exports in some years and does not export in other years, in this case we include this particular firm in exporting firms' group in the years in which it has sold all or a portion of its output in foreign markets, and in all other years we include this particular firm in non-exporting firms' group because this firm's exports are zero in these years.

Table 6: Summary Statistics (Non-Exporting Industries)

Year	Total Employment	GDP Growth	Sales Growth	Job Creation	Job Destruction	Net Flows	Gross Flows
1999	185107	3.47					
2000	170681	3.92	13.66	4.80	26.39	-21.59	31.19
2001	204611	2.46	33.56	6.49	10.04	-3.55	16.52
2002	184298	2.10	-1.14	3.31	7.53	-4.22	10.85
2003	174126	2.82	11.92	3.19	11.12	-7.93	14.31
2004	163456	2.76	-10.09	5.29	6.88	-1.58	12.17
2005	155087	2.17	13.88	4.46	9.27	-4.81	13.72
2006	158170	2.85	-23.85	4.86	7.45	-2.58	12.31
2007	155693	2.56	8.85	4.50	9.10	-4.61	13.60
2008	159679	0.55	14.44	8.69	6.44	2.25	15.13
2009	109278	-4.92	-305.86	1.92	7.77	-5.85	9.69

Note: See Table 2 for EU and non-EU trading partners of the UK.
All the figures except total employment are in percentage.
Note that we define non-exporting industry as the group of a firms in an industry that do not sell their out put in the foreign markets.

Table 7: Average Job Creation, Job Destruction , Net Flows, Gross Flows, Sales, Exports and Wages in UK Manufacturing Industries from 1999-2010

Industry Code	JC	JD	NF	GF	Sale	Export	Wages
15	50983.08	95592.34	-44609.25	146575.4	3697189	171874.6	122165.1
16	5597.333	3591.583	2005.75	9188.917	291182.3	60399.43	14601.97
17	5803.333	11071.58	-5268.25	16874.92	96932.39	20055.54	12565.97
18	4503.417	8552	-4048.583	13055.42	70634.84	7543.109	7467.337
19	892.1667	2388.5	-1496.333	3280.667	40240.04	7230.404	3196.646
20	2846.833	8060.167	-5213.333	10907	85744.76	4543.737	8847.788
21	3799.417	9297.667	-5498.25	13097.08	506284.3	36815.36	22395.56
22	22281.5	34270	-11988.5	56551.5	1260667	178784.6	100786.7
23	3445.333	7741.083	-4295.75	11186.42	2321497	504470.7	58681.81
24	18202.83	50266.42	-32063.58	68469.25	3272974	411923.3	119461.8
25	8148.583	20784.83	-12636.25	28933.42	480903.2	74528.7	36091.47
26	8039.583	26072.25	-18032.67	34111.83	1543351	62480.46	34576.44
27	6096.75	11961.67	-5864.917	18058.42	390737.8	142946.2	30326.74
28	36356.33	54847.42	-18491.08	91203.75	995959.7	297853.5	126096.8
29	26240.75	58231.42	-31990.67	84472.16	1107337	426489.7	127410.9
30	7200.083	6551.25	648.8333	13751.33	783334.3	62050.59	26499.78
31	15751.67	35525.25	-19773.58	51276.92	605052.3	144426.8	54367.87
32	14031.17	13341.83	689.3333	27373	711675.7	238626.1	46822.89
33	16995.83	21788.42	-4792.583	38784.25	566316.6	201236.1	61050.16
34	7424.75	22025	-14600.25	29449.75	492274.6	92554.8	42116.74
35	14638.58	11589.75	3048.833	26228.33	406481.1	205955.2	68437.18
36	17701.67	28204.67	-10503	45906.33	685707.6	106033.4	68424.65

UK SIC 2003 classification is used for industry classification coding.
Wages, Sales and Exports are at 2005 prices.
see Table A.7 in the appendix for industry code explanation

Table 8: UK Real Exchange Rate with Selected Countries

Year	Selected 32 Countries	Selected EU Countries	Selected non-EU Countries
1999	0.996	1.036	0.894
2000	1.040	1.120	0.855
2001	1.027	1.103	0.842
2002	1.014	1.070	0.874
2003	0.960	0.976	0.924
2004	0.989	0.984	1.000
2005	1.000	1.000	1.000
2006	1.015	1.011	1.028
2007	1.035	1.013	1.091
2008	0.921	0.884	1.013
2009	0.808	0.784	0.864
2010	0.809	0.805	0.819

Note: See Table 2 for selected EU and non-EU trading partners of the UK.
Real exchange rate figures are calculated using 2005 as base year.

It seems that in the early 2000s, fluctuations in the real exchange rate are followed by the shifting of resources from exporting industries to non-exporting industries. Thus, the fall of employment in trading industries appears to be absorbed by non-trading industries. However, after 2002 employment in both the exporting and non-exporting industries falls which gives the impression that the UK manufacturing sector is contracting. Moreover, summary statistics given in Tables 4, 5, 6 and 7 also show that UK manufacturing sector is contracting. Employment growth in all the industries except industries 16, 30, 32, and 35 net employment is negative. Table 7 indicates that 18 out of 22 industries of the UK manufacturing sectors show a decline in average employment. Tables 4, 5, 6, 7 and 8 indicate that the impact of the real exchange rate on aggregate employment is small. So, the summary statistics given in Tables 4, 5, 6, 7 and 8, and the trends in Figures 4, 5, 6 and 7 given above and Figures 16 and 17 in Appendix A reveal that the employment and real exchange rate are interconnected and labor adjustment cost driven by the exchange rate is worthy of analysis. Industry-wise exports are shown in Figure 19 in Appendix A. Figure 19 in Appendix A indicates that the industrial exports of the UK manufacturing sector vary across the industries and over the time. Particularly the exports of the industries 15, 16, 17, 20, 21, 22, 23, 26, 30 and 32 show a considerable variations in their sales in the foreign markets.

2.3.6 Estimation of the Model

The models proposed in equations (2.3.21), (2.3.22) and (2.3.23) are the dynamic panel models in which the current realization of the job flows are influenced by the previous period job flows. These models are first order autoregressive (AR1) panel data models because only the first lag of the dependent variable appears as an explanatory variable in the models. The general form of first order autoregressive (AR1) panel data models can be written as follows:

$$y_{it} = \sum_{i=1}^{\rho} \alpha_i y_{i,t-1} + \beta_0 + \beta_1 x_{it} + \beta_2 z_{it} + \mu_i + \tau_t + \varepsilon_{it} \tag{2.3.26}$$

where $t = 1 + \rho, ..., T$ years, $i = 1, ..., N$ industries, y_{it} is the job flow rate in industry i at time t, x_{it} is a vector of pre-determined control variables, z_{it} is a vector of other exogenous variables, μ_i is an unobserved time-invariant industry-specific fixed effects, τ_t is time specific fixed effects and ε_{it} is an error term. α_i, ı=1,.....,ρ and β_j, j=0,1,2 are the regression coefficients with $|\sum \alpha_i| \leq 1$. Blundell and Bond (1998) focused on initial conditions to estimate the parameters of dynamic models such as this. In these initial conditions which implies that moment restrictions are sufficient to estimate α_i for $T \geq 3$ Blundell and Bond (1998) assume that μ_i and ε_{it} are independently distributed across the i and have the familiar error components structure in which $E[\mu_i] = 0$, $E[\varepsilon_{it}] = 0$,

$E[\mu_i \varepsilon_{it}] = 0$, for $t = 1 + \rho, ..., T$ years, $i = 1, ..., N$ industries. They also assumed that error ε_{it} are serially uncorrelated and that the initial conditions y_{it} are predetermined. That is $E[\varepsilon_{it}\varepsilon_{is}] = 0$ for $i = 1, ..., N$ and $s \neq t$ and $E[y_{i1}\varepsilon_{it}] = 0$ for $t = 2, ..., T$ years, $i = 1, ..., N$ industries.

Estimating such a dynamic regression model of industrial job flow rates controlling for different possible determinants on a panel of heterogeneous industries may raise econometric problems which need to be care of while estimating these models. These problems include:

- Omitted variable or time invariant industry specific characteristics (fixed effects) μ_i may be correlated with the explanatory variables and cause biased estimation.
- The idiosyncratic disturbance term ε_{it} may have individual specific pattern of heteroscedasticity.
- Due to shorter time and larger industry dimension of the panel data, a shock to industry specific effects may not dissipate with time and hence cause significant correlation of y_{it-1} with the error term.
- Besides y_{it-1}, some other regressors may be endogenous and thus may be correlated with the error term in the regression.

All these problems make OLS estimates biased and inconsistent. Particularly the endogeneity of $y_{i,t-1}$ to the industry specific fixed effect μ_i makes $y_{i,t-1}$ correlated with error term and ultimately makes OLS estimates upward biased and inconsistent (Presbitero, 2008). Therefore, a possible solution to get consistent estimates is Generalized Method of Moments (GMM) which takes care of these issues when estimating the dynamic panel model. Specifically, Arellano and Bover (1995) / Blundell and Bond (1998) propose System GMM to estimate the dynamic panel model such as given in equation in 2.3.26. Basically, System GMM estimate the dynamic panel model using a system of two simultaneous equations, one in levels and other in first differences. Moreover, System GMM uses instruments while estimating the regression model, where the instrument used in level equations are lagged first differences and instruments used in first difference equation are lagged levels of the series. Through this System GMM controls for potential endogeneity problem and controls for possible correlation between the unobserved, time invariant cross-section specific effects and any of the explanatory variable and gives consistent estimates. Solomon (2010) describes three advantages of using System GMM estimator to estimate the dynamic panel model.

- First, System GMM controls for the potential endogeneity arising from the explanatory variables in the model.

- Second, System GMM control for the possible correlation between the unobserved, time invariant cross-section specific effects and any of the explanatory variable.

- Finally, System GMM is good in dealing with short and persistent data sets and it does not suffer from the weak instrument problem which could arise from such a data set.

2.4 Empirical Results

2.4.1 All Industries

This section discusses the results for all industries of the UK manufacturing sector. From all industries of the UK manufacturing sector we mean that when we estimate the empirical model using the data of 22 industries of the UK manufacturing sectors included in our sample. Table 9 reports the estimation results when the dependent variable is net job flows. Column 1 contains the results when we consider 32 trading partners of the UK as one group while calculating the real exchange rate. This column shows how employment responds to variations in the real exchange rate of the UK with major trading partners of the UK. Column 2 shows the results when we consider only selected European trading of the UK as one group while calculating the real exchange rate. Column 3 shows the results when we consider only selected non-European trading of the UK as a one group while calculating the real exchange rate. Column 4 shows the results when we consider real exchange rate of the UK with both European and non-European trading partners of the UK simultaneously. Column 5 displays the results when we consider real exchange rate of the UK with both European and non-European trading partners along with their interaction. All the remaining tables presented in this section are structured similarly except that they contain as the dependent variables job creation, job destruction and gross job flows, respectively. We have estimated these models using the Blundell and Bond (1998) dynamic panel estimation technique, generally known as System GMM and our main variable of interest, competitiveness, is assumed to be predetermined.

Now we discuss our findings one by one in the light of the results presented in Tables 9, 10, 11 and 12. Our first result highlights the response of net job flows to the variations in competitiveness. Columns 1, 2 and 3 of Table 9 shows that the coefficient of competitiveness is negative and statistically significant. Thus, columns 1, 2 and 3 of Table 9 indicate that a rise in competitiveness[1] significantly reduces the net job flows in the UK manufacturing sector.

[1]Our variable competitiveness is combination of the real exchange rate based on trade weighted relative wages and openness of the industry, therefore, when we say rise in competitiveness variable it means UK products are becoming less competitive in international markets due to the rise in relative wage cost of the UK products.

Table 9: Net Job Flows in Manufacturing Sector of the UK (All Industries)

	Dependent Variable: Net Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	(-0.363)**	(-0.403)***	(-0.512)***	(-0.372)**	(-0.413)**
	(0.172)	(0.151)	(0.165)	(0.147)	(0.174)
L. Job Destruction	(-0.558)***	(-0.424)**	(-0.337)*	(-0.351)**	-0.244
	(-0.165)	(0.171)	(0.184)	(0.14)	(0.168)
Average Wage	(-0.833)	-0.516	-0.260	-0.183	-0.055
	(0.601)	(0.548)	(0.596)	(0.619)	(0.702)
GDP Growth	0.004**	0.003*	0.003*	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	(-0.027)*	(-0.029)***	(-0.035)**	(-0.030)**	(-0.036)**
	(0.014)	(0.013)	(0.016)	(0.0146)	(0.019)
Competitiveness	(-0.520)**				
(32 Partners)	(0.249)				
Competitiveness		(-0.539)**		-0.107	0.530
(EU Partners)		(0.252)		(0.333)	(0.48)
Competitiveness			(-0.352)***	(-0.282)*	(-0.391)**
(non-EU Partners)			(0.118)	(0.168)	(0.171)
Competitiveness					0.001*
(Interaction)					(0.001)
Constant	0.056*	0.040*	0.038*	0.028	0.022
	(0.024)	(0.022)	(0.021)	(0.028)	(0.021)
Arellano AR(2) Probability	0.120	0.172	0.500	0.265	0.640
Hansen Test Probability	0.720	0.963	0.931	0.535	0.998
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Specifically, net job flow rates are reduced by 0.520, 0.539 and 0.352 units, with a one unit rise in the competitiveness of the UK with respect to 32 trading partners, with respect to EU trading partners and with respect to non-EU trading partners respectively. Since the competitiveness variable is a combination of the real exchange rate and openness, therefore, these results imply that a rise in the real exchange rate significantly reduces net employment in the UK manufacturing sector and this effect is more intensive in the industries that export more. Moreover, an increase in the real exchange rate significantly decreases net employment in UK manufacturing sector whether we consider the real exchange rate of the UK with respect to selected 32 trading partners, the real exchange rate of the UK with respect to selected EU trading partners or the real exchange rate with respect to selected non-EU trading partners. So, the real exchange rate affects net job flows in the UK manufacturing sector negatively and significantly whether we consider 32 trading partners as a group to calculate the real exchange rate, or we split these 32 trading partners into EU and non-EU trading partners and consider them as an individual group

to calculate the real exchange rate, and consider UK trade with only one group at a time.

The UK has trade ties with the EU and non-EU countries and UK exports are going to EU and non-EU countries at the same time though the volume of exports going to EU trading partners is considerably higher than the volume of exports going to non-EU trading partners. Moreover, the wage cost of the UK relative to EU countries and relative to non-EU countries also varies. Therefore, the impact of a change in the real exchange rate of the UK with respect to EU countries may differ from the impact of a change in the real exchange of the UK with respect to non-EU countries. To test this we have divided the 32 trading partners into EU and non-EU trading partners and calculated the real exchange rates and competitiveness for each group and have included the competitiveness of the UK in EU markets and the competitiveness of the UK in non-EU markets simultaneously in the model. The results of this model are reported in column 4 of Table 9. The coefficients of Competitiveness (EU Partners) and Competitiveness (non-EU Partners) indicate that Competitiveness (EU Partners) and Competitiveness (non-EU Partners) both affect the net job flows in the UK manufacturing sector negatively. However, Competitiveness (non-EU Partners) significantly reduces net job flows in the UK and Competitiveness (EU Partners) plays an insignificant role in determining the net employment in the UK. This implies that when we consider the real exchange rate of the UK with EU countries and the real exchange rate of the UK with non-EU countries then a rise in the real exchange rate of the UK with non-EU countries significantly reduces the employment in the UK. This also implies that a rise in wage costs of the UK relative to non-EU countries is detrimental to employment in the UK. However, a rise in wage costs of the UK relative to the EU countries is insignificant in explaining employment in the UK. This may due to the fact that UK is relatively more low cost than non-European trading partners and relatively less low cost as compared with European trading partners (see Figures 8 and 9 for the cost comparison).

Similarly, column 5 of the Table 9 shows the results when we add the interaction of the Competitiveness (EU Partners) and Competitiveness (non-EU Partners) in the model. The idea behind including this interaction terms was to test whether the fluctuations in competitiveness of UK goods in EU markets affects the competitiveness of UK goods in the non-EU markets or the other way round and ultimately affect the job flows in the UK or not. Results reported in column 5 of the Table 9 once again indicate that a rise in competitiveness of the UK in non-EU markets significantly determines net employment in the UK whereas a rise in competitiveness of the UK in EU markets does not affect net employment in the UK. However, the positive and significant coefficient of the interaction terms indicates that the fluctuations in competitiveness of the UK goods in EU markets affects the competitiveness of UK goods in the non-EU markets or the other way round

and significantly increases job flows in the UK. This also indicates that the rise in the competitiveness in the non-EU markets leads to increase in the jobs that firms that export their products to the EU countries, and vice versa.

The elasticity of net employment in UK manufacturing sector to competitiveness with respect to 32 trading partners is about seven percent(0.06). Similarly, the elasticity of net employment in UK manufacturing sector to competitiveness with respect to European trading partners is seven percent(0.09). However, the elasticity of net employment in UK manufacturing sector to competitiveness with respect to non-European trading partners is relatively less and it is four percent(0.02). These elasticities shows that other things remaining the same, one percent change in the competitiveness leads to less than one percent changes in the net employment in the UK manufacturing sector.

Since we define competitiveness as a product of the real exchange rate (trade weighted wage cost of the UK relative to its trading partner) and openness (average share of exports in total sales in last two years), therefore, our negative coefficients of the competitiveness imply that a rise in the wage cost of the UK relative to its trading partners reduces employment in the UK manufacturing sector. This effect becomes intensive for firms with larger export shares. Note that this finding does not change whether we consider all 32 sample trading partners of the UK or when we divide these 32 trading partners into European and non-European trading partners of the UK and use European or non-European only or both at a time as a separate group (see Columns 1, 2, 3 and 4 in Table 9) or when we consider or European and non-European trading partners both simultaneously and along with their interaction (see Columns 4 and 5 in Table 9).

However, the coefficient of competitiveness (EU trading partners) in Column 2 of the Table 9 is bigger than the coefficient of competitiveness (non-EU trading partners) in Column 3 of the Table 9. This finding suggests that as compared to a shock to UK competitiveness in non-EU markets, a shock to UK competitiveness in EU markets affects employment in the manufacturing sector of the UK more significantly. The difference in the effect of a change in competitiveness of the UK with regard to European and non-European countries on net employment exists because the UK exports more relatively to European countries (see, Table 3). Moreover, as displayed in Column 4, when we take into account European and non-European trading partners of the UK simultaneously, then, a rise in UK competitiveness relative to non-European countries significantly reduces net employment. This result suggests that employment in the UK is more sensitive to fluctuations in exchange rates of the UK with non-European countries despite the fact that the share of UK exports going to non-European countries is lower than the share of UK exports going to the European countries.

Furthermore, Table 9 shows that firm-specific variables like average wages and the firm

size reduces the net jobs flows. However, a rise in average wages significantly decreases the net job flows in the UK manufacturing sector. The coefficient of the average wage ranges from -1.009 to -0.562 depending on the model specification. This implies that firms cut down their staff when they face a higher wage cost. Moreover, the negative coefficients of size in all the models we have estimated show that net job flows decreases with an increase in the size of a firm. Although, all the coefficients of size variable are statistically insignificant, they indicate that the jobs in the bigger firms are relatively more stable than the small firms.

Another important determinant of the net job flows in the UK is the GDP growth rate. Column 1, 2, 3, 4 and 5 of the Table 9 show that the coefficients of GDP growth are positive and statistically significant. The coefficient of the GDP growth rate almost remains 0.002 what ever the specification of the model we estimate. This implies that as the GDP of the UK rises net jobs increase in the UK. This also indicates that during the periods of prosperity employment increases and during the slump time employment in the UK decreases.

Now we discuss our findings highlighting the response of job creation to the variations in competitiveness. Columns 1, 2 and 3 of Table 10 show that the coefficient on competitiveness is negative and statistically significant. Thus, columns 1, 2 and 3 of Table 10 indicate that a rise in competitiveness significantly reduces job creation in the UK manufacturing sector. Specifically, job creation rates are reduced by 0.432, 0.412 and 0.290 units with a one unit rise in the competitiveness of the UK with respect to 32 trading partners, with respect to EU trading partners and with respect to non-EU trading partners respectively. Since the competitiveness variable is a combination of the real exchange rate and openness, therefore, these results imply that a rise in the real exchange rate significantly reduces new job opportunities in the UK manufacturing sector and this effect is more intensive in those industries that export more. Moreover, an increase in the real exchange rate significantly hinders job creation in the UK manufacturing sector whether we consider the real exchange rate of the UK with respect to selected 32 trading partners, the real exchange rate of the UK with respect to selected EU trading partners or the real exchange rate of the UK with respect to selected non-EU trading partners of the UK. So, the real exchange rate affects job creation process in the UK manufacturing sector negatively and significantly whether we consider 32 trading partners as a group to calculate the real exchange rate, or we split these 32 trading partners into EU and non-EU trading partners and consider them as an individual group to calculate real exchange rate, and consider UK trade with only one group at a time.

The results reported in the column 4 of the Table 10 show that the coefficients of the Competitiveness (EU Partners) and Competitiveness (non-EU Partners) indicates that

Competitiveness (EU Partners) and Competitiveness (non-EU Partners) both affect the job creation in the UK manufacturing sector negatively.

Table 10: Job Creation in Manufacturing Sector of the UK (All Industries)

	Dependent Variable: Job Creation Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	(-0.189)*	-0.122	(-0.231)***	(-0.221)***	(-0.225)***
	(0.105)	(0.1)	(0.094)	(0.081)	(0.085)
L. Job Destruction	-0.108	(-0.218)*	-0.082	-0.089	-0.102
	(0.09)	(0.118)	(0.081)	(0.083)	(0.1)
Average Wage	(-0.715)**	(-1.009)***	(-0.562)*	(-0.598)*	(-0.733)**
	(0.288)	(0.317)	(0.029)	(0.307)	(0.366)
GDP Growth	0.002*	0.002*	0.002**	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Size	-0.003	-0.003	-0.005	-0.004	-0.009
	(0.015)	(0.014)	(0.015)	(0.015)	(0.016)
Competitiveness	(-0.432)***				
(32 Partners)	(0.145)				
Competitiveness		(-0.412)***		-0.129	-0.037
(EU Partners)		(0.156)		(0.221)	(0.351)
Competitiveness			(-0.290)***	(-0.249)***	(-0.229)**
(non-EU Partners)			(0.065)	(0.1)	(0.108)
Competitiveness					0.0002
(Interaction)					(0.001)
Constant	0.074**	0.086**	0.074***	0.074***	0.080***
	(0.015)	(0.017)	(0.013)	(0.013)	(.016)
Arellano AR(2) Probability	0.160	0.368	0.119	0.117	0.120
Hansen Test Probability	0.960	0.864	0.997	0.998	0.991
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

However, Competitiveness (non-EU Partners) significantly reduces job creation rates in the UK and Competitiveness (EU Partners) plays an insignificant role in determining new employment opportunities in the UK. This implies that when we consider the real exchange rate of the UK with EU countries and the real exchange rate of the UK with non-EU countries then a rise in the real exchange rate of the UK with non-EU countries significantly reduces new job opportunities in the UK. This also implies that a rise in wage costs of the UK relative to non-EU countries is detrimental to employment generation in the UK. However, a rise in wage costs of the UK relative to the EU countries is insignificant in explaining new job creations in the UK. This may due to the fact that UK is relatively more low cost than non-European trading partners and relatively less low cost as compared with European trading partners (see Figures 8 and 9 for the cost comparison).

Similarly, results reported in column 5 of Table 10 once again indicate that a rise in

competitiveness of the UK in non-EU markets significantly determine job creation in the UK whereas the a rise in competitiveness of the UK in EU markets does not affect job creation in the UK. However, the positive and significant coefficient of the interaction term indicates that the fluctuations in competitiveness of UK goods in EU markets affect the competitiveness of UK goods in the non-EU markets or the other way round and significantly increase job opportunities in the UK. This also indicates that the rise in competitiveness in the non-EU markets leads to increase in jobs in the firms that export their products to the EU countries, and vice versa.

The negative coefficients on competitiveness in the Table 10 imply that a rise in the wage cost of the UK relative to its trading partners decreases new employment opportunities in the UK manufacturing sector. This effect becomes intensive for firms with larger export shares. Once again note that this finding does not change whether we consider all 32 sample trading partners of the UK or when we divide these 32 trading partners into European and non-European trading partners of the UK and use European or non-European only or both at a time as a separate group (see Columns 1, 2, 3 and 4 in Table 10) or when we consider or European and non-European trading partners both simultaneously and along with their interaction (see Columns 4 and 5 in Table 10).

However, the coefficient on competitiveness (EU trading partners) in Column 2 of the Table 10 is bigger than the coefficient on competitiveness (non-EU trading partners) in Column 3 of the Table 10. This finding suggests that as compared to a shock to UK competitiveness in non-EU markets, a shock to UK competitiveness in EU markets affects new jobs opportunities in manufacturing sector of the UK more significantly. Moreover, as displayed in Column 4, when we take into account European and non-European trading partners of the UK simultaneously, then, a rise in UK competitiveness relative to non-European countries significantly reduces job creation. This result suggests that job creation in the UK is more sensitive to fluctuations in exchange rates of the UK with non-European countries.

Furthermore, Table 10 shows that firm specific variables like average wages and firms size, and job creation move in opposite direction. However, a rise in average wages significantly decreases job creation in the UK manufacturing sector. The coefficient on the average wage ranges from -1.009 to -0.562 depending on the model specification. This implies that firms cut down recruitment of new staff when they face higher wage costs. Moreover, the negative coefficients on size in all the models we have estimated show that job creation decreases with an increase in the size of a firm. Although, all the coefficients of a variable named size are statistically insignificant, they indicate the stability of the jobs in the bigger firms.

Another important determinant of job creation in the UK is the GDP growth rate.

Column 1, 2, 3, 4 and 5 of the Table 10 show that the coefficients on GDP growth are positive and statistically significant. The coefficient of GDP growth almost remains 0.002 whatever the specification of the model we estimate. This implies that as the GDP of the UK rises job creation also increases in the UK. This also indicates that during the times of economic prosperity when GDP increases, the employment opportunities in the UK also increases and during slumps when GDP declines, the employment opportunities in the UK decrease as well.

Table 11: Job Destruction in Manufacturing Sector of the UK (All Industries)

	Dependent Variable: Job Destruction Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	0.068	0.061	0.093	-0.046	-0.049
	(0.174)	(0.171)	(0.178)	(0.155)	(0.155)
L. Job Destruction	0.283**	0.289**	0.254*	0.332**	0.320**
	(0.126)	(0.125)	(0.129)	(.143)	(0.146)
Average Wage	-0.664	-0.650	-0.744	-0.566	-0.541
	(0.609)	(0.608)	(0.606)	(0.5)	(0.491)
GDP Growth	(-0.002)*	(-0.002)*	(-0.002)*	(-0.002*)	(-0.002)*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.024	0.024	0.026	0.018	0.019
	(0.018)	(0.018)	(0.018)	(0.019)	(0.02)
Competitiveness	0.087				
(32 Partners)	(0.156)				
Competitiveness		0.075		0.038	-0.307
(EU Partners)		(0.18)		(0.217)	(0.365)
Competitiveness			0.082	0.017	0.057
(non-EU Partners)			(0.078)	(0.121)	(0.133)
Competitiveness					-0.001
(Interaction)					(0.001)
Constant	0.055***	0.055***	0.057***	0.057***	0.057
	(0.02)	(0.02)	(0.02)	(0.017)	(0.016)
Arellano AR(2) Probability	0.162	0.151	0.204	0.143	0.162
Hansen Test Probability	0.663	0.473	0.443	0.984	0.991
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table 11 shows the results regarding the response of job destruction to variations in the competitiveness and other key variables affecting job destruction. Columns 1, 2, 3, 4 and 5 of Table 11 show that the coefficients on competitiveness are positive and statistically insignificant. This implies that fluctuations in competitiveness do not play any role in explaining job destruction in the UK manufacturing sector. In other words, in response to fluctuations in the real exchange rate firms in the UK manufacturing sector do not fire their workers. This also indicates that firms in the UK manufacturing sector retain their

trained workers when they face a rise in wage costs relative to wage costs in the trading partners of the UK.

Columns 1, 2, 3, 4 and 5 of Table 11 indicate that job destruction in UK manufacturing sector is mainly determined by the GDP per capita and the previous period job destructions. An increase in the GDP significantly reduces the job destructions. The coefficients of GDP remain almost -0.002 whatever the model specification we adopt to estimate the response of job destruction. This implies that during a period of prosperity the rate of job destruction is significantly decreased. The coefficients of GDP remain almost -0.002 whatever the model specification we adopt to estimate the response of job destruction. Moreover, the previous period job destruction also significantly explains current period job destruction. The coefficients of lagged job destruction range from -0.254 to 0.334 in different models we have estimated to estimate the responses of job destruction to different variables. Furthermore, results reported in Table 11 indicate that average wages and firm size do not play any role in explaining job destruction in the UK manufacturing sector.

Table 12 shows the results regarding the gross flows of jobs in the UK manufacturing sector. Columns 1, 2, 3, 4 and 5 of the Table 12 indicate that the coefficients on competitiveness are negative and insignificant in the entire set of models we have estimated. This implies that fluctuations in competitiveness do not explain variations in gross flows of employment in the UK manufacturing sector. In other words, we can say that fluctuations in the real exchange rates of the UK do not affect the gross flow of jobs in the UK manufacturing sector. Table 12 shows that gross flows of employment in the UK manufacturing sector are mainly driven by average wage costs, previous period job creations and previous period job destructions. The coefficients of the previous period job creation and previous period job destructions are positive and significant which implies that previous period job flows are really important in determining current period gross job flows in UK manufacturing sector. The coefficients of the previous period job creation ranges from 0.228 to 0.435 in the models we have estimated. Similarly, the coefficients of the previous period job creation ranges from 0.277 to 0.337 in the models we have estimated. Moreover, Columns 1, 2, 3, 4 and 5 of Table 12 show that coefficients of the average wage are negative and statistically significant in the entire set of models we have estimated. This implies that a rise in average wages reduces gross flows of the jobs in the UK manufacturing sector significantly. This decrease in the gross job flows in response to a one unit increase in the average wage ranges from -1.173 to -1.582 depending on the model's specification.

Overall, results reported in Tables 10 and 11 explain the adjustment process in net employment. Our findings suggest that the adjustment process in net employment to a real exchange rate led fluctuations in competitiveness works through job creation.

The results in Tables 10 and 11 confirm this observation. Table 10 shows that compet-

Table 12: Gross Job Flows in Manufacturing Sector of the UK (All Industries)

	Dependent Variable: Gross Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	0.417*	0.435*	0.370	0.228	0.229
	(0.245)	(0.245)	(0.236)	(0.22)	(0.255)
L. Job Destruction	0.284*	0.277	0.310*	.337**	.334**
	(0.164)	(0.167)	(0.158)	(0.151)	(0.154)
Average Wage	(-1.329)**	(-1.363)**	(-1.173)*	(-1.580)*	(-1.582)*
	(0.624)	(0.639)	(0.651)	(0.817)	(0.869)
GDP Growth	0.000	0.000	0.000	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Sales Growth	0.001	0.001	0.002	0.005	0.005
	(0.007)	(0.007)	(0.007)	(0.01)	(0.01)
Size	0.016	0.016	0.014	0.014	0.014
	(0.025)	(0.024)	(0.025)	(0.028)	(0.029)
Competitiveness	-0.137				
(32 Partners)	(0.187)				
Competitiveness		-0.103		0.073	0.076
(EU Partners)		(0.213)		(0.282)	(0.391)
Competitiveness			-0.107	-0.129	-0.129
(non-EU Partners)			(0.1)	(0.111)	(0.111)
Competitiveness					0.000
(Interaction)					(0.001)
Constant	0.095***	0.096***	0.094***	0.110***	0.110***
	(0.026)	(0.026)	(0.026)	(0.03)	(0.03)
Arellano AR(2) Probability	0.683	0.683	0.644	0.651	0.653
Hansen Test Probability	0.884	0.884	0.888	0.716	0.655
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

itiveness affects job creation significantly and Table 11 shows that competitiveness affects job destruction insignificantly. Keeping in mind the definition of competitiveness, in the light of results presented in these two tables we may infer that a shock to the real exchange rate disturbs only job creation. Considering the way we have calculated the real exchange rate, another interpretation of the result is that the rise in UK wage costs relative to its trading partners hinders the creation of new jobs but does not affect existing jobs in the UK manufacturing sector. This result also implies that a rise in the wage cost of the UK relative to its trading partners reduces new job opportunities in the UK manufacturing sector but does not affect the existing jobs in the UK manufacturing sector. This effect becomes intensive for firms with larger export shares. This finding does not change whether we consider all 32 sample trading partners of the UK or when we divide these 32 trading partners into European and non-European trading partners of the UK and use European

or non-European only or both at a time as a separate group (see Columns 1, 2, 3 and 4 in Tables 10 and 11) when we consider or European and non-European trading partners both simultaneously and along with their interaction (see Columns 4 and 5 in Tables 10 and 11).

Based on the results given in Tables 10 and 11 we can say that in response to a shock to competitiveness, net employment in UK manufacturing sector adjusts through job creation. Moser et al. (2010) reports similar findings for Germany, a comparatively more restricted labor market compared with the UK. This finding seems to be in contrast with the findings of Klein et al. (2003) for the USA labor market which appears to adjust through job destruction in response to a shock to the real exchange rate. The difference in the adjustment process in response to fluctuations in the real exchange rate in UK and USA labor markets might be due to the following three reasons. First, there is a difference in definition of the real exchange rate,Klein et al. (2003) use real exchange rate based on prices, whereas we use real exchange rate based on trade weighted relative wages. Second, we use different definition of the openness, Klein et al. (2003) use ratio sum of imports and exports to total out as a measure of openness, whereas we use average share of exports in total sales in previous two years as a measure of openness. Third, we use a different data set to analyze to the impact of real exchange rate on employment. We have used UK manufacturing sector data whereas Klein et al. (2003) have used US manufacturing sector data to estimate the impact of exchange rate on employment.

Our finding that the reaction of job creation and job destruction to a shock in competitiveness is not the same for the UK is in line with the existing literature for other European countries like Germany and France. Using establishment level data, Moser et al. (2010) find that the reaction of job creation and job destruction to real exchange rate changes is asymmetric for Germany. Similarly, Abowd et al. (1999) report that exogenous shocks other than the real exchange rate affect job creation more than job destruction. However, our estimates for job creation and job destruction are higher than the coefficients estimated by Moser et al. (2010). So our results suggest that UK labor market adjustment is larger than in the German labor market. In fact, our findings are comparable with the findings of Burgess and Knetter (1998) for the United States, Canada and the United Kingdom that indicate that employment adjusts more quickly in response to a shock to the real exchange rate while German and Japanese employment are insensitive to shocks to the real exchange rate.

Once again our finding that job creation and job destruction behave differently in response to a shock in competitiveness does not change with the change of the specification of the model. Fluctuations in competitiveness affect job creation significantly and job destruction insignificantly whether we consider competitiveness with regard to all (32 in

our sample) trading partners of the UK or take into account competitiveness with regard to EU or non-EU trading partners only. Columns 1, 2 and 3 in Tables 10 and 11 support this observation. Furthermore, changes in competitiveness foster only job creation even when we check the effect of competitiveness of the UK with regard to non-EU trading partners of the UK controlling for the effect of competitiveness of the UK with respect to EU trading partners (see Columns 4 and 5 in Tables 10 and 11).

The asymmetric reaction of job creation and job destruction in response to a shock in competitiveness may indicate that firms in the UK manufacturing sector do not want to lose their trained workers, at least in the short run. However, these firms do not offer new jobs if they lose their competitiveness in world markets. This behavior of firms may be behind the active response of job creation and non-responsiveness of job destruction to a shock to competitiveness.

Our third result emphasizes the response of employment to temporary shocks other than competitiveness shocks such as GDP and sales growth. The results presented in Tables 9, 10 and 11 show that temporary shocks to GDP growth significantly affect job flows in UK manufacturing. A negative shock to GDP growth significantly reduces job creation and net job flows and significantly increases job destruction. This seems to suggest that employment in the UK responds to shocks and adjusts according to the nature of the shock. Workers laid off in the bad times are rehired in good times.

In contrast to the results of Moser et al. (2010) that GDP growth and sales growth do not affect job flows, we found that GDP growth increases job flows. This finding indicates that the UK employment market appears to respond to market forces while the German labor market does not exhibit such responses. Moreover, our results do not change when we change the model specification, considering all 32 partners, European, non-European or both together and without their interaction (see Columns 1, 2, 3 and 4 in Tables 9, 10 and 11).

Our fourth result highlights the effects of variations in average wage costs and job flows. Tables 9, 10, 11 and 12 indicate that a rise in average wage costs (represented with average wage in the results tables) significantly decreases net job flows, job creation and gross job flows but does not explain job destruction. This result indicates that in response to a rise in average wage cost firms do not lay off their existing workers, however, they may be reluctant to hire new workers.

Another potential implication of this finding is that an increase in average wages benefits only those workers who remain in their jobs or who have succeeded in getting a job. However, an increase in average wages is detrimental to unemployed labor because unemployed workers have to bear the cost of higher wages in terms of lower jobs opportunities available and longer spells of unemployment. This finding is again comparable to that of

Moser et al. (2010) for Germany, a rise in average costs significantly reduces job creation but does not affect job destruction. Our findings show that a rise in average costs significantly reduces gross job flows and job creation but does not affect job destruction, these do not change with the change in specification. Columns 1, 2, 3 and 4 in Tables 10, 11 and 12 confirm this observation.

Finally, we find that the larger the size of the firm, the lesser will be net job flows and job creation (see Table 9). However, the coefficients are very small. This implies that bigger firms discourage job creation and try to absorb the temporary rise in demand. On the other hand, smaller firms have less capacity to bear the shock so they lay off their workers in bad times and rehire them in good times. This behavior of smaller firms raises their contribution toward net job flows. In other words, in the UK manufacturing sector smaller firms contribute more to net job flows. Hijzen et al. (2010) report similar results for smaller firms for the UK using data over the period from 1997 to 2008. From Columns 1, 2, 3 and 4 of Table 9 we can say that our finding that bigger firms contribute less towards net job flows is robust and does not change with the change in model specification.

The results we have discussed above are robust and do not alter with the changes in model specification. They remain consistent when we consider all 32 major trading partners of the UK, when we take into account only European trading partners or when we use data on the non-European trading partners of the UK in our specification. The changes in the model specification slightly alter the value of the parameters but signs and statistical significance of the parameters do not change.

2.4.2 Exporting Industries

The results discussed so far show that a rise in UK wage costs relative to its trading partners significantly reduces net employment overall in the UK manufacturing sector. Moreover, the adjustment process in employment works through job creation. In this section, we report the results of only exporting industries of the UK manufacturing sector. **we define an exporting industry as the group of firms in an industry which sell all or a portion of their output in foreign markets. Moreover, if a firm exports in some years and does not export in other years, in this case we consider this particular firm exporting firms group only in the years in which it has sold all or a portion of its output in foreign markets. The year in which this particular firm's exports are zero, in that year we consider this firm in non-exporting firms group.** Table 13 describes the results for net job flows in exporting industries which are quite similar to the results for net job flows in UK manufacturing as a whole.

Now we discuss our findings one by one in the light of the results presented in Tables

Table 13: Net Job Flows in Manufacturing Sector of the UK (Exporting Industries)

	Dependent Variable: Net Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	(-0.163)*	(-0.171)*	0.111	0.238	0.230
	(0.096)	(0.096)	(0.137)	(0.153)	(0.159)
L. Job Destruction	-0.548	-0.564	(-0.594)**	(-0.706)**	(-0.740)**
	(0.393)	(0.393)	(0.241)	(0.303)	(0.366)
Average Wage	-0.007	-0.019	0.086	-0.012	-0.016
	(0.074)	(0.075)	(0.121)	(0.132)	(0.123)
GDP Growth	0.005***	.005***	.007***	.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Sales Growth	-0.003	-0.004	-0.007	-0.005	-0.005
	(0.011)	(0.012)	(0.009)	(0.009)	(0.009)
Size	0.008	0.009	0.097	0.095	0.094*
	(0.071)	(0.071)	(0.059)	(0.052)	(0.053)
Competitiveness	(-0.273)*				
(32 Partners)	(0.141)				
Competitiveness		(-0.288)*		-0.201	-0.277
(EU Partners)		(0.153)		(0.246)	(0.537)
Competitiveness			(-0.134)*	-0.019	-0.005
(non-EU Partners)			(0.077)	(0.13)	(0.179)
Competitiveness					-0.973
(Interaction)					(4.918)
Constant	0.016	0.019	-0.032	-0.012	-0.009
	(0.031)	(0.032)	(0.041)	(0.046)	(0.042)
Arellano AR(2) Probability	0.997	0.998	0.931	0.938	0.923
Hansen Test Probability	0.943	0.973	0.803	0.709	0.777
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

13, A.1, A.2, and reftab:Table A3 in Appendix A. The result given in Table 13 highlights the response of net job flows in exporting industries of the UK manufacturing sector to the variations in competitiveness. Columns 1, 2 and 3 of Table 13 show that the coefficient on competitiveness is negative and statistically significant. Thus, columns 1, 2 and 3 of Table 13 indicate that a rise in competitiveness significantly reduces net job flows in exporting industries of the UK manufacturing sector. Specifically, net job flow rates are reduced by 0.273, 0.288 and 0.134 units, with a one unit rise in the competitiveness of the UK with respect to 32 trading partners, with respect to EU trading partners and with respect to non-EU trading partners respectively. Since the competitiveness variable is a combination of the real exchange rate and openness, therefore, these results imply that a rise in the real exchange rate significantly reduces net employment in exporting industries of the UK manufacturing sector and this effect becomes more intensive in the industries that

export more. Moreover, an increase in the real exchange rate significantly decreases net employment in exporting industries of the UK manufacturing sector whether we consider the real exchange rate of the UK with respect to selected 32 trading partners, real exchange rate of the UK with respect to selected EU trading partners or real exchange rate of the UK with respect to selected non-EU trading partners of the UK. So, real exchange rate affects net job flows in exporting industries of the UK manufacturing sector negatively and significantly whether we consider 32 trading partners as a group to calculate the real exchange rate, or we split these 32 trading partners into EU and non-EU trading partners and consider them as an individual group to calculate real exchange rate, and consider UK trade with only one group at a time.

The UK has trade ties with the EU and non-EU countries and UK exports are going to EU and non-EU countries at the same time though the volume of exports going to EU trading partners is considerably higher than the volume of exports going to non-EU trading partners. Moreover, the wage cost of the UK relative to EU countries and relative to non-EU countries also varies. Therefore, the impact of a change in the real exchange rate of the UK with respect to EU countries differs from the impact of a change in the real exchange of the UK with respect to non-EU countries. The results given in column 4 of the Table 13 provides the evidence for this observation. The coefficients of Competitiveness (EU Partners) and Competitiveness (non-EU Partners) indicate that Competitiveness (EU Partners) and Competitiveness (non-EU Partners) both affect the net job flows in the UK manufacturing sector negatively. However, both the coefficients are insignificant statistically which indicates that Competitiveness (non-EU Partners) and Competitiveness (EU Partners) play an insignificant role in determining net employment in the exporting industries of the UK. This implies that fluctuations in the real exchange rate of the UK with EU countries and with non-EU countries do not affect employment in exporting industries of the UK. Furthermore, this finding indicates that a rise in wage costs of the UK relative to EU and non-EU countries decreases net employment in the exporting industries of the UK. However, this decrease in the net employment is insignificant. This may be due to the fact that UK is relatively more low cost than non-European trading partners and relatively less low cost as compared with European trading partners (see Figures 8 and 9 for the cost comparison).

Similarly, column 5 of the Table 13 shows the results when we add the interaction of the Competitiveness (EU Partners) and Competitiveness (non-EU Partners) in the model which indicate that neither competitiveness of the UK in non-EU markets nor the competitiveness of the UK in EU markets affect the net employment in the exporting industries of the UK. However, the negative and significant coefficient of the interaction terms in column 5 of the Table 13 indicates that the fluctuations in competitiveness of

the UK goods in EU markets do not affect the competitiveness of the UK goods in the non-EU markets or the other way round and also have no role in explaining the net job flows in exporting industries of the UK.

Since we define competitiveness as the product of the real exchange rate (trade weighted wage cost of the UK relative to its trading partner) and openness (average share of exports in total sales in last two years), therefore, our negative coefficients on competitiveness imply that a rise in the wage cost of the UK relative to its trading partners reduces employment in exporting industries of the UK manufacturing sector. This effect becomes intensive for firms with larger export shares. Note that this finding does not change whether we consider all 32 sample trading partners of the UK or when we divide these 32 trading partners into European and non-European trading partners of the UK and use European or non-European only or both at a time as a separate group or when we consider or European and non-European trading partners both simultaneously and along with their interaction (see Columns 1, 2, 3, 4 and 5 in Table 13).

However, the coefficients are significant only in the first three models. Moreover, the coefficient on competitiveness (EU trading partners) in Column 2 of the Table 13 is bigger than the coefficient on competitiveness (non-EU trading partners) in Column 3 of the Table 13. This finding suggests that as compared to a shock to UK competitiveness in non-EU markets, a shock to UK competitiveness in EU markets affects employment in exporting industries of the UK manufacturing sector more significantly. The difference in the effect of a change in competitiveness of the UK with regard to European and non-European countries on net employment exists because the UK exports more relatively to European countries (see, Table 3).

Furthermore, Table 13 shows that firm specific variables like average wages and firm size do not affect net jobs flows in exporting industries of the UK manufacturing sector. However, a rise in average wages decreases the net job flows in the UK manufacturing sector. The coefficient on the average wage ranges from -0.007 to -0.086 depending on the model specification. This implies that firms cut down their staff when they face a higher wage cost. Another important determinant of the net job flows in exporting industries of the UK is the GDP growth rate. Column 1, 2, 3, 4 and 5 of the Table 13 show that the coefficients of GDP growth are positive and statistically significant. The coefficients of the GDP growth rates range from 0.005 to 0.007 depending on the model specification. This implies that as the GDP of the UK rises the net jobs increase in exporting industries of the UK. This also indicates that macroeconomic prosperity increases the employment in the exporting industries of the UK and vice versa.

The results presented in Table 13 show that a rise in competitiveness significantly decreases net employment in the exporting industries of UK manufacturing. This implies

that a rise in the real exchange rate trims down jobs in exporting industries of the UK manufacturing sector. This impact is more intensive for more open firms. In other words employment is more sensitive to fluctuations in the real exchange rate for firms who trade more. This observation is robust and does not change with the change in trading partners of the UK. Columns 1, 2 and 3 of Table 13 show that a negative relationship between net job flows and competitiveness holds whether we consider all 32 trading partners of the UK or when we focus on only European or non-European trading partners of the UK.

Another finding regarding the effect of a shock to competitiveness on net job flows, which Table 13 displays, is that a shock to the competitiveness of the UK in EU countries market is more detrimental to net job flows in exporting industries of the UK manufacturing sector than to a shock in competitiveness of the UK in non-EU country markets. Columns 2 and 3 of Table 13 show that a rise in competitiveness in EU countries' markets reduces net employment three times more as compared to the reduction in employment in response to a rise in competitiveness in non-EU countries. In other words, net employment in exporting industries of the UK manufacturing sector is more sensitive to a shock in competitiveness in EU markets than to a shock in competitiveness in non-EU markets. Higher sensitivity of net job flows in exporting industries to a shock in competitiveness in EU markets as compared to a shock in competitiveness in non-EU markets is due the fact that about 60 percent of the exports of the UK goes to EU countries (see Table 3).

Now we discuss our findings highlighting the response of job creation in exporting industries of the UK manufacturing sector to variations in competitiveness. Columns 1, 3 and 4 of Table A.1 in Appendix A show that the coefficient on competitiveness is negative and statistically significant. Thus, Columns 1, 3 and 4 of Table A.1 in Appendix A indicate that a rise in competitiveness significantly reduces job creation in exporting industries of the UK manufacturing sector. Specifically, job creation rates are reduced by 0.174, 0.105 and 0.097 units with a one unit rise in the competitiveness of the UK with respect to 32 trading partners and with respect to non-EU trading partners respectively. Since the competitiveness variable is a combination of the real exchange rate and openness, therefore, these results imply that a rise in the real exchange rate significantly reduces the new job opportunities in the UK manufacturing sector and this effect is more intensive in the industries those exports more. Moreover, an increase in the real exchange rate significantly hinders job creation in the UK manufacturing sector whether we consider the real exchange rate of the UK with respect to selected 32 trading partners or real exchange rate of the UK with respect to selected non-EU trading partners of the UK. However, the coefficient on competitiveness (EU partners) is negative but statistically insignificant which implies that fluctuations in the real exchange rate do not explain variations in new job creation in the exporting industries of the UK manufacturing sector. So, the real

exchange rate affects job creation process in the UK manufacturing sector negatively and significantly whether we consider 32 trading partners as a group to calculate the real exchange rate, or we split these 32 trading partners into EU and non-EU trading partners and consider them as an individual group to calculate the real exchange rate, and consider UK trade with only one group at a time.

The results reported in the column 4 of the Table A.1 in Appendix A show that the coefficients on Competitiveness (EU Partners) and Competitiveness (non-EU Partners) indicates that Competitiveness (EU Partners) and Competitiveness (non-EU Partners) both affect job creation in the UK manufacturing sector negatively. Similarly, results reported in column 5 of the Table A.1 in Appendix A show that the coefficient of the interaction term is positive and insignificant which indicates that the fluctuations in competitiveness of the UK goods in EU markets do not affect competitiveness of the UK goods in the non-EU markets or the other way round.

Furthermore, Column 1, 2, 3, 4 and 5 of the Table A.1 in Appendix A shows that firm-specific variables like average wages and firm size, and job creation move in the opposite direction. However, a rise in average wages significantly decreases job creation in the exporting industries of the UK manufacturing sector. The coefficient of the average wage ranges from -0.165 to -0.069 depending on the model specification. This implies that firms cut down the new recruitment of new staff when they face a higher wage cost. Moreover, the negative coefficients of size in all the models we have estimated show that job creation decreases with an increase in the size of a firm. Although, all the coefficients of a variable named size are statistically insignificant, they indicate the stability of jobs in the bigger firms.

Another important determinant of the job creation in the UK is the GDP growth rate. Column 1, 2, 3, 4 and 5 of the Table A.1 in Appendix A show that the coefficients of GDP growth are positive and statistically significant. The coefficient of the GDP growth ranges from 0.002 to 0.003 depending on the specification of the model we estimate. This implies that as the GDP of the UK rises, the job creation also increases in the exporting industries of the UK. This also indicates that during the economic prosperity when GDP increases, the employment opportunities in exporting industries of the UK also increases.

Table A.2 in Appendix A shows the results regarding the response of job destruction in exporting industries of the UK manufacturing sector to variations in competitiveness and other key variables affecting job destruction. Columns 1, 2, 3, 4 and 5 of Table A.2 in Appendix A show that the coefficients on competitiveness are positive and statistically insignificant. This implies that fluctuations in competitiveness do not play any role in explaining job destruction in exporting industries of the UK manufacturing sector. In other words, in response to fluctuations in the real exchange rate firms in exporting industries

of the UK manufacturing sector do not fire their workers. This also indicates firms in the UK manufacturing sector retain their trained workers when they face a rise in wage costs relative to wage costs in the trading partners of the UK.

Columns 1, 2, 3, 4 and 5 of Table A.2 in Appendix A indicate that job destruction rates in the UK manufacturing sector are mainly determined by GDP growth rates, average wages and previous period job destructions. An increase in GDP growth rates significantly reduces the job destructions. The coefficients on GDP range from -0.004 to -0.005 depending on the model specification we adopt. This implies that during a period of prosperity job destruction rates are significantly decreased. The coefficients of average wages range from -0.169 to -0.191 depending on the model specification we adopt. This implies that firms in the exporting industries of the UK manufacturing sector do not fire their worker when they face a rise in average wages. Moreover, the previous period job destruction also significantly explains the current period job destruction. The coefficients of lagged job destruction ranges from -0.391 to 0.476 in different models we have estimated to estimate the responses of job destruction to different variables. Furthermore, results reported in Table A.2 in Appendix A indicate that firm size does not play any role in explaining job destruction rates in exporting industries of the UK manufacturing sector.

Table A.3 in Appendix A shows the results regarding gross flows of jobs in exporting industries of the UK manufacturing sector. Columns 1, 2, 3, 4 and 5 of the Table A.3 in Appendix A indicate that coefficients on competitiveness are negative and insignificant in the entire set of models we have estimated. This implies that fluctuations in competitiveness do not explain variations in gross flows of employment in the UK manufacturing sector. In other words, we can say that fluctuations in the real exchange rates of the UK do not affect gross flows of jobs in UK manufacturing sector. Table A.3 in Appendix A shows that gross flows of employment in the UK manufacturing sector are mainly driven by average wage costs and GDP growth rates. The coefficients of average wages and GDP growth rates are negative and significant which implies that average wages and GDP growth rates are really important factors in determining the gross job flows in exporting industries of UK manufacturing sector. The coefficients on average wages range from -0.366 to -0.411 in the models we have estimated. This implies that a rise in average wages reduces gross flows of the jobs in exporting industries of the UK manufacturing sector significantly. This decrease in the gross job flows in response to a one unit increase in the average wage ranges from -0.366 to -0.411 depending on the model's specification. Similarly, the coefficients of the GDP growth rates remain -0.003 in the models we have estimated. This implies that a rise in GDP growth rates reduces the gross flows of the jobs in the UK manufacturing sector significantly. This decrease in the gross job flows remains the -0.003 in response to a one unit increase in the GDP growth rate in all the

models we have estimated.

Overall, results reported in Tables A.1 and A.2 in Appendix A explain the adjustment process in net employment. Our findings suggest that the adjustment process in net employment to real exchange rate led fluctuations in competitiveness works through job creation because changes in competitiveness affect only job creation significantly but do not foster job destruction (see Columns 1, 3 and 4 in Tables A.1 and A.2 in the Appendix A). This finding indicates that shocks to the real exchange rate do not affect job destruction but significantly hinder job creation in the UK exporting industries. Keeping in view the definition of the real exchange rate, we can also say that a rise in UK wage costs relative to its trading partners decreases job creation significantly and does not change job destruction in exporting industries.

Columns 1 and 3 of Tables A.1 and A.2 in the Appendix A indicate that in response to a shock in competitiveness the adjustment process in employment in exporting industries works through job creation whether we consider competitiveness of the UK in all 32 trading partners countries' markets or when we take into account non-EU trading partners of the UK only. However, the adjustment process in employment in response to fluctuations in competitiveness is not clear when we reduce the sample to EU trading partners of the UK only or when we control for the effect of competitiveness in non-EU markets or in EU markets. This is clear from the coefficients on competitiveness from Columns 2 and 4 in Tables A.1 and A.2 in the Appendix A. This may be due to the fact that we have calculated competitiveness using the wage cost of the UK relative to its trading partners. The wage cost in EU trading partners of the UK and the UK is more or less same and does not change very much over time. Therefore, a slight change in relative wage cost of the UK is not enough to change job creation or job destruction.

We also find that net job flows are insensitive to firm-specific average wage costs. However, overall macroeconomic conditions in the country significantly disturb net job flows. For instance, Table 13 shows that a positive shock to GDP promotes jobs significantly in exporting industries. This implies that workers laid off in bad times are rehired in good times. We can also interpret this finding as employment in trading firms responds to the macroeconomic environment in the country. Once again, our finding that the overall macroeconomic environment in a country plays a vital role in determining the employment level does not change with the change in specification (see Columns 1, 2, 3, 4 and 5 in Table 13).

Another observation similar to our main findings is that job creation and job destruction in exporting industries do not respond symmetrically to a shock in competitiveness. Job creation decreases significantly in response to a rise in competitiveness while job destruction is insensitive to changes in the competitiveness (see Tables A.1 and A.2 in the

Appendix A). This implies that firms do not lay off their trained workers in response to a negative shock to their demand in the short run, however, they recruit new staff in response to a positive shock to their demand. Like our finding for all industries, our finding that job creation and job destruction behave differently in response to a shock in competitiveness for exporting industries does not change as well with the change in specification of the model (see results in Columns 1, 2, 3, 4 and 5 of Table A.2 and Columns 1 and 3, of Table A.1 in the Appendix A).

Furthermore, for exporting industries we find that for firm-specific variables, sales growth and average wages play a significant role in explaining variations in jobs but sales growth has limited power to explain deviations in employment. Tables A.1 and A.2 in the Appendix A indicate that average wages hinders job creation and job destruction significantly but sales growth explains neither job creation nor job destruction. Fluctuations in average wages lead to changes in job creation and in job destruction is consistent and do not change with the change in specification of the model (see results in Columns 1, 2, 3, 4 and 5 of Tables A.1 and A.2 in the Appendix A).

With regard to total job flows in exporting industries in response to a shock in firm specific and macroeconomic variables, Table A.3 in the Appendix A indicates that firm-specific variables and the overall macroeconomic environment in the country significantly explain the overall reallocation of the jobs. A rise in average wages and GDP growth reduces the gross job flows in exporting industries. However, sales growth increases the gross job flows in exporting industries of the UK manufacturing sector. Furthermore, Columns 1, 2, 3, 4 and 5 of Table A.3 in the Appendix A indicate that firm specific and macroeconomic variables play a significant role in determining the gross job flows in exporting industries and this finding does not change with the change of specification.

2.4.3 Non-Exporting Industries

So for we have discussed our results for all industries and only exporting industries of the UK manufacturing sector. Now we turn to explain our findings regarding non-exporting industries in the UK manufacturing sector. **We define a non-exporting industry as the group of firms in an industry those do not sell their products in the foreign markets.** Table 14 shows the results for the net job flows in firms those sell their products only in domestic markets. We call this group of firms non-exporting industries. The table displays that changes in real exchange rate do not affect net job flows in non-exporting firms. This observation remains valid whether we consider all 32 trading partners of the UK or we estimate the effects of real exchange rate on net job flows taking in to account only European or non-European trading partners of the UK simultaneously. The results in Columns 1, 2, 3, 4, and 5 of Table 14 support this observation as the coefficients of the

real exchange rates in all the models are insignificant .

Table 14: Net Job Flows in Manufacturing Sector of the UK (Non-Exporting Industries)

	Dependent Variable: Net Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	(-0.374)**	(-0.388)***	(-0.329)**	(-0.390)***	(-0.711)***
	(0.15)	(0.121)	(0.16)	(0.119)	(0.186)
L. Job Destruction	-0.030	0.163	-0.260	0.169	-0.573
	(0.38)	(0.225)	(0.356)	(0.221)	(0.482)
Average Wage	-1.618	-0.263	-1.453	-0.530	-5.119
	(1.48)	(2.185)	(1.335)	(2.073)	(4.928)
GDP Growth	0.005*	0.007*	0.0001	0.007*	0.023**
	(0.003)	(0.004)	(0.003)	(0.004)	(0.011)
Size	(-0.108)**	(-0.182)**	(-0.115)*	(-0.180)**	(-0.109)*
	(0.052)	(0.08)	(0.066)	(0.082)	(0.055)
Real Exchange Rate	-0.246				
(32 Partners)	(0.219)				
Real Exchange Rate		-0.372		-0.371	7.719
(EU Partners)		(0.268)		(0.268)	(6.027)
Real Exchange Rate			0.149	0.166	42.993
(non-EU Partners)			(0.277)	(0.328)	(30.095)
Real Exchange Rate					-38.513
(Interaction)					(27.888)
Constant	0.371	0.383	0.025	0.350	-8.154
	(0.349)	(0.345)	(0.088)	(0.353)	(6.552)
Arellano AR(2) Probability	0.934	0.323	0.762	0.313	0.659
Hansen Test Probability	0.937	0.364	0.985	0.334	0.420
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

In Table 14 the coefficient of the real exchange rate of UK with European trading partners are negative and the coefficient of the real exchange rate of UK with non-European trading partners are positive in case of non-exporting industries. This indicates that due to a rise in the real exchange rate of UK with non-European trading partners keeping the real exchange rate with European trading partners constant increases the net jobs flow rate in non-exporting industries and also indicate the transfer of the resources from exporting firms to non-exporting firms. Whereas the negative coefficient of the real exchange rate with European trading partners terms points out that an increase in real exchange rate reduces net employment in non-exporting firms. The reduction in employment in non-exporting firms may be taking place due to a rise in imports that have become cheaper as a result of a rise in the real exchange rate. However, these effects of the real exchange rate on net employment rates in non exporting firms are insignificant.

We also find that in non-exporting firms the net job flows are mainly determined by *GDP* growth. Columns 1, 2, 4, and 5 of Table 14 show that the coefficients on GDP growth rates are positive and statistically significant. This implies that an increase in *GDP* growth leads to a rise in employment in non-exporting firms. **The marginal effect of the GDP growth rate on net employment rate for exporting industries are 0.005, 0.007, 0.007 and 0.023 for models 1, 2, 3, 4 and 5 in Table 14. A one percent change in GDP growth rate leads to less than one percent change in the employment[2]. This implies that in a time of prosperity employment rises and in bad times employment falls. This result also indicates that the overall macroeconomic environment in the country affects job flows in non-exporting firms of manufacturing sector of the UK. This result remains valid for the entire set of models we have estimated except when we consider non-European trading partners of the UK. This may be due to the fact that most UK trade takes place with other European countries.**

Columns 1, 2, 3, and 5 of Table 14 show that the size of a firm in an industry has a negative effect on net employment rates in the non-exporting industries. The marginal effects of the size of a firm in an industry on net employment rates in non-exporting industries are -0.108, -0.182, -0.115, -0.180 and -0.109 for models 1, 2, 3, 4 and 5 respectively, in Table 14. This implies that as the size of a firm in an industry increases the fluctuations in the net employment decreases. However, our results indicate that one percent change in size of a firm in an industry leads to a less than one percent change in the employment[3]. Results shown in Table 14 implies that for non-exporting firms, the bigger the firm, the lesser will be the net change in employment in response to a shock. Net job flows decrease with the increase in the size of the firm. This indicates that smaller firms are more vulnerable to a shock. In other words, we can say that bigger firms have more capacity to bear shocks and the adjustment in employment in bigger firms is relatively low. This result is very stable and does not change with the change of specification.

We also find that a shock to the real exchange rate neither creates nor destroys jobs in non-exporting industries. The coefficients of the real exchange rates in the entire set of the models we have estimated for job creation and job destruction in non-exporting industries are insignificant (see Tables A.4 and A.5 in Appendix A). This implies that job creation and job destruction in non-exporting industries of the UK manufacturing sector

[2]The elasticities of net employment rates to GDP growth rates for these coefficients are -0.19, -0.26, -0.19, -0.004 and -0.87

[3]The elasticities of net employment rates to GDP growth rates for these coefficients are 0.34, 0.57, 0.36, 0.57 and 0.34

are insensitive to variations in the real exchange rate. Once again our finding that changes in real exchange rate do not bring changes in job creation or job destruction for non-trading industries is consistent and does not vary with change to the model specification.

Table A.4 in Appendix A show previous period job creation rates, *GDP* growth and average wages play a significant role in determining the job creations rates. The negative and statistically coefficients of the previous period job creation rates and the average wages indicate that other things remaining the same, a rise in previous period job creation rates, and a rise in average wages decrease job creation rates significantly. Whereas positive and statistically coefficients of the GDP growth rates indicate that a rise in GDP growth rates increases the job creation rates in non-exporting industries significantly. The marginal effect of the previous period job creation rates, average wages and GDP growth rates are -0.110, -1.429 and .009 respectively when in the model 1. The marginal effects of these variables are similar in other four model given in the Table A.4 in Appendix A. The positive coefficients of GDP growth rate implies that other thing remaining the same, as the GDP growth rate rise the firms increase hiring the new staff which leads to increase in the opportunities to get employed for the existing unemployed workers and for the new workers joining the labor force. The negative coefficients of average wages implies that other thing remaining the same, as wages rise firms reduce hiring new staff which leads to a reduction in the opportunities to get employed for the existing unemployed workers and for new workers joining the labor force.

However, a one percent change in the previous period job creation rates, average wages and GDP growth rates leads to less than one percent changes in job creation rates because the elasticities in job creation rates with respect to previous period job creation rates, average wages and GDP growth rates are less than one for all the models we have estimated except for average wages in model 4 and for GDP growth in model 5[4]. Whereas, Table A.5 in Appendix A indicates that the job destruction rate is mainly determined by the previous period job destruction rates and no other variable has a significant effect on job destruction rates except GDP growth rates which is significant in model 5. Results presented in Tables A.4 and A.5 in Appendix A show that *GDP* growth significantly determines job creation and job destruction in non-exporting industries. However, *GDP* growth affects job creation significantly in all five models, and job destruction in one out of five models we have estimated. Therefore, we can say that our finding is consistent and does not change with the change of model specification. In addition, we may say that the

[4]The elasticities of job creation rate with respect to previous period job creation rates are -0.12, -0.13, -0.10, -0.13 and -0.18 for models 1, 2, 3, 4 and 5 respectively. The elasticities of job creation rate with respect to average wages are -0.61, -0.90, -0.58, -1.08 and -0.98 for models 1, 2, 3, 4 and 5 respectively. The elasticities of job creation rate with respect to GDP growth rates are 0.39, 0.56, 0.13, 0.52 and 1.82 for models 1, 2, 3, 4 and 5 respectively.

adjustment process in net employment to a shock in average wages mainly works through job creation because fluctuations in average wages affect job creation significantly and job destruction insignificantly in most of the models we have estimated (see Tables A.4 and A.5 in Appendix A).

With regard to firm-specific variables, we find that a rise in average wages does not affect job destruction but significantly reduces job creation in non-exporting firms of the UK manufacturing sector. This implies that non-exporting firms do not lay off their existing staff when they face higher wages. However, they avoid new recruitment when wages rise. As a result, the effect of a rise in wages on net employment becomes insignificant (see Table 14). Table A.6 in Appendix A shows that gross flows of the jobs are mainly determined by previous period job creations and job destruction rates. Tables A.4 and A.5 in Appendix A also support this observation. These two tables show that job creation and job destruction rates are significantly determined by their lags.

Overall, our results show that a change in wage costs of the UK manufacturing sector relative to the wage costs in UK's trading partners does not affect net employment in non-exporting industries of the UK. Moreover, variations in the real exchange rates neither create nor destroy jobs in non-exporting industries of the UK. Average wages and GDP growth play a major role in explaining the dynamics of the employment in non-exporting industries. Moreover, these results remain consistent whether we consider the real exchange rate of the UK with 32 trading partners of the UK or we take into account real exchange rate of the UK with only European or real exchange rate of the UK with non-European trading partners of the UK only.

2.5 Conclusions

Shocks to the real exchange rate change incentives to produce tradable versus non-tradable goods and generate labor market adjustment costs and may end up with net losses/gains in employment. Along with the size of adjustment costs, how the adjustment process in employment works is really important in labor market analysis. In this paper we have analyzed three main questions. First, how employment in UK manufacturing responds to a real exchange rate-led shock in competitiveness. Second, whether the adjustment in employment works through job creation or job destruction. And third, whether the effect of real exchange rate-led changes in UK competitiveness with European and non-European countries is similar. Furthermore, the data we used provide us with an opportunity to extend our analysis to exporting and non exporting firms of the UK manufacturing sector.

Using GMM we have estimated the dynamics of employment adjustments due to a shock in competitiveness for the UK manufacturing sector. Our first conclusion is that there is a significant reduction in the employment due to a rise in UK wage costs relative

to its trading partners. This effect is more pronounced in industries that export relatively more. However, the effect is small economically.

Second, the adjustment in net employment to a shock in competitiveness is significantly driven by job creation and not significantly affected by job destruction. However, in job creation previous period job destruction plays a more important role. Our results are comparable to the results of Moser et al. (2010) for Germany, Abowd et al. (1999), Gourinchas (1999) for France who found that job creation is more sensitive to shocks to the real exchange rate as compared to job destruction. However, Moser et al. (2010) found lower coefficients as compared to those we reported here.

Moreover, our results suggest that the UK labor market responds to shocks and induces the employment smoothing accordingly. For example, temporary shocks to GDP significantly explain job creation, job destruction and net flows. This implies that workers fired in bad times will be rehired in good times. So, employment will be high in good times but low in bad times.

Similar to the Hijzen et al. (2010) findings regarding the contribution of smaller firms to employment fluctuations, we also find that smaller firms contribute more towards job creation and slightly less towards job destruction than larger firms. This implies that employment in small firms is more sensitive to fluctuations in competitiveness than large firms. Furthermore, the size of labor adjustment in the UK manufacturing sector in response to real exchange rate led fluctuations in competitiveness of the UK with European and non-European countries differs. This observation is similar to the results of Burgess and Knetter (1998) that the size of labor adjustment in response to a shock in real exchange rate varies from country to country.

Moreover, we found that fluctuations in real exchange rate may not affect net employment in non-exporting firms. However, the increases in real exchange rate significantly reduce net employment in exporting firms. So we can say that employment in exporting and in non-exporting firms behave differently in response to a change in the real exchange rate. In fact, changes in the real exchange rate put more pressure on net employment through job creation than job destruction in both exporting and non-exporting firms of the manufacturing sector of the UK.

Finally, the average wage cost affects jobs creation significantly but does not foster job destruction. This suggest that insiders benefit from higher wages while outsiders bear the cost of the job reallocation process.

Chapter 3

Financial Turmoil, External Finance and UK Exports

3.1 Introduction

The funds that a firm acquires from the external resources such as banks and other financial institutions to finance their productive activities are called external finance. Availability and easier access to the funds from external resources play an important role in growth and development of a country. The growing literature in trade and finance establishes the fact that access to finance is a key ingredient in firms' growth. According to the Business Environment and Enterprise Survey BEEPS (2010), about 66% of the respondent firms in 29 countries of Europe and Central Asia (ECA) and 63% of EU-10 countries respondent firms report that access to external finance is one of the major obstacles in doing business. Furthermore, this report indicates that the percentage of firms indicating unfavorable interest rates as the main reason for not applying for a loan ranges from about 2 to 42% of the firms surveyed. Overall, the survey suggests that unavailability of external funds at affordable costs is a major obstacle in starting, maintaining or extending business to foreign markets. In other words, credit constraints may prevent firms from extending their business across borders.

Several empirical studies have examined the relationship between trade and finance from different dimensions. Some of them look into the impact of financial development on international trade and show that financial development promotes international trade. For example, Beck (2003) finds that countries with better developed financial system have higher export shares and trade balances in the industries that use more external finance. Similarly, Hur et al. (2006), using cross-country industry level data, report that financial development increases export shares and trade balances. On the other hand, some studies have examined the linkages between access to external finance and cross border economic activities. For instance, Berman and Héricourt (2010) using a large cross-country firm-level data set of nine developing and emerging economies show that financial constraints create a disconnection between a firm's productivity and its export status. Manova et al. (2011) using Chinese firms' data show that credit constraints restrict international trade flows. Specifically, their findings indicate that limited credit availability hinders firms' trade flows.

Another dimension explored in the trade and finance literature is how credit constraints affect firms' decisions to enter in international markets. Minetti and Zhu (2011) find that the probability of exporting in Italian credit-rationed firms is 39% lower and that credit

rationing reduces foreign sales by more than 38%. Similarly, using UK firm-level data, Guariglia and Mateut (2010) study the links between firms' global engagement status and their financial health and show that the global engagement of firms improves their financial health, suggesting that firms involvement in cross-border activity shields them from financial constraints.

In general, researchers have established the fact that financial constraints reduce international trade. However, empirical evidence on how firms exports respond to financial constraints during the financial crisis is limited. According to my knowledge there is only one paper by Chor and Manova (2011) which explores how international imports to the USA reacted during the financial crisis. They show that countries with higher interbank rates export less to the USA. They also show that this negative relationship has been further intensified during the recent financial crisis when the interbank rate shot up. Furthermore, they find that industries that require more external finance, with lower access to trade credit and lower collateralizable assets, export less, and this effect becomes even stronger during financial crisis. According to WTO (2010), the volume of the global trade contracted by 12.2% during 2007-2009 global economic crisis. It was the largest decline in world trade since World War 2.

Moreover, the intensity of the decline in trade flows caused by the financial constraints seems to increase during the financial crisis (Chor and Manova, 2011). According to WEO (2010) annualized quarter-over-quarter drop in the global real GDP averaged under 6% from the last quarter of 2008 to the first quarter of 2009, whereas the drop in global real imports was five times as large and averaged over 30% during the same time period. The same source reports that volume of the global trade which was growing at 2.9% in 2008 showed a decrease of 11% in 2009. During this period the imports and exports of the advanced economies declined more rapidly than the imports and exports of the emerging and developing economies. The imports and exports of the advanced economies declined by 12.7% and 12.4% respectively in 2009, whereas the imports and exports of the emerging and developing economies declined by 8.2% and 7.8% respectively in 2009. Similarly, Mora and Powers (2009) report that nominal global merchandise exports dropped by 32% between the second quarter of 2008 and second quarter of 2009.

Mora and Powers (2009) consider the decline in trade financing as a major contributor towards the decline in the world trade during the second half of 2008 and early 2009. Summarizing the findings of the 6 surveys of international banks, suppliers, and government agencies, Mora and Powers (2009) point out that trade financing is number two cause of the decline in the global trade after falling the international demand. In these surveys, among international suppliers, 30 % consider reduced supply of trade financing as a key factor in lowering foreign sales, and 57 % of the banks reported that lower credit availabil-

ity contributed to trade decline between the second half of 2008 and early 2009. Banks reduced the supply of trade financing in last quarter of 2008 the trade financing and the value of letters of credit fell by 11% in this quarter. Furthermore, the global impact of the crisis on trade financing peaked in the first half of the 2009.

Similarly, quoting the surveys of International Monetary Fund (IMF) and the Bankers Association for Finance and Trade (BAFT) now merged with International Financial Services Association (BAFT-IFSA), Chauffour and Malouche (2011) report that about 40 percent of trade finance was bank intermediated whose prices increased considerably during the 2007-2009 financial crisis. Mora and Powers (2009) report that the price of letter of credit increased by 70 base points and the price of export credit insurance increased by 100 base points during the crisis. The trade cost on average increased by about 11% between the second quarter of 2008 to the first quarter of 2009 (Jacks et al., 2009). This rise in the costs of the trade in general and the increase in the cost of trade finances in particular played their role in the collapse of global trade. Thus, it appears that reduction in the availability of the trade finance, and the rise in the cost of the trade finance resulted in the fall of the global trade. So, it is worthwhile to analyze whether trade finance was indeed a major factor driving the fall in UK trade during the recent financial crisis.

Thus, in this chapter we analyze how UK exports responded to external financing during the financial crisis of 2007-2009. It is useful to analyze UK exports during the financial crisis because the UK is the seventh largest producer of manufacturing goods and the fifth largest exporter of manufacturing goods in the world (Garcia-Vega et al., 2012). Furthermore, on average 30 percent of the total sales of UK manufacturing firms are directed abroad. The UK is the second largest host to multinational enterprises (Guariglia and Mateut, 2010). Moreover, UK is one of the economies that was severely affected by the financial crisis 2007-2009. During the crisis, the UK's growth rate fall to -0.4 percent (Das, 2010), unemployment rate increased to 7.8 percent and the lending interest rates shot up to 6.5 percent per annum (Brancaccio and Fontana, 2010). Furthermore, in this crisis the Northern Rock bank, Royal Bank of Scotland (RBS) and Halifax Bank of Scotland (HBOS) got into trouble, RBS bank announced the loss of 24.1 billion pounds, the biggest loss of the corporate history, and the share price index decreased to 83.59. The UK's credit market was dried up and credit provided to the private sector decreased to $3.353 billion. Moreover, during the crisis period 25 percent of UK manufacturers reported lack of credit as a major hurdle in fulfilling their export orders and 15 percent of manufacturers reported lack of credit as a factor likely to constraint their investment in next twelve months (BOE, 2011). Furthermore, UK exports declined drastically during the crisis period; the details of decline in exports are given in Table 16. In order to rescue the UK's banks, Bank of England slashed the interest rate to 0.5 percent and the UK government announced a

bailout package of £400 billion worth. The UK government measures to encourage lending and to revive confidence in financial markets have increased UK taxpayer liability to 1.5 trillion pounds (Oxlade, 2012). These facts about the UK economy during the financial crisis 2007-2009 raise the importance of the analysis which estimates the impact of the financial crisis on UK sectoral exports. We use monthly UK exports data to estimate the effects of the global financial crisis 2007-2009. Our sample period consists of January 2002 to September 2011.

We contribute to the existing literature in three aspects. First, the existing literature estimates the impact of the current global financial crisis on US exports, whereas we focus on UK exports. Second, in the previous literature researchers analyzed the impact of the financial crisis on exports from the supply side only. Rather, we estimate the impact of the financial crisis on exports considering both the demand and supply sides. Finally, we use monthly data whereas most of the previous studies have used annual data.

We show that financial dependence is significant in determining the volume of UK exports. Specifically, we find that the impact of financial dependence is negative and statistically significant. We also show that the negative relationship between financial dependence and the ability of firms to export became relatively stronger during the 2007-2009 financial crisis. These results hold when we use different proxies for financial dependence in our analysis.

Further, our findings suggest that GDP and the capital-labor ratio of the UK and the GDP and claims on the private sector of the importer country have positive and significant impact on UK sectoral exports. Moreover, we found that the capital-labor ratio and interest rates of importer countries are negative and statistically significant. We also observe that the UK lending rate affects UK exports negatively.

In general, our findings remain unchanged when we use the overnight interbank rate instead of the lending rate as a measure of cost of capital. They remain unchanged even when we use an instrumental variable (IV) approach to estimate the model. Furthermore, the negative impact of financial dependence on exports holds when we extend our analysis to the sectoral level; we find that those sectors that rely more on external finance, have lower access to trade credit and have lower collateralizable assets export less relatively.

The rest of the Chapter is organized as follows. Section 3.2 reviews the studies that have focused on the effects of financial dependence on exports. A brief review of financial crisis 2007-2009 is also presented in this section. Section 3.3 describes the data we use in our empirical analysis and discusses the construction of the variables. Section 3.4 presents the empirical model which we estimate in order to examine the impact of financial crisis on UK sectoral exports. Section 3.5 presents and discusses the empirical findings. Finally, Section 3.6 presents conclusions.

3.2 Literature Review

The linkages between trade and finance have been extensively analyzed both theoretically and empirically. Researchers mainly focus on estimating the impact of overall financial conditions in a country on international trade, in explaining the channels through which financial constraints influence the cross-border flows of goods and services, and on exploring whether firms' participation in exporting activity affects their financial health. In general, the trade and finance literature establishes the fact that financial constraints affect international trade. However, this effect varies across firms, industries, sectors and countries depending on their dependence on external finance and overall financial conditions in the country.

Several studies document that in the presence of credit constraints, countries with more developed financial markets have a comparative advantage in financially vulnerable sectors. Beck (2002), using 30 years data for 65 countries, explores the link between financial development and trade in manufactures. He shows that countries with better-developed financial sectors have a comparative advantage in manufacturing industries. Moreover, he also shows that financial development has a significant impact on both the level of exports and trade balance of manufactured goods. Similarly, Kletzer and Bardhan (1987) show that a well-developed financial sector can theoretically lead to a comparative advantage in industries that rely more on external financing. Hur et al. (2006) report a positive relationship between financial development and industry-level exports. In short, the development of the financial system in a country boosts exports by providing easy access to financial resources to the exporters.

With regard to the association between firms' financial health and their exporting activities Greenaway et al. (2007), using data of UK manufacturing firms, show that exporter firms exhibit better financial health than non-exporter firms. In fact, not only does firms' financial health affect exports but firm involvement in international trade also affects firms' financial status. Regarding the impact of firms' participation in cross-border sales on the financial health of firms, Greenaway et al. (2007) and Guariglia and Mateut (2010) analyze the link between global engagement status and financial health of the UK firms and find that global engagement status shields firms from financial constraints. Hence, the existing literature seems to establish a two-way causality between financial health and firms' exporting status.

Evidence from existing studies suggests that trade finance is a key element in determining the volume of international trade. According to Auboin (2009) 80 to 90% of world trade depends on some form of trade financing. This implies that countries with better financial markets have a comparative advantage in accessing foreign markets and

extending their business beyond their national borders because developed financial markets provide trade credits on easier terms and conditions than relatively less developed financial markets.

In fact, trade financing generates funds to cover substantial upfront sunk costs that firms intending to start exporting activity or to extend their business in global market have to pay but cannot be financed with internal cash flows. This implies that policies that ensure the availability of funds at easier terms and conditions will stimulate trade.

By and large, the trade and finance literature identifies three main reasons of exports' reliance on external finance. First, firms have to bear additional upfront fixed sunk costs as well as some variable costs specific to international trade which cannot be met from internal cash flows. Sunk costs include expenditures made to search for profitable export markets and to set up marketing and distribution networks abroad. They also include outlays incurred in adapting the product to meet international standards and regulatory compliance and variable costs consisting of expenditure on shipping and customs duties. In most cases firms have to bear these expense before the export revenues are realized. In order to finance these expenditures, exporters opt for external resources. Second, on average international transactions take 30 to 90 days longer than domestic transactions which further intensifies an exporter's need for external capital (Chor and Manova, 2011). Finally, cross border business activities involve more risk relative to domestic business activities. To avoid this risk exporters have to insure their transactions for which they have to pay insurance premium leading to an increase in the cost of exporting and further intensifying the need for external capital. As a result of the risks associated with trade, the benefits/profit of trade may fall.

Although sunk entry cost is crucial for exporters, it varies with the size of firms. Das et al. (2007) show that on average sunk entry cost for Colombian small producers is higher and ranges from 430,000 to 412,000 US dollars while for large producers on average it is lower and ranges from 334,000 to 402,000 US dollars. However, they report similar sunk entry costs across sectors. In sum, in the presence of a sunk entry cost, exporting becomes a challenge for firms. Furthermore, firms have to bear these costs before they actually start exporting their product. This implies that only firms with sufficient liquidity can expand their business beyond national borders.

The above mentioned factors indicate the significance of financial markets for cross-border trade. Any disruption in financial markets which constrained the liquidity available may affect firms' decisions to sell their products in global markets and affects the overall volume of trade. Recently, using Italian firm level data, Minetti and Zhu (2011) show that credit constraints impede exporting activities of firms. This negative impact of credit constraints on exports becomes stronger during the financial crisis when the supply of funds

becomes worse. Likewise, Auboin (2009) reports that 10-15% of the fall in international trade in the second half of 2008 was due to a fall in the supply of trade finance. Furthermore, the size of global market for trade finance in 2008 is estimated at the $10-12 trillion, which is almost 80% of the total value of world trade in 2008. In a nutshell, international trade and finance are closely linked and among others factors global trade also reflects variations in financial markets.

Thus, researchers working on trade and finance use different firm-specific variables to denote firms' dependence on external resources and to evaluate the impact of external financing on international trade. For instance, to reflect firms' requirement for outside capital Rajan and Zingales (1998) and Chor and Manova (2011) use the fraction of total capital not financed by internal cash flows. This measure of firms' financial dependence along with reflecting the volume of formal trade financing also indicates firms' long term need for external capital. Using this definition of firms' dependence on external finance to estimate the impact of external finance on exports Chor and Manova (2011) show that countries with high costs of capital export less in sectors that depend more on external resources.

Buyer-supplier trade credit is another important indicator which shows firms' dependency on external finance and reflects short term working capital needs of firms and affects cross border trade. Petersen and Rajan (1997), Fisman and Love (2003) and Chor and Manova (2011) use buyer-supplier trade credit as a potential substitute for formal trade financing. Their findings indicate that firms with greater access to buyer-supplier trade credit export more relative to firms with lower access to buyer-supplier trade credit. Furthermore, Brennan et al. (1988) and Long et al. (1993) argue that buyer-supplier trade credit is used to ensure the quality of the product and as an incentive to discriminate among cash and credit customers. Since buyer-supplier trade credit does not come from formal banking channels, firms with a greater access to buyer-supplier trade credit may show some resilience to the detrimental effects of a financial crisis which squeezes liquidity and makes it harder for firms to get credit from formal banking channels.

Along with the availability of external funds, the ability of firms to acquire these funds also matters. Therefore, firms' endowment of tangible assets which determines their ability to acquire funds from formal banking channels becomes important. In principle, firms characterized with more tangible assets can offer greater collateral to acquire external funds. Researchers use tangible assets as an inverse proxy for the financial vulnerability of firms. For example, Chor and Manova (2011) use tangible assets as an inverse proxy for the financial vulnerability of sectors to estimate the impact of the financial crisis on US imports. Their findings show that the exports of the sectors with higher endowments of tangible assets are less sensitive to adverse credit conditions during the 2007-2009 financial

crisis.

So far we have discussed studies which focus on the overall impact of financial development on international trade. Now we emphasize how international trade behaves in response to unexpected events happening in financial markets which reduce the availability of funds. In fact, the importance of financial resources in promoting and extending cross border trade flows magnifies when financial markets face a liquidity crunch and trade financing dries up. Indeed, financial crisis depletes trade financing and creates a gap between demand for and supply of trade finance. Chauffour and Malouche (2011) report that the gap between demand and supply of trade finance in US financial markets was estimated at around $25 billion during the 2007-2009 financial crisis. Furthermore, they report that this gap increased to around $300 billion in secondary markets with the spread of financial crisis from USA to EU and then to the developing countries. This suggests that the trade finance market dried up globally during the 2007-2009 financial crisis.

Consequently, firms became financially constrained and their output, employment and sales declined in both domestic and foreign markets. In particular, foreign sales contracted drastically during the financial crisis. Levchenko et al. (2011) report that from the second quarter of 2008 to second quarter 2009 US imports declined by 21.4 percent and exports dropped by 18.9 percent. Similarly, Auboin (2009) reports that 10-15% of the fall in cross border trade in the second half of 2008 was caused by the fall in the supply of trade finance. In the same vein Amiti and Weinstein (2011) estimate that the 1997 banking crisis caused a 10.5 percent decline in Japanese exports. Bricongne et al. (2012) report similar results for French sector level exports. In short, financial crisis has severe consequences for international trade.

However, the financial turmoil's effect on cross border trade varies from firm to firm, industry to industry, sector to sector and from country to country depending on the size and dependency of firm, industry or sector on external financial resources and on the level of financial markets developments in the country. For instance, Chor and Manova (2011) report that credit constraints hinder international trade and this hindrance intensified during the 2007-2009 financial crisis when acute shortage of trade financing prevailed in the financial markets. Moreover, they find that exports decreased relatively more in sectors which rely more on external finance, have limited access to buyer-supplier trade credit and have fewer collateralizable assets.

On the whole, the existing literature establishes a strong link between external finance and international trade flows. Specifically, researchers consider that credit constraints hinder cross border flows of goods and services. However, the literature on how international trade flows respond to unexpected events like liquidity crisis in financial markets is limited. Existing work mainly focuses on USA and European countries. Particularly,

very few studies exist with reference to the impact of the 2007-2009 financial crisis on international trade. Specifically, with reference to the response of international trade flows of the UK during the 2007-2009 liquidity crunch the existing literature is scarce. Thus, to look into effects of financial crisis on UK trade flows has worth and will contribute to the trade-finance literature considerably.

3.3 A Brief Review of Financial Crisis 2007-2009

Financial crisis, or credit crunch, is not a new phenomenon. Financial markets in the world have gone through sudden liquidity crunches in the past as well. According to Bordo (2008) financial crises are as old as financial markets. However, the 2007-2009 financial crisis differs from previous crises in its nature, intensity and in the level of damage to economies facing the crisis.

The 2007-2009 financial crisis was a global crisis which started in the USA and spread like a wild fire to other parts of the globe through asset markets, international banking and through monetary standards. For instance, Das (2010) states that given the economic, financial and trade inter-linkages of the world economy, the US financial crisis shifted to other economies very quickly. Furthermore, during the crisis, valuation of the banks fell and stock markets crashed across the countries. For example US and UK indices dropped by more than three-quarters of their original value during this period (Wisniewski and Lambe, 2011). As a result, many banks across the globe suspended their normal activities and failed to honor their obligations. Specifically, Lehman Brothers, Bear Stearns, BNP Paribas, Sachsen LB and Northern Rock bank were among the victims of the crisis.

In terms of intensity and damage, the 2007-2009 financial crisis was so damaging that COP (2009) and De Larosière (2009) described it as the worst crisis since the Wall Street Crash and the Great Depression of late 1920s and 1930s. Likewise, Turner (2009) considered it as the greatest crisis in the history of finance capitalism. Consequently, economies facing the crisis were damaged intensively. For instance, the WorldBank (2011) shows that growth rate of the world economy declined to -2.05 percent in 2009 from 3.94 percent in 2007. Similarly, high income economies, OECD, EURO Area, Japan and United States declined to -3.53, -3.69, -4.18, -6.29 and -2.67 percent in 2009 which were growing at 2.65, 2.54, 2.82, 2.36 and 1.94 percent, respectively, in 2007. However, low and middle income economies showed a positive growth rate in 2009 and were growing at the rate of 2.78 percent in 2009. This suggests that financial crisis led to severe economic contraction in advanced economies where financial markets are well developed.

Indeed, liquidity constraints arising from the financial crisis 2007-2009 have contributed to falls in aggregate supply and demand. Output and employment decreased drastically during the crisis period. For example, Das (2010) reports that the growth rate of the

second largest economy in Europe, i.e., the UK fell to -0.4 percent in third quarter of 2009. Similarly, Brancaccio and Fontana (2010) reports that the unemployment rate in US rose from 4.7 percent in the fourth quarter of 2007 to 9.2 percent in the second quarter of 2009. Likewise, unemployment in the UK moved from 5.1 percent to 7.8 percent, France from 7.5 percent to 9.1 percent, Spain from 8.6 percent to 17.9 percent, and Ireland from 4.6 percent to 12 percent during the same time period. These examples of a decline in growth rate and in employment indicate that the 2007-2009 financial crisis has affected real sector intensively.

With regard to the reasons behind the financial crisis of 2007-2009, Brancaccio and Fontana (2010) point to two issues. First, they argued that misguided underpricing of the risk which made financial investors overconfident in measuring and managing the risk lead to financial crisis. Second, they consider the 'Greenspan Put', i.e., loose monetary policy of early 2000 as a major cause of the recent financial crisis. In a similar vein Bordo (2008) suggests that major changes in regulations, lax regulatory oversight, a relaxation of normal prudent lending and period of abnormally low interest rates contributed to the crisis. Along with the default of subprime mortgage, the above mentioned factors created uncertainty in financial markets about the soundness of loans for buyouts leading to drying up the interbank lending market. The prevailing uncertainty and lack of funds available in financial markets turned into a severe liquidity crisis in a very short period of time and spread across the globe through trade and financial markets linkages.

Consequently, the governments and the central banks of some economies, plagued with liquidity crisis, stepped in with fiscal and monetary stimulus to combat the crisis. For example, in the case of monetary measures to combat crisis and to encourage lending, the Bank of England slashed bank rate form 5% in 2008 to 0.5% in 2009 and the US central bank kept bank rates close to zero in 2008. With reference to fiscal stimulus Das (2010) reports that initially the US government provided a small stimulus worth $152 billion in 2008 and later in 2009 president Obama signed a package worth $787 billion to save the banks. Furthermore, to rescue US financial institutions and to reduce market rates the Federal Bank committed itself to purchase $1.7 trillion worth of treasury bonds, mortgage-backed securities and agency debts. Similar measures were taken to save the financial institutions of the UK. The BBC reports that in October 2008, the UK government announced a $88 billion rescue package for the banking system. Moreover, the UK government offered up to $350 billion in short-term lending support[5].

In the context of the chronology of the events which took place during the 2007-2009 financial crisis, Wisniewski and Lambe (2011) and Brunnermeier (2009) state that early signs of the crisis became visible in February 2007 when delinquency rates among subprime

[5]See, http://news.bbc.co.uk/1/hi/7521250.stm.

borrowers increased. Later, in June 2007, the leading investment bank Bear Stearns came under pressure when two of its hedge funds failed to meet their margin calls. The crisis intensified and spread to other economies with the passage of time. As Edmonds et al. (2010) report the disruption in the banking operation intensified in August 2007 when BNP Paribas suspended normal activities on three of its hedge funds and the ECB was forced to provide liquidity, and the German Bank Sachsen LB became a victim of the crisis. Failure of the banks to continue their normal activities generated chaos and a fear of liquidity problem in the financial markets.

The fear of liquidity problems worsened with the collapse of Bear Stearns in March 2008. However, the financial crisis reached on its peak in September 2008 when Lehman Brothers collapsed (Oxlade, 2012)[6], followed by the announcements of bailout packages for the banks by governments of the affected economies and mergers of banks in October 2008. Consequently, the public debts mounted up and macroeconomic conditions worsened. Despite granting the generous bail out packages to banks by the government to cope with the liquidity crisis, confidence in financial markets only slowly returned in April 2009.

Up till now we discussed the overall development of the crisis. Now we look into the insights of the crisis with reference to the UK. The UK is one of the economies which has been severely affected by the financial crisis of 2007-2009. The tidal wave of the crisis starting with the repayment of the subprime mortgage in August 2007 entangled the UK as well. At the same time, British house prices started to fall and triggered the financial crisis in the UK. However, British house prices stabilized in April 2009[7]. **The overnight interbank rate started to shoot up and reached to 6.5 percent per annum in September 2008 which was 5.31 percent per annum in January 2007 and share price index number decreased to 83.596 in October 2008 from 131.015 in June 2007, as a result the credit market dried. The claims on private sector which shows credit provided to private sectors decreased to $3.353 billion in June 2008 from $14.082 billion in June 2007. This created distress in the stock markets and share prices declined. The share price index dropped from 132.5 in May 2007 to 82.2 in November 2008 and declined further to 74.2 in February 2009. As a result investment, output and exports declined. The real exports of the UK declined to £4155.988 million in September 2008 from £10025.571 million in July 2007 when the crisis started[8]. According HM Trea-**

[6]Oxlade, A. (2012), Economy watch: Is the British economy already back into recession? http://9dj1o_x.0.u.is/money/news/article-1616085/Economy-watch-What-Britain.html.

[7]See footnote 2 for reference.

[8]These figures are taken from International Financial Statistics(IFS) 2011 data base.

sury's Management Report (2012)[9], following a news report leaked by BBC that Northern Rock bank had approached the Bank of England for liquidity support, on 14 September 2007 about £4.6 billion were withdrawn from the Northern Rock bank. Furthermore, the report states that in January 2008 Royal Bank of Scotland (RBS) announced the biggest loss in the corporate history, a loss of £24.1 billion. BOE (2011) reports that in 2007 less than 3% of the UK manufacturers cited the lack of credit as a factor likely to constraint their export orders over next three months, this number increased to 15% in 2009. In addition, in 2007, less than 2% of the UK manufacturers cited the lack of credit as a factor likely to constraint their output over next three months, this number increased to 25% in 2009. Consequently, UK exports declined. However, the decline in exports varied from sector to sector.

For example, from October 2008 to November 2008 within the period of one month Food and live animal exports dropped by 9.2 percent, Beverage and tobacco exports decreased by 19.4 percent, Crude materials, inedible except fuel exports decreased by 44.5 percent, Chemical and related products exports dropped by 22.1 percent, Manufactured goods classified chiefly by material decreased by 14.9 percent and Machinery and transport equipment exports decreased by 11.9 percent. Similar trends were observed in the exports of other commodities during this period (see Table 16 for details). These figures show that the financial crisis 2007-2009 has affected the real economy of the UK particularly the financial crisis 2007-2009 had severe consequences for the UK exports.

In the chronology of events which took place in the UK during the financial crisis, Northern Rock got into trouble and applied for liquidity support from the Bank of England in September 2007 and finally was nationalized in February 2008 after two unsuccessful bids. Similarly, in early October 2008 Halifax Bank of Scotland (HBOS) ran into a trouble and through a bailout package was merged into Lloyds bank in January 2009. On 8th October 2008 UK government announced 400 billion pound worth rescue plan for the banks and nationalized HBOS and RBS, two largest banks of the UK and took the partial ownership of the Lloyd TSB bank. According to Oxlade (2012) UK government measures to encourage lending and to revive confidence in financial markets has increased UK taxpayers' liability to 1.5 trillion pounds.

In sum, the 2007-2009 financial crisis was global in nature and severely affected macroeconomic conditions across the globe. Indeed, acute liquidity constraints in financial mar-

[9] Review of HM Treasury's management response to the financial crisis, March 2012 Report available at http://www.hm-treasury.gov.uk/d/review_fincrisis_response_290312.pdf

kets during the crisis have led to the contraction of the real sector in all the affected economies. Thus, given the above mentioned facts it is important o investigate the impact of 2007-2009 financial crisis on UK exports.

3.4 Empirical Model and Methodology

3.4.1 Empirical Model

Given the state of the literature we use the models given in equations 3.4.1 and 3.4.2 to analyze the impact of 2007-2009 financial crisis on the UK exports. These models are modified versions of the model used by Chor and Manova (2011) to estimate the impact of financial crisis on US imports. In their model, Chor and Manova (2011) consider only demand side of the exports which is affected by changes in cost of the capital. **Chor and Manova (2011) interacted exporter country's cost of capital with the financial vulnerability of different sectors of the importing country. This implies that Chor and Manova (2011) are changing the exporter country's cost of capital and observing its impact on exports through changes in the financial vulnerabilities of the sectors operating in the importing countries in response to the changes in exporter country's cost of capital. This may be incorrect because fluctuations in the exporter country's cost of the capital will affect the financial vulnerabilities of firms or the sectors operating in an exporting country rather than affecting the financial vulnerabilities of the firms or the sector operating in the importing country. Moreover, from the model proposed by Chor and Manova (2011), we cannot differentiate whether fluctuations in the cost of capital affect exports by affecting the demand for exports or by affecting the supply of exports because Chor and Manova (2011) have interacted exporter country's cost of the capital with the financial vulnerability of the sectors operating in the importing countries to measure the impact of the financial vulnerability of the sector on exports.**

Thus, to overcome the above mentioned problems in Chor and Manova (2011) model we have modified it. In the modified model we interact exporter country's cost of the capital with financial vulnerability of firms or sectors operating in the exporting countries to estimate the impact of the financial vulnerability of a firm or a sector on its exports. This will give the impact of the financial conditions in the exporting country on the supply of the exports. In addition, we interact the cost of capital in the importer country with financial vulnerability of firms or sectors operating in the importing country. This will give the impact of the financial conditions prevailing in the importing country on the demand for exports. So, from the modified model we can

easily bifurcate the impact of the variations in the cost of the capital on the supply of exports and on the demand for exports.

The modified version of the model is given below in equations 3.4.1 and 3.4.2.

$$Exports_{uk,kit} = \beta_1 IBrate_{uk,t} \times EXTFIN_{uk,k} + \beta_2 D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k} + \beta_3 IBrate_{it} \times EXTFIN_{i,k} + \Sigma_{j=1}^{n} \alpha_j Z_j + D_{kt} + D_{it} + D_{ik} + \epsilon_{ikt} \quad (3.4.1)$$

$$Exports_{uk,kit} = \beta_0 Exports_{uk,kit-1} + \beta_1 IBrate_{uk,t} \times EXTFIN_{uk,k} + \beta_2 D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k} + \beta_3 IBrate_{it} \times EXTFIN_{i,k} + \Sigma_{j=1}^{n} \alpha_j Z_j + D_{kt} + D_{it} + D_{ik} + \epsilon_{ikt} \quad (3.4.2)$$

where k = sector, t = time and i = importer country

$Exports_{uk,kit}$=UK exports in sector K going to importing country i.

$IBrate_{uk,t}$=cost of capital in UK at time t. In principle, insurance costs and interest rates charged on the exports credit lines would be the ideal measures to represent the cost of the trade financing for the UK. However, unfortunately, a direct measure of insurance costs and the rates charged on the exports credit lines are not available for the UK and for the trading partners of the UK from the data sources we have used to get the data for this chapter. Therefore, following Chor and Manova (2011) we use interbank lending rate as a measure of cost of the capital or as a proxy for the trade financing in the UK and in trading partners of the UK.

$IBrate_{i,t}$=cost of capital the cost of trade financing in importing country at time t. We use the interbank lending rate as a measure of cost of the capital as a proxy for the trade financing in trading partners of the UK.

$EXTFIN_{uk,k}$=dependence of sector k of the UK on external resources. We have used four proxies; External Finance, Trade Credit, Tangible Assets and Leverage, to measure the dependence of a sector k of the UK on external resources and their definitions are given in the variable construction section.

$EXTFIN_{i,k}$=dependence of sector k of the importing country on external resources. We have used credit to the private sector as a proxy to measure the dependence of sector k of the importing country on external resources.

Z=is a vector of control variables and includes GDP of the UK, interest rates of the UK, Capital labor ratio of the UK, importer country's GDP, Capital labor ratio, interest rates, and Time required to enforce a contract (TREC). All these variables directly or indirectly affect UK exports and have been used as control variables in the literature. Note that in

our analysis exports, GDP of the UK, Capital-labor ratio of the UK, importer country's GDP, Capital-labor ratio are in log form.

D_{it}= Country-time fixed effects. They will capture the impact of the shocks to aggregate production and bilateral exchange rates fluctuations in each importing country on their imports over time.

D_{kt}= Sector-time fixed effects. They will capture the impact of the shocks to aggregate production, bilateral exchange rates fluctuations on different sectors which vary across the sectors depending on the size, vulnerability and trade volumes of a sector.

D_{ik}= Country-sector fixed effects. They will capture the time-invariant sources of the comparative advantage that affect the average pattern of the country imports across the sectors.

D_{Crisis}=dummy variable, equal to 1 if the period is crisis period, otherwise zero. In our analysis, following (Wisniewski and Lambe, 2011) we use the time period from May 2007 to February 2009 as the crisis period.

ϵ_{ikt}= error term

In both models we use double interaction ($IBrate_{uk,t} \times EXTFIN_{uk,k}$) and triple interaction ($D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k}$) terms. Here, the double interaction term $IBrate_{uk,t} \times EXTFIN_{uk,k}$ measures the sensitivity of financial vulnerability of the sector k in the UK to fluctuations in the cost of capital. $IBrate_{i,t} \times EXTFIN_{i,k}$ measures the sensitivity of the financial vulnerability of the sector k in the importing country to changes in the cost of capital. When the cost of capital rises it becomes harder for a firm to acquire external finance leading to a reduction in output and exports especially in firms with greater requirements for external finance. So, we expect the coefficient of the $IBrate_{uk,t} \times EXTFIN_{uk,k}$ term, i.e., $\beta_1 < 0$. Similarly, the double interaction term $IBrate_{i,t} \times EXTFIN_{i,k}$ measures the sensitivity of financial vulnerability of the sector k in importing country i to fluctuations in the interest rates. The double interaction term $IBrate_{i,t} \times EXTFIN_{i,k}$ also measures fluctuations in demand for imports of country i from the UK. So, the coefficient of $IBrate_{i,t} \times EXTFIN_{i,k}$ term, i.e. β_3 shows the sensitivity of UK exports to changes in interest rates in importing country. As the cost of borrowing for consumption purposes increases demand for imported goods decreases. Thus, as a consequence, when the cost of borrowing increases it will decrease UK exports as well. So, we expect the coefficient of the $IBrate_{i,t} \times EXTFIN_{i,k}$ term, i.e., $\beta_3 < 0$.

The triple interaction term $D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k}$ measures the sensitivity of financial vulnerability of the sector k in the UK to fluctuations

in the cost of capital during the crisis period. In fact, credit conditions in a country become worse as the interest rate shoots up during the financial crisis and in turn the cost of capital becomes very high. Subsequently, firms cannot afford to raise external funds at high interest rates and cut down their output and employment during periods of liquidity crunch. Consequently, domestic and foreign sales decline. In particular, financially constrained firms' exports decline relatively more as compared to less constrained firms. Therefore, we expect coefficient of the $D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k}$ term, i.e., $\beta_2 < 0$ as well. In other words, we expect that the negative effect of a rise in interest rate on exports intensifies during the credit crunch.

3.4.2 Construction of Variables

The funds that a firm acquires from the external resources such as banks and other financial institutions to finance their productive activities are called external finance. For firms' dependence on external resources, we use the following four proxies.

3.4.3 External Finance (EXTFIN)

External Finance (EXTFIN) is defined as the fraction of total capital expenditure not financed by internal cash flows from operation (Rajan and Zingales, 1998):

$$\text{EXTFIN} = \frac{\text{Total Capital Expenditure not Financed by Internal Cash Flows from Operation}}{\text{Investment}}$$

It indicates firms' long term need for external finance. A rise in interest rates makes it costly for firms to get finance from formal banking channels and ultimately leads to a decrease in cross-border activities of financially constrained firms. Therefore, we expect the coefficients of $IBrate_{uk,t} \times EXTFIN_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times EXTFIN_{uk,k}$ terms, i.e., both β_1 and β_2 to be less than zero when using EXTFIN as a proxy for financial dependence of the sector to estimate equation 3.4.1.

3.4.4 Trade Credit (TCRED)

Trade Credit (TCRED) is defined as the ratio of trade credit to the book value of total assets of firms.

$$\text{TCRED} = \frac{\text{Trade Credit}}{\text{Book Value of Total Assets of Firm}}$$

This variable indicates firms' short term working capital requirements (Chor and Manova, 2011). Firms use trade credit as an alternative to borrowing from formal banking channels. Moreover, firms with a greater access to trade credit are less sensitive to a

rise in interest rates because they can finance their cross-border activities by using buyer-supplier trade credit. Therefore, we expect the coefficients of $IBrate_{uk,t} \times TCRED_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times TCRED_{uk,k}$ terms, i.e., β_1 and β_2 to be greater than zero when instead of EXTFIN we use TCRED as a proxy for financial dependence of the sector to estimate equation 3.4.1. Furthermore, β_2 can be less than zero as well if the crisis exhausts the credit availability along with the other forms of financing to the firms to support their exports.

3.4.5 Tangible Assets (TANG)

Tangible Assets (TANG) is defined as the ratio of tangible assets to book value of total assets.

$$\text{TANG} = \frac{\text{Total Tangible Assets}}{\text{Book Value of Total Assets of Firm}}$$

This proxy captures firms' ability to pledge collateral in acquiring external borrowing (Braun (2003) ; Claessens and Laeven (2003) ; Chor and Manova (2011)). Firms with greater tangible assets can get funds from banks more easily because they can offer more assets as collateral. Therefore, we expect the coefficients of $IBrate_{uk,t} \times TANG_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times TANG_{uk,k}$ terms, i.e., both β_1 and β_2 to be greater than zero when instead of EXTFIN we use TANG as a proxy for financial dependence of the sector to estimate equation 3.4.1.

3.4.6 Leverage (LEVERAGE)

Leverage is defined as the ratio of total debt to book value of total assets.

$$\text{LEVERAGE} = \frac{\text{Total Debt}}{\text{Book Value of Total Assets of Firm}}$$

Leverage shows the riskiness of firms. Risks of default increase with an increase in the leverage of firms. Banks try to avoid lending funds to firms with high leverage or may lend to them at an interest rate which is higher than the interest rate which banks charge firms with lower values of leverage. So, firms with high leverage may not be able to get funds from banks easily and reduce their cross-border activities. Thus, we expect the coefficients of $IBrate_{uk,t} \times LEVERAGE_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ terms, i.e., both β_1 and β_2 to be less than zero when we use LEVERAGE as a proxy for financial dependence of the sector to estimate equation 3.4.1. On the other hand, the leveraged firms are normally big in their sizes, and can manage to get loans from the banks to finance their production activities fulfill their export orders even under the financial crisis situations. Thus, in this case the coefficients of $IBrate_{uk,t} \times LEVERAGE_{uk,k}$ and

$D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ terms, i.e., both β_1 and β_2 to be greater than zero when we use LEVERAGE as a proxy for financial dependence of the sector to estimate equation 3.4.1. If the crisis become so worse that the leveraged firms could not exploit the banks to get the funds then the coefficient of $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ terms will be less than zero.

Note that we calculate these proxies at the firm level and then to match with sector level data we take a median of all the firms operating in a sector.

3.4.7 Data Sources

The data we use for this study are taken from various sources and our sample period consists of January 2002 to September 2011. Monthly data of UK exports are taken from Overseas Trade Statistics, HM Revenue & Customs (HMRC). Overseas Trade Statistics, HM Revenue & Customs (HMRC) provide detailed data on monthly exports and imports of the UK. Furthermore, HMRC provides the break down on import and export data for the UK according to regions, trading partners and Standard International Trade Classification (SITC) commodity codes. Note that our sample covers UK exports going to 25 major trading partners only. Table 9 shows these trading partners. Also note that these trading partners account for more than 80% of UK exports. Thus, the selection of the sample seems reasonable.

Table 15: The UK Major Trading Partner

No	Trading partner	No	Trading Partner
1	BELGIUM	14	NETHERLANDS
2	CANADA	15	NORWAY
3	CHINA	16	POLAND
4	CZECH REPUBLIC	17	QATAR
5	DENMARK	18	RUSSIA
6	FRANCE	19	SINGAPORE
7	GERMANY	20	SPAIN
8	HONG KONG	21	SWEDEN
9	HUNGARY	22	SWITZERLAND
10	INDIA	23	TAIWAN
11	IRISH REPUBLIC	24	TURKEY
12	ITALY	25	USA
13	JAPAN		

In order to measure the financial dependence of the sectors, firm level data are taken from Financial Analysis Made Easy (FAME). FAME provides detailed information on companies for a period of ten years. Moreover, the majority of the firms, for which FAME provides data, are not listed on the stock exchange. In general, non-listed companies are small, financially constrained, possess lower assets and have poor credit ratings as com-

pared to large, financially sound, and well-established listed companies with better credit ratings. In addition, smaller firms are likely to face more problems in obtaining financial resources from banking and non banking channels relative to the large firms. Thus, our proxies for the financial dependence of firms should provide a good representation of financially constrained firms. Table B.5 provides the characteristics of the sectors and the number of firms included in each sector included in our sample. Monthly lending interest rate, overnight interbank rate, consumer price index and claims on private sector of partner countries and of the UK, are extracted from International Financial Statistics (IFS). Data of the UK's GDP,labor force and gross fixed capital formation and the GDP, labor force, gross fixed capital formation and the time required to enforce a contract (TREC) of partner country are extracted from the World Development Indicators (WDI).

3.4.8 At First Glance

Table B.4 given in Appendix B reports the means, standard deviations, maximum and minimum values of the key variables used in the analysis, before, after and during the financial crisis 2007-2009. This table shows that on average the lending rates and overnight interbank rates have increased on average during the financial crisis which indicate that the credit markets of the UK were tighten and the credit availability to firms to finance their production activities to fulfill their export orders have lowered during the crisis. Table B.4 given in Appendix B also indicates that on average the cost of capital increased during the financial crisis and has played its role in decreasing UK exports. This decline in the UK exports is shown in Table 16. Table 16 shows that if we compare total exports at the start of the crisis and the exports when recovery started the total exports of the UK have declined by 13.8 percent. Furthermore, Table 16 shows that total exports declined by 14.2 percent within the period of one month, from October 2008 to November 2008, when the crisis was at its peak.

Our objective is to explore how the financial crisis of 2007-2009 has affected the UK exports. To achieve this goal we a require measure of credit conditions in the UK and in trading partners of the UK as our key explanatory variables. The interest rates charged on export credit lines or insurance would be the ideal variables to be used as a direct measure of the cost of trade financing. But unfortunately, the data of the rates charged on export credit lines or insurance is not readily available for the countries included in our sample from the data sources that we have used for this chapter. Therefore, following Chor and Manova (2011) we use interbank lending rates as a proxy to measure the cost of trade financing. Chor and Manova (2011) state that in the absence of systematic information on the cost of trade financing, the interbank lending

Table 16: Percentage Decline in the UK Exports at the Peak and During the Financial Crisis

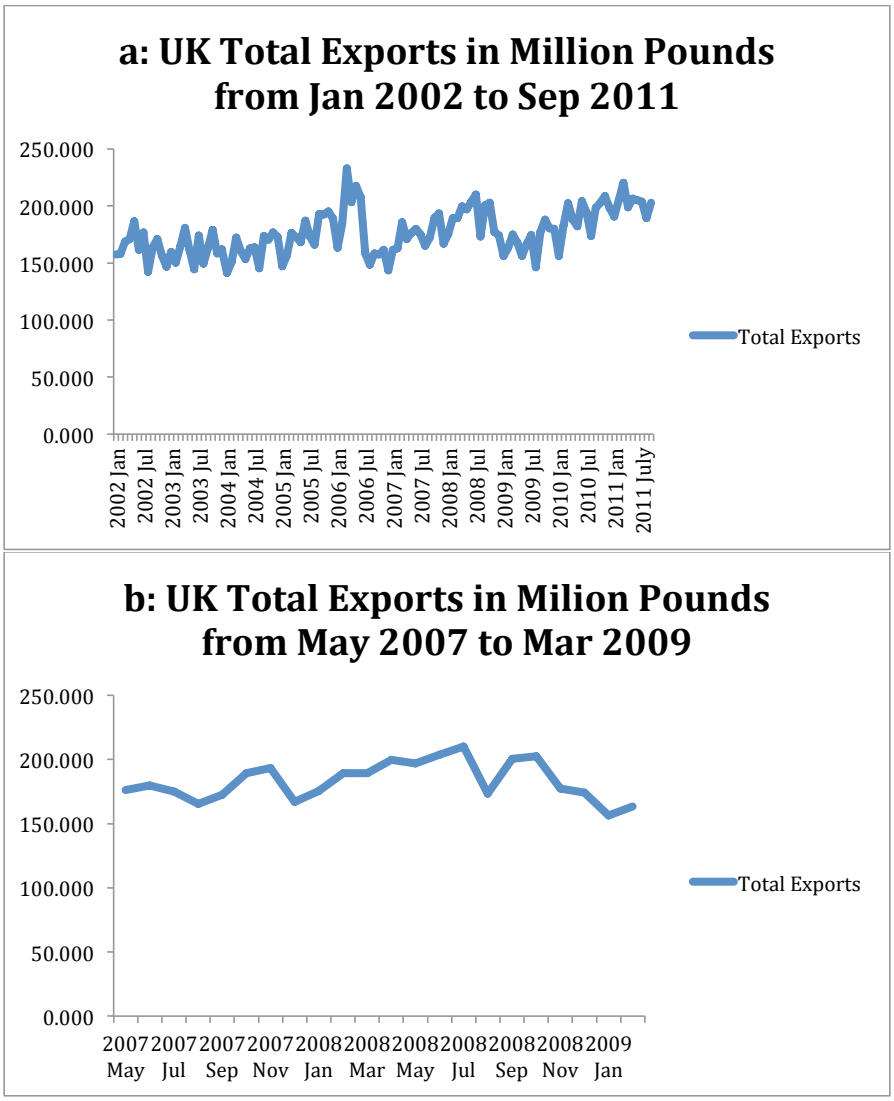
Sector	Peak of the Crisis	Overall during the Crisis
Food and Live Animal	-9.2	11.1
Beverages and Tobacco	-19.4	-7.7
Crude Materials, Inedible except Fuel	-44.5	-32.7
Minerals Fuels, Lubricants and Related material	-11.5	-5.5
Animal and vegetable oils, Fats and Waxes	-9.9	47.6
Chemical and Related Products, n.e.s	-22.1	5.9
Manufactured goods classified chiefly by material	-14.9	-38.8
Machinery and Transport Equipments	-11.9	-24.9
Miscellaneous manufactured article	-9.0	-11.7
Commodities and Transactions not Classified elsewhere in the SITC	-10.6	8.7
Total Exports	-14.2	-13.8

Note: Calculated from Overseas Trade Statistics, HM Revenue & Customs (HMRC) monthly data on UK exports. Peak of the Crisis values are calculated using the exports from October 2008 to November 2008. Overall during the Crisis values are calculated using the exports from March 2007 to February 2009.

rate can serve as a broader measure of the cost of external finance in the economy and also as a proxy for the cost of trade financing. Basically, interbank rate is an interest rate that commercial banks charge from each other for a short term loan which a commercial bank acquires from the other commercial banks to adjust liquidity positions and to meet the reserve requirements. Furthermore, the interbank lending rate serves as a benchmark for the overall cost of the credit in the economy and other interest rates such as a mortgage rates and commercial banks lending rates take a clue from it. However, Chor and Manova (2011) state that the interbank rate is a noisy measure of the actual cost of trade financing to exporting firms and underestimates the impact of financial distress on trade flows. In order to support their argument Chor and Manova (2011) present two reasons. First, the interbank rate is an interest rate for the contracts that actually took place, and the financial transaction that did not occur would presumably cleared at a higher interest rates. This implies that the actual marginal cost of capital for the marginal exporter would likely to be higher. Second, at the height of the financial crisis, credit tightening is due to the higher cost of credit and due to a limited availability of external financing, both of which would hamper firms' ability to export. In the absence of systematic data on the loan quantities across countries and over time we cannot evaluate the impact of credit rationing on trade flows. Thus, results using the interbank rate as a proxy for cost of credit will provide only a lower bound for the combined effects of both margins of credit tightening. Thus, in the light of Chor and Manova (2011) arguments, use of interbank

lending rate as a measure of credit conditions in a country underestimates the impact of credit conditions on trade flows. With these limitations, we use interbank lending rate as a measure of tightness of prevailing credit conditions in the countries included in our sample. In addition, the fluctuations in total exports of the UK for the whole sample period and during the financial crisis are shown in the Figure 11. This figure depicts that the exports of the UK were falling even before the start of financial crisis because cost of the capital were increasing even before the start of financial crisis. The trends in cost of the capital represented by the lending interest rates and overnight interbank rates are shown in Fig 13 indicate this phenomenon.

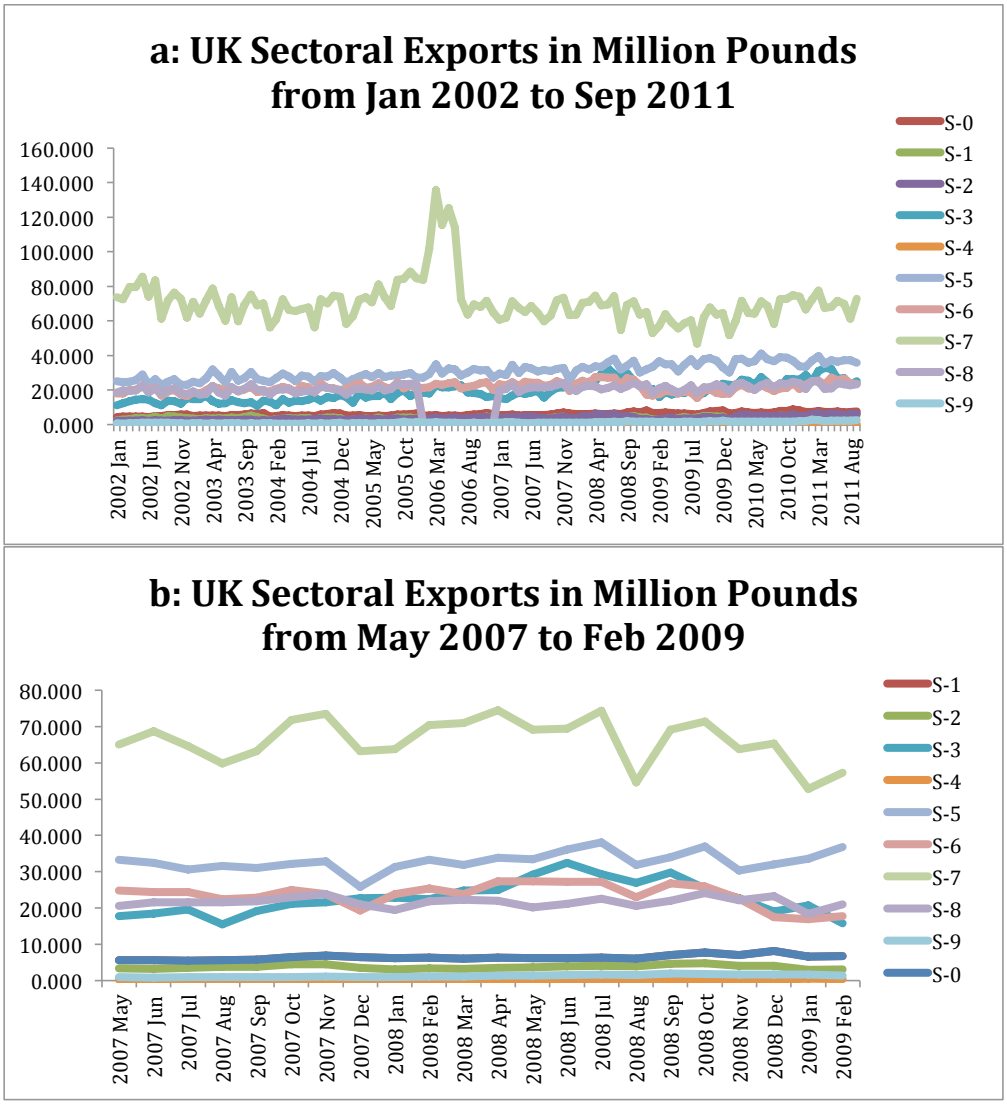
Figure 11: Total Exports of the UK



The Fig 13 shows a sharp decline in the interest rate after 2009 which indicates the measures taken by the Bank of England to encourage the investors in which the Bank has slashed the interest rate from 5 percent in 2008 to 0.5 percent in 2009. This decline in the

interest rate revived the confidence of the investors in the gloomy situation prevailing in the UK and around the world. As a result the share price index started to improve from the second quarter of 2009 which had been falling since the start of the crisis. Figure 20 in Appendix B shows the fluctuations in share price index before, after and during the crisis. However, UK exports revived after the second quarter of the 2009 as shown by the Figure 11. Sector level exports of the UK show a similar trend to the trend of total exports of the UK. Figure 12 shows the trends in sectoral exports for the whole sample period as well as during the crisis period.

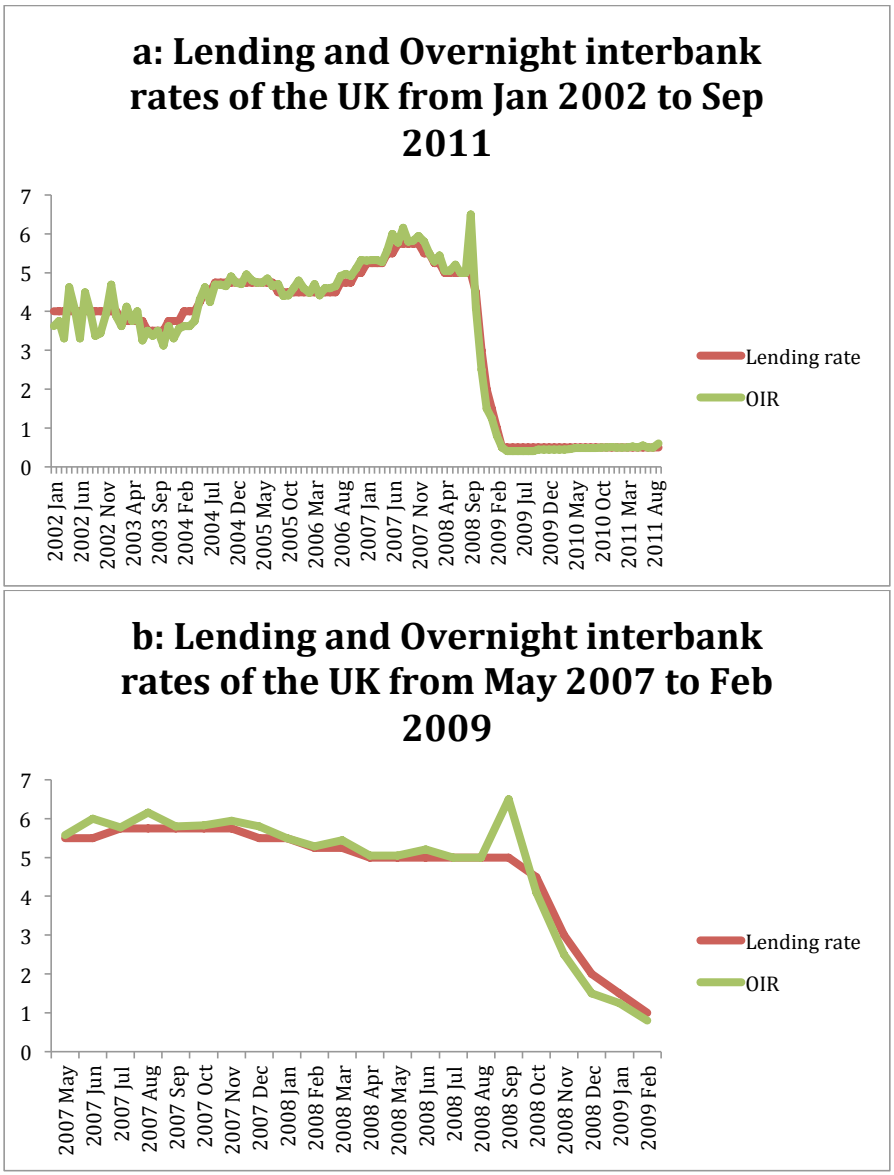
Figure 12: Sectoral Exports of the UK



see Table B.6 for SITC code explanation

The Figure 12 shows that Machinery and transport equipments (S-7), Chemical and related products (S-5), Manufactured goods chiefly classified by material (S-6), Miscellaneous manufactured articles (S-8) are the major exports of the UK. Similar to the Table 16, Figure 12 shows that exports in all the sectors have declined when the crisis was at its

Figure 13: Monthly Lending and Overnight Interbank Rates of the UK



peak. The exports of Minerals fuels, lubricants and related material (S-3) and Chemical and related material (S-5) sectors have decreased drastically when the crisis was at its peak. However, Table B.4 in Appendix B shows that on average UK exports going to the selected trading partners have increased during the crisis. This implies that the UK exports have declined drastically in the minor trading partners of the UK. However,if we compare the UK exports going to all trading partners of the UK at the beginning of the crisis with the exports when the recovery started, then Table 16 shows that overall UK exports have declined by -13.8 percent. Furthermore, Table 16 shows that the exports of Manufactured goods chiefly classified by material (S-6), Crude materials, inedible except fuel (S-2) and Machinery and transport equipments (S-7) were severely hit by the financial crisis, when we compare the export at the beginning of the crisis with the exports when

the recovery started.

Table B.4 also indicates that the key variables identified in the literature to measure the cost of capital, i.e. the lending rates and overnight interbank rate have increased on average and became more volatile during the financial crisis 2007-2009. During the crisis, on average rise in the lending interest rate and in the overnight interbank rate reflects that the credit conditions in UK had become worse during the 2007-2009 financial crisis. This rise in the cost of capital during the crisis had led to an increase in the vulnerability of financially constrained firms. As a result UK exports declined.

In sum, Table 16, Table B.4 in Appendix B, Figure 13, Figure 20 in Appendix B, Figure 11 and Figure 12 indicate that the financial conditions in the UK had become tight during the financial crisis and led to the increase in financial vulnerability of firms, which in turn, have adversely affected the cross-border activity of the UK firms.

3.4.9 Estimation of the Model

The model shown in equation 3.4.1 is a simple panel regression model and we use Ordinary Least Square (OLS) technique to estimate the model given in equation 3.4.1. In this model we control for sector-time, country-time and country-sector fixed effects through the dummy variables used in the model. However, equation 3.4.2 is a dynamic model as it contains the lagged dependent variable as an explanatory variable.

Inclusion of the lagged dependent variable as an explanatory variable and the time invariant unobserved sector and country specific effects make the model given in equation 3.4.2 endogenous. Moreover, there is problem of reverse causality between the GDP of the UK and the exports of the UK in the in equation 3.4.2 as well. Therefore, OLS estimates become inconsistent. Actually, in presence of the endogenous variables in the model, the OLS estimates just give the magnitude of the association and do not give the directions of the causation which is required for the policy analysis. Therefore, we use Instrumental Variable (IV) method to get the consistent estimates which is a widely used methodology is presence of the endogenous variable in the model to get the consistent estimates. This method not only gives the magnitude of the association but the direction of causality as well. Basically, the IV method uses the instrumental variable in place of the variable which is causing the endogeneity problem in the model. A good instrument has three properties. First, the instrumental variable is uncorrelated with the error terms. Second, the instrumental variable is correlated with the variable being instrumented. Third, an instrumental variable is strongly correlated with the variable being instrumented. The first and the second properties of the instrumental variable are called necessary conditions for a variable to be an instrument of a variable. With these properties of the instruments, the IV method gives consistent estimates of the model which can be used for policy analysis.

Moreover, along with catering the simultaneous causality bias the IV method addresses the omitted variable bias and errors in the variable bias as well.

Econometricians suppose.

$$Y_i = \beta X_i + \varepsilon_i \tag{3.4.3}$$

In this equation Y_i is dependent variable and X_i is an independent variable. ϵ is error term. Now if we apply OLS to estimate the β, then β will be consistent and can be used for policy analysis only if

$$Cov(X\epsilon) = 0 \tag{3.4.4}$$

However, if

$$Cov(X\epsilon) \neq 0 \tag{3.4.5}$$

Then OLS to estimate the β will be inconsistent and cannot be used for policy analysis. However, the Instrumental Variable(IV) method gives consistent estimates of β which can be used for the policy analysis. Actually, the IV method breaks the X_i in to two parts, one which is correlated with the error term and the other part which is not correlated with the error term. IV method do this using the instrumental variables. Suppose there exists a variable Z_i which is correlated with the X_i but not correlated with the error term. The variable Z_i will be a valid instrument if it satisfies the conditions below.

$$Cov(Z\epsilon) = 0 \tag{3.4.6}$$

$$Cov(XZ) \neq 0 \tag{3.4.7}$$

Now if the Z_i satisfies the above conditions then in first stage regress X_i on Z_i using the OLS and calculate the predicted values of X_i. These predicted values of the X_i will not be correlated with the error term. Then in the second stage use these predicted values of X_i instead of the X_i in the original model given in equation 3.4.3 to get the consistent estimates of the β.

We can write the above mentioned process as under.

Stage 1:

$$X_i = \theta Z_i + \upsilon_i \tag{3.4.8}$$

Now calculate the predicted values of X_i, $\widehat{X}_i$ where $\widehat{X}_i$=$\widehat{\theta} Z_i$. As the Z_i is not correlated with the error term ε, the $\widehat{X}_i$=$\widehat{\theta} Z_i$ will not be correlated with error term ε as well. Therefore, replace the X_i with the $\widehat{X}_i$ in equation 3.4.3 and estimate it using OLS.

Stage 2:

$$Y_i = \beta \widehat{X}_i + \varepsilon_i \tag{3.4.9}$$

This will give the value of the β which is consistent and can be used for the policy analysis.

The model given in equation in 3.4.2 contains the lag of dependent variable $Exports_{uk,kit-1}$ as an explanatory variable. The term $Exports_{uk,kit-1}$ will be correlated with error term ε_{kit}. Therefore, we use the Instrumental Variable technique to estimate the parameters of the model because this methodology removes the problem of endogeneity by using the instruments of the variables causing the endogeneity and gives consistent estimates when we estimate a dynamic panel model.

3.5 Empirical Results

In this section we discuss the results we have got by estimating equations 3.4.1 and 3.4.2. Overall, our results presented in Tables 17, 18, 19, 20, 21, 22, 23, B.1, B.2, B.3 and B.5 show that UK exports are more sensitive to the cost of capital in sectors which are financially constrained, have limited access to buyer-supplier trade credit, are endowed with less tangible assets and have higher values of leverage. In addition, the sensitivity of UK exports to the cost of capital increased during the 2007-2009 financial crisis.

3.5.1 Aggregate Results

Tables 17, 18, 19 and 20 present the results from aggregate data obtained for equation 3.4.1. Column 2 in all tables in this section shows the results of models that estimate the impact of external resources on exports after controlling for the country-time, sector-time, country-sector and other factors that influence exports. Column 3 in all the tables in this section presents the findings that estimate the impact of external resources and the financial crisis of 2007-2009 on exports after controlling for country-time, sector-time, country-sector and other factors influencing export shares. Column 4 in all the tables in this section shows the results of models which estimate the impact of external resources, financial crisis and the impact of importing country financial variables on export shares after controlling for country-time, sector-time, country-sector and other factors influencing the export. These tables differ with each other only with respect to the proxy used to measure firm's dependency on external resources.

Table 17 shows the results when we estimate equation 3.4.1 using external finance as a proxy for firms' dependence on external resources and lending interest rate as a measure of the cost of capital.

As expected, β_1 and β_2, the coefficients of $Lrate * EXTFIN$ and $D\_Crisis * Lrate * EXTFIN$ variables respectively are less than zero and statistically significant in columns

Table 17: External Finance and Lending Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
Lrate * EXTFIN	-0.031***	-0.019*	-0.024*
	(0.010)	(0.010)	(0.014)
D_Crisis * Lrate * EXTFIN		-0.013***	-0.009*
		(0.004)	(0.005)
Lrate * Pvt_Claims			0.032**
			(0.012)
UK Interest Rate	-0.004	-0.004	-0.0005
	(0.012)	(0.012)	(0.015)
Partner Interest Rate	-0.011	-0.011	-0.519**
	(0.025)	(0.024)	(0.198)
UK GDP	27.944***	27.230***	18.236***
	(2.482)	(2.565)	(2.793)
Partner GDP	0.382***	0.383***	0.588***
	(0.021)	(0.021)	(0.032)
UK K/L Ratio	1.803**	1.797**	1.686*
	(0.795)	(0.795)	(0.858)
Partner K/L Ratio	-0.468***	-0.467***	-0.083***
	(0.025)	(0.024)	(0.024)
N	13216	13216	12206
r2	0.958	0.958	0.957

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

2, 3 and 4 of Table 17. A one percent rise in the cost of the capital leads to 0.024 percent decrease in UK exports in the sectors which depend more on the external resources. This decrease in UK exports due to the rise in the cost of capital intensified further by 0.009 percent during the financial crisis 2007-2009 when financial conditions not only in the UK but all over the world became tight. Since we have used lending interest rate as a proxy for the cost of capital. Therefore, these results imply that as the lending rate goes up, the UK tends to export relatively less in the sectors which depend more on external resources. Moreover, this negative effect of the lending interest rate on UK exports became stronger and highly significant during the 2007-2009 financial crisis when financial conditions in the UK became tight and lending interest rates shot up. Table 17 also shows that a rise in the cost of capital in the UK decreases UK sector level exports. These findings are consistent with Chor and Manova (2011), who also report that countries with higher interbank rates export relatively less to the USA in sectors with greater external finance requirements. They also report that the negative effect significantly intensified during the 2007-2009 financial crisis. Similarly, our results are consistent with the findings of Manova et al. (2011), who, using Chinese firm level data, show that financial constraints hinder firms' trade flows. Moreover, Bricongne et al. (2012) report similar results for French sector level

exports.

Table 17 shows that the coefficients of GDP and the capital-labor ratio of the UK are statistically significant and indicate that these variables significantly affect UK sectoral exports. Columns 2, 3 and 4 of the Table 17 show that the sectoral exports of the UK increases significantly with the increase in GDP and the capital labor ratio of the UK. One percent increase in UK GDP increases UK exports by 18.236 percent, and a one percent increase in the UK capital-labor ratio increases UK exports by 1.686 percent. This implies that GDP and the capital labor ratio of the UK significantly contribute to the exports of the UK. **The significant coefficients of the GDP of the UK and the GDP of the importer country implies that exports can decline in the absence of a financial crisis if the GDP of an exporter or importer country declines. A fall in the GDP of the exporter country will reduce the supply of the exports and the reductions in the importer country's GDP will reduce demand for the exports. Moreover, the exports of a country can decline if the domestic demand for goods increases and production remains constant.**

Column 4 of the Table 17 shows that the financial variables of importing country, claims on private sectors as percentage of GDP and partner country interest rates significantly affect UK exports. A one percent rise in the partner country's claims on private sector as a percentage of the GDP increases UK exports by 0.032 percent whereas one percent rise in the importing country's interest rate reduces UK exports by 0.519 percent. This implies that the rise in the financial resources of the consumers living in trading partners increases demand for goods imported from the UK whereas the rise in cost of the financial resources in the importing country reduces the demand for goods imported from the UK. Moreover, partner country GDP and the capital-labor ratio significantly determine UK exports. Importing country GDP and UK exports are positively related whereas importing country capital labor ratio and UK exports move in the opposite direction. This implies that increases in the GDP of trading partners boost their imports from the UK whereas an increase in capital relative to the labor of the trading partners discourages imports from the UK. This result is quite meaningful because a rise in GDP of the importing countries increases their income level which in turn boosts demand for imported goods, while an increase in the capital labor ratio of trading partners indicate that their capacity to produce and meet their demand for a product domestically is increased. Consequently, their demand for imported goods decreases.

Overall, the results displayed in Table 17 indicate that the 2007-2009 financial crisis had severe consequences for UK trade. Furthermore, the 2007-2009 financial crisis exerted its pressure on UK exports by affecting the both demand and supply sides of exports. Results in Table 17 also suggest that financial crisis hits the exports of financially constrained firms

relatively more and the policies that reduce that cost of capital and generate liquidity can reduce the detrimental effects of financial turmoil on international trade.

Table 18: Trade Credit and Lending Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
Lrate * TCRED	1.046***	0.851**	0.855**
	(0.315)	(0.307)	(0.308)
D_Crisis * Lrate * TCRED		0.170***	0.118*
		(0.055)	(0.059)
Lrate * Pvt_Claims			0.031**
			(0.012)
UK Interest Rate	-0.080***	-0.080***	-0.071***
	(0.022)	(0.022)	(0.021)
Partner Interest Rate	-0.010	-0.012	-0.496**
	(0.024)	(0.024)	(0.196)
UK GDP	25.577***	25.118***	15.915***
	(2.609)	(2.641)	(2.639)
Partner GDP	0.382***	0.383***	0.591***
	(0.021)	(0.021)	(0.032)
UK K/L Ratio	1.793**	1.798**	1.688*
	(0.798)	(0.799)	(0.862)
Partner K/L Ratio	-0.468***	-0.467***	-0.082***
	(0.024)	(0.024)	(0.024)
N	13216	13216	12206
r2	0.958	0.958	0.957

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 18 shows the results when we consider buyer-supplier credit as a proxy for trade financing and lending interest rate as the proxy for the cost of capital. As we anticipated, once again we obtain β_1 and β_2, the coefficients of the coefficients of $Lrate * TCRED$ and $D\_Crisis * Lrate * TCRED$ variables respectively, are greater than zero. $\beta_1 > 0$ implies that as the cost of capital increases, sectors with greater access to buyer-supplier trade credit export more as compared to sectors that have lower access to buyer-supplier trade credit. $\beta_2 > 0$ implies that during the financial crisis, when liquidity was squeezed and the cost of trade financing from formal banking channel shot up, sectors that have greater access to buyer-supplier trade credit exported more relatively.

In simple words, the results presented in Columns 2, 3 and 4 in Table 18 provide evidence that access to buyer-supplier trade credit increases UK exports and this effect intensified during the financial turmoil of 2007-2009. Specifically, the Column 4 shows that one percent rise in the cost of the capital increases the exports of the UK in the sectors that have access to buyer-supplier credit in terms of advance payments by 0.855 percent. This increase in the UK exports further intensified by the 0.118 percent during

the financial crisis of 2007-2009, particularly in the sectors whose firms were able to get buyer-supplier trade credits during the financial crisis. These results are consistent with the findings of Chor and Manova (2011) and Levchenko et al. (2010) who report the role of trade credit in explaining the variations in sector-level trade flows during the crisis. In short, the results presented in Table 18 indicate that the ability and willingness of a trading partners to continue in providing trade credit in terms of cash in advance or in terms of spot payments during the financial disruption will reduce the detrimental effects of the financial crisis for cross border trade flows.

Furthermore, similar to Table 17, Table 18 shows that variations in the UK's GDP, lending interest rates and capital labor ratio and the variations in importing country's GDP, lending interest rates, capital labor ratio and credit to private sector as a percentage of the GDP significantly explain UK exports. Increase in the GDP and capital labor ratio of the UK and the GDP of the trading partner increases the UK exports because the coefficients of these variables in the Table 18 are positive and statistically significant. However, the increase in lending interest rates of the UK and the lending interest rates and capital labor ratio of the trading partner decreases the UK exports significantly because the coefficients of these variables in the Table 18 are negative and statistically significant.

Overall results shown in Table 18 indicate that financial crisis 2007-2009 affected the UK exports by reducing the credit availability to the firms from alternative sources, other than formal financial institutions which affected both the demand and supply of the UK exports.

Table 19 shows the results when we consider endowments of tangible assets of a sector as an inverse proxy for financial vulnerability of the sector and the lending interest rate as a proxy for the cost of capital. In fact, firms, industries or sectors characterized with greater assets tangibility can offer greater collateral in order to get finance from formal banking channels. So, in principle firms, industries or sectors endowed with greater tangible assets are likely to be less sensitive to the frictions in financial markets or to the adverse credit conditions. Thus, we expect β_1 and β_2 to be greater than zero.

Results shown in Table 19 indicates the coefficients of $Lrate * TANG$ are less than zero when we estimate equation 3.4.1 using tangible assets of a sector as the proxy for financial dependence of a sector on external resources. These coefficients range from -0.196 to -0.241 in the models we have estimated. These coefficients indicate that the sectoral exports of the UK decline more in the sectors endowed with greater tangible assets when they face a higher cost of capital. However, columns 1, 2 and 3 of Table 19 show that the coefficients of the terms $D\_Crisis * Lrate * TANG$ are greater than zero when we estimate equation 3.4.1 using tangible assets of a sector as the proxy for financial dependence of a sector on external resources and the lending interest rate as a proxy for cost of the capital.

Table 19: Tangible Assets and Lending Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
Lrate * TANG	-0.196**	-0.241***	-0.208**
	(0.070)	(0.067)	(0.077)
D_Crisis * Lrate * TANG		0.041**	0.029*
		(0.016)	(0.015)
Lrate * Pvt_Claims			0.031**
			(0.011)
UK Interest Rate	0.057**	0.056**	0.056*
	(0.026)	(0.026)	(0.030)
Partner Interest Rate	-0.010	-0.011	-0.507**
	(0.024)	(0.024)	(0.191)
UK GDP	24.088***	23.103***	14.298***
	(2.121)	(2.211)	(2.368)
Partner GDP	0.382***	0.383***	0.589***
	(0.021)	(0.021)	(0.031)
UK K/L Ratio	1.818**	1.822**	1.711*
	(0.797)	(0.797)	(0.861)
Partner K/L Ratio	-0.468***	-0.467***	-0.082***
	(0.024)	(0.024)	(0.024)
N	13216	13216	12206
r2	0.958	0.958	0.957

Robust Standard errors in parentheses, Standard errors are clustered by Importers

Country-time, Sector-time and Country-Sector effects are controlled

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

These coefficients indicate that during the financial crisis 2007-2009 in which reserves of the financial institutions were decreased dramatically, banks were reluctant to give loans to the firms and interest rates were gone up, the UK sector level exports increased in the sectors that were endowed with greater tangible assets because they can present more assets as a collateral to the banks to get loan. This also implies that in the presence of high cost of capital, UK export performance is better in the sectors characterized by greater tangible assets. Moreover, the coefficient of the triple interaction term ($D\_Crisis * Lrate * TANG$), β_2 is greater than zero which implies that the positive impact of tangible assets on UK export performance became markedly stronger during the 2007-2009 financial crisis.

With regards to other control variables used in the models, Table 19 shows that GDP and the capital labor ratio of the UK significantly determine UK sectoral exports. Columns 2, 3 and 4 of the Table 19 show that the sectoral exports of the UK increases significantly with the increase in GDP and the capital labor ratio of the UK. One percent increase in GDP of the UK increases the exports of the UK by 14.298 percent and one unit increase in capital labor ratio of the UK increases the exports of the UK by 1.711 units. This implies that GDP and the capital labor ratio of the UK significantly contribute to the exports of the UK.

Column 4 of Table 19 shows that the financial variables of importing country, claims on private sectors as a percentage of GDP and partner country interest rates significantly affect UK exports. A one percent rise in the partner country's claims on private sector as a percentage of the GDP increases UK exports by 0.031 percent whereas a one percent rise in the importing country's interest rates decreases UK exports by 0.507 percent. This implies that the rise in the financial resources of the consumers living in trading partners increases demand for goods imported from the UK whereas the rise in the cost of financial resources in the importing country reduces the demand for goods imported from the UK. Moreover, partner country GDP and the capital-labor ratio significantly determine the UK exports. Importing country GDP and UK exports are positively related whereas importing country capital labor ratio and UK exports move in the opposite direction. This implies that increases in the GDP of trading partners boost their imports from the UK whereas an increase in capital relative to the labor of the trading partners discourages imports from the UK. This result is quite meaningful because a rise in GDP of the importing countries increases their income level which in turn boosts demand for imported goods, while an increase in the capital labor ratio of trading partners indicate that their capacity to produce and meet the their demand for a product domestically is enhanced. Consequently, their demand for imported goods decreases.

Overall, results shown in Table 19 indicate that the 2007-2009 financial crisis had severe consequences for UK exports particularly for the exports of the sectors with lesser

endowments of the tangible assets. Furthermore, the 2007-2009 financial crisis exerted its pressure on UK exports by affecting both the demand and supply sides of exports. Results in Table 19 also suggest that financial crisis hits the exports of financially constrained firms relatively more and policies that reduce that cost of capital and generate liquidity can reduce the detrimental effects of financial turmoil on international trade.

Once again our results are consistent with the findings of Chor and Manova (2011) who report that countries with higher interbank rates export more in the sectors intensive in tangible assets. They also provide evidence of stronger comparative advantage of a sector with greater tangible assets has in exporting its products during the financial crisis over the sector with lower tangible assets. Similarly, Iacovone and Zavacka (2009) also report that the decline in exports of the sector endowed with fewer tangible assets during the financial crisis.

Table 20: Leverage and Lending Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
Lrate * Leverage	-0.240	-0.285*	-0.254
	(0.157)	(0.160)	(0.165)
D_Crisis * Lrate * Leverage		0.040**	0.036**
		(0.017)	(0.017)
Lrate * Pvt_Claims			0.029**
			(0.013)
UK Interest Rate	0.085	0.085	0.070
	(0.055)	(0.055)	(0.061)
Partner Interest Rate	-0.010	-0.011	-0.467**
	(0.024)	(0.024)	(0.220)
UK GDP	26.753***	26.235***	16.435***
	(2.695)	(2.733)	(3.032)
Partner GDP	0.382***	0.383***	0.595***
	(0.021)	(0.021)	(0.035)
UK K/L Ratio	1.812**	1.818**	1.702*
	(0.799)	(0.799)	(0.865)
Partner K/L Ratio	-0.468***	-0.467***	-0.079***
	(0.024)	(0.024)	(0.025)
N	13216	13216	12206
r2	0.958	0.958	0.957

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Actually, a higher proportion of the tangible assets in firms' total assets provides higher protection to banks because banks can recover their loans by selling these assets if a firm defaults. So, banks prefer to lend to firms with greater tangible assets. This relationship between tangible assets and access to financial resources makes sectors with intensive tangible assets less vulnerable to financial markets disruptions. Therefore, export

performance of the sectors with greater tangible assets remains relatively stable during financial crisis.

Table 20 shows results when we consider leverage as a proxy for financial dependence of a sector on external resources. Basically, leverage indicates the riskiness of a firm. A firm with larger values of leverage is more risky than a firm with a lower value of the leverage. So, it is likely that firms characterized by higher leverage face problems in getting funds from financial institutions. Particularly, during a liquidity crisis banks hesitate to lend to highly leveraged firms. Therefore, such firms are likely to face disruption in their exporting activity during the financial crisis. Hence, we expect coefficients of both single and double interaction terms, i.e., the parameters of $IBrate_{uk,t} \times LEVERAGE_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ to be less than zero. In general, the leveraged firms are big in their sizes and have more collateralizable assets which they can present as a collateral to get funds from the financial resources from the financial institutions. If this is the case, then leverage firms may get the funds easily from the banks even under the crisis situations. Under this scenario the coefficients of both single and double interaction terms, i.e., the parameters of $IBrate_{uk,t} \times LEVERAGE_{uk,k}$ and $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ can be greater than zero. However, if the crisis becomes so severe that banks are unable to give loans to leveraged firms, then coefficient of double interaction terms, i.e., the parameters of $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ will be less than zero.

Table 20 shows results when we consider leverage as a proxy for financial dependence of a sector on external resources. Columns 2, 3 and 4 of the Table 20 show that the coefficients of single interaction terms i.e., the parameters of $IBrate_{uk,t} \times LEVERAGE_{uk,k}$ are negative and ranges from -0.240 to -0.285 depending on the control variable used in the model. This implies that in the presence of higher cost of trade financing the UK exports less in sectors characterized by higher values of leverage. This result seems reasonable because the leverage indicates the riskiness of a firm. A firm with larger values of leverage is more risky than a firm with a lower value of the leverage. So, it is likely that firms characterized by higher leverage face problems in getting funds from financial institutions. However, this effect is statistically significant only in case the model 2. Moreover, Column 3 and 4 of the Table 20 indicate that the coefficients of the $D_{Crisis} \times IBrate_{uk,t} \times LEVERAGE_{uk,k}$ is positive and ranges from 0.036 to 0.040 which implies that the exports of the leveraged sector have increased during the financial crisis 2007-2009. Specifically, Column 4 of the Table 20 indicates that one unit rise in leverage of a firm increases the UK exports by 0.036. This effect of the leverage on the UK exports is statistically significant. The leveraged firms have exported more during the financial crisis 2007-2009 because in general, the highly leveraged firms are big in their sizes and have

more collateralizable assets which they can present as a collateral to get funds from the financial institutions.

Furthermore, similar to Tables 17, 18 and 19, the Table 20 shows that variations in the UK's GDP and capital labor ratio and the variations in importing country's GDP, lending interest rates, capital labor ratio and credit to private sector as a percentage of the GDP significantly explain the variations in the UK exports. Increase in the GDP and capital labor ratio of the UK and the GDP of the trading partner increases the UK exports because the coefficients of these variables in the Table 20 are positive and statistically significant. However, increase in the lending interest rates and capital labor ratio of the trading partner decrease the UK exports significantly because the coefficients of these variables in the Table 20 are negative and statistically significant.

Overall, Tables 17, 18, 19 and 20 indicate that the financial crisis 2007-2009 had affected the UK exports significantly. In particular, a decline in UK sector level exports during the financial crisis has resulted in severe consequences for the real economy. On one hand the tight conditions for access to financial resources during the crisis severely affected firms' ability to invest in new and in existing projects leading to fall in output and employment. On the other hand, a gloomy picture of the economy along with the rise in unemployment decreased consumers' income which shattered consumers' confidence and their demand for products fell sharply across the globe. As a result, exports fell down.

3.5.2 Sectoral Analysis

So for we have discussed our finding regarding the overall effects of the 2007-2009 global financial crisis on UK exports. We presented the evidence that financially vulnerable sectors export less when they face higher costs of capital and this effect had intensified during the 2007-2009 financial crisis when financial conditions not only in the UK but in the whole world became tight. Moreover, these negative effects were more prominent in the sectors endowed with less tangible assets, having lower access to buyer-supplier credit and having higher values of leverage.

In this section we report our findings regarding the response of exports of different sectors to the 2007-2009 financial turmoil. We define a firm as a financially constrained firms if it require funds from external sources to carry out its production activities and have a lower access to funds from the external sources. We have used four proxies to represent financial constraints of a firm. They include the External finance, defined as a ratio of capital expenditure not financed by the internal cash flows from operation to the investment (EXTFIN), Trade credit, defined as a ratio of trade credit to the book value of total assets of firm (TCRED), Tangible assets, defined as ratio of total tangible assets to the book value of total assets of firm (TANG) and Leverage, defined as ratio of total

debt to the book value of total assets of a firm. We have calculated these proxies for each firm included in the sector and then have taken a median value of all the firms in a sector to represent a financial constraints of a sector. In simple words a sector is a financially constrained if on average firms included in a sector have lower access to external finance or have lower access to trade credit or have lesser collateralizable assets to get loans from banks or other financial institutions. Table B.5 in Appendix B shows the average values of the proxies used to represent the financial constraints of different sector.

Table 21: External Finance and Lending Interest Rate (Sectoral Analysis)

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Lrate * EXFIN	0.042	-0.240***	-0.497*	-0.352	0.839	-1.021***	-0.693	-1.316	-2.023	-3.469**
	(0.079)	-0.055	(0.201)	(0.744)	(0.904)	(0.212)	(3.548)	(0.967)	(2.229)	(1.158)
D_Crisis * Lrate * EXTFIN	-0.047*	-0.112	-0.019*	-0.012**	-1.678*	-0.022	-0.369	-284.106***	-0.503**	-0.889***
	(0.025)	(0.070)	(0.008)	(0.005)	(0.927)	(0.048)	(0.406)	(41.429)	(0.220)	(0.214)
Lrate * Pvt_Claims	-0.017	0.077***	0.017	0.060	-0.021	0.001	-0.012	0.035**	0.002	-0.000
	(0.012)	(0.024)	(0.020)	(0.089)	(0.049)	(0.011)	(0.015)	(0.012)	(0.024)	(0.004)
UK Interest Rate	-0.071	-0.227**	-0.747	-0.323	-0.184	-2.631***	0.868	-0.082	1.493	1.925***
	(0.070)	(0.082)	(0.425)	(1.147)	(0.569)	(0.686)	(3.045)	(0.054)	(1.406)	(0.495)
Partner Interest Rate	0.309	-1.223***	-0.279	-0.883	0.411	0.006	0.225	-0.539**	-0.030	-0.183
	(0.189)	(0.364)	(0.379)	(1.473)	(0.772)	(0.160)	(0.230)	(0.189)	(0.370)	(0.100)
UK GDP	7.103**	32.682***	-8.535***	-769.959***	21.421***	57.039***	22.799**	164.626***	41.775***	4.043
	(2.959)	(7.008)	(1.701)	(74.432)	(6.700)	(10.463)	(10.106)	(26.648)	(6.412)	(9.788)
Partner GDP	-8.192***	-20.115***	2.094***	15.572***	-19.534***	-14.871***	-9.740***	-9.034***	-24.699***	17.157***
	(1.566)	(4.023)	(0.392)	(0.745)	(4.659)	(1.653)	(2.193)	(1.429)	(3.222)	(3.913)
UK K/L Ratio	1.863***	3.244***	-0.785	256.252***	4.058	6.116***	0.954	-149.254***	3.722***	-1.949***
	(0.316)	(0.354)	(0.599)	(22.995)	(2.497)	(0.869)	(1.007)	(22.680)	(0.699)	(0.315)
Partner K/L Ratio	-2.801***	-7.020***	0.699	1.900***	-7.175***	-5.212***	-3.645***	-3.096***	-8.720***	6.034***
	(0.513)	(1.328)	(0.611)	(0.128)	(1.465)	(0.540)	(0.715)	(0.464)	(1.046)	(1.338)
trec	0.033***	0.087***	-0.935***	15.987***	0.079***	0.061***	0.046***	0.041***	0.105***	-0.081***
	(0.007)	(0.017)	(0.096)	(1.572)	(0.022)	(0.007)	(0.010)	(0.006)	(0.014)	(0.016)
N	889	889	184	256	886	889	889	889	889	622
r2	0.978	0.903	0.869	0.976	0.907	0.979	0.960	0.958	0.983	0.815

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Country-time, Sector-time and Country-Sector effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table B.6 in the Appendix B for SITC Code Explanation.

We classify UK exports at the sectoral level using Standard International Trade Classification (SITC) Revision 3. Details of these codes are given in Table B.6 in Appendix B.

Table 21 presents results when we estimate equation 3.4.1 for each sector separately using external finance as proxy for financial dependence of the sector and lending interest rate as a proxy for the cost of capital. The coefficients of the $Lrate * EXTFIN$ ranges from -0.3.469 to 0.839. These coefficients implies that the marginal sensitivity of the UK sectoral exports to the financial vulnerability caused by the changes in the cost of the capital varies from sector to sector depending on their sizes, their requirements of funds from the external sources and availability of the required funds from formal and non-formal financial institutions. Overall, results given in Table 21 highlight that eight out of ten sectors tend to reduce their exports when they face higher cost of capital. However, only five sectors become financially vulnerable when the cost of capital increases and significantly reduce their exports. These sectors are Beverages and Tobacco (SITC-1), Crude materials, inedible except fuels (SITC-2), Chemical and related products n.e.s (SITC-5) and Commodities and transactions not classified elsewhere in the SITC (SITC-9).

Note that in Table 21, β_2 i.e the coefficient of $D\_Crisis * Lrate * EXTFIN$ is less than zero and statistically significant for all sectors except Beverages and Tobacco (SITC-1) and Manufactured goods classified chiefly by material (SITC-6) sectors. The coefficient of $D\_Crisis * Lrate * EXTFIN$ ranges from -284.106 to -0.012 which indicates that financial crisis 2007-2009 affected the exports of different sector differently. Table 21 shows that the financial crisis 2007-2009 had the most severe consequences for the exports of the Machinery and transport equipment (SITC-7) sector and had the least impact on the exports of beverages and tobacco (SITC-1) sector. Overall the coefficients of the term $D\_Crisis * Lrate * EXTFIN$ indicate that the reduction in sector level exports of the UK intensified during the 2007-2009 global financial crisis. Overall, Table 20 and results reported in Table 21 point out that the UK sector level exports depend more on external finance. Therefore, they were severely affected by the 2007-2009 global financial crisis.

Other variables which significantly affected the UK sectoral exports are the GDP and the capital-labor ratio of the UK and the GDP and the capital labor ratio of the trading partners of the UK. These variables significantly explain the variations in the exports of all the sectors. Lending interest rates of the UK and the lending interest rates and claims on private sectors of the importing countries are insignificant in explaining the variations in the exports of most of the sectors when we consider their impact on the exports of a single sector at a time.

On the whole, Table 21 provides the evidence that the net effect of the 2007-2009

financial crisis on UK sectoral exports is negative and consistent with the existing literature. For instance, Jansen and von Uexkuell (2010) state that the net effect of the global financial crisis on trade is negative. In fact the loss in economic activity due to financial turmoil 2007-2009 resulted in a decline in incomes of consumers living in the UK as well as the consumers living in the other parts of the globe. In turn, demand for imports declined across the globe leading to a contraction in the volume of international trade overall . Our finding that exports of "Food and Live Animals" decreased during the financial crunch support this fact. Actually, the decrease in economic activity and the rise in unemployment during the financial crisis resulted in a decrease of incomes of the people. As a result, demand for food and live animal decreased because a big chunk of the income, people spend on their food. Jansen and von Uexkuell (2010) report a fall income of along with a rise in prices of food items during the crisis as major reasons of fall in export of food items.

Moreover, the results given in Table 21 suggest that the financial crisis created the rippling effects for sector level export of the UK. Declines in foreign sales of one sector have generated a decline in exports of the other sectors. For example, negative coefficients of the triple interaction terms $D\_Crisis * Lrate * EXTFIN$ point out that exports of all sectors declined during the financial crisis. This overall decline in exports led to decrease in the demand for transport and allied sectors which contribute to boost the trade. The results shown in columns 5, 8, 9 and 10 of the Table 21 may support this argument and point out that the decline in the exports of Animal and vegetable oils, fats and waxes (SITC-4), Miscellaneous manufactured articles (SITC-8), Commodities and transaction not classified elsewhere in the SITC (SITC-9) and Machinery and Transport Equipment (SITC-7) exports significantly declined during crisis period. As a result demand for lorries and trucks used to transport tradable commodities from one destination to another destination declined which contributed to the decline in demand for Minerals, Fuels, Lubricants and related material (SITC-3) leading to the decrease in the exports of Fuels, Lubricants and related material (SITC-3). Results provided in column 4 of Table 21 favor this observation.

We find that except for Food and live animal (SITC-0) and Animal and vegetable oils, fats and waxes (SITC-4), all other sectors that require external financing reduce their foreign sales when they experience a rise in the interest rate. However, columns 3, 4, 7 and 11 in Table 21 show that an increase in interest rates leads to a significant reduction in exports of Beverages and tobacco (SITC-1), Crude materials, inedible except Fuel (SITC-2), Chemical and Related Products, n.e.s (SITC-5), Commodities and transactions not classified elsewhere in the SITC (SITC-9).

3.5.3 Sensitivity Analysis

We check the robustness of our results in two ways. First, instead of the lending interest rate, we use the overnight interbank rate as the proxy for cost of capital. However, the proxies to represent financial vulnerability of the sector; EXTFIN, TCRED and LEVERAGE remain the same. Second, we apply the instrumental variable (IV) technique to estimate our model because current period exports may be driven by previous period exports and may become endogenous. If this is the case then OLS gives biased and inconsistent estimates whereas the IV approach takes care of endogeneity problems and gives unbiased and consistent estimates.

3.5.4 An alternative Proxy for Cost of Capital

Table 22 reports the results when we use external finance as a proxy for financial dependence of a sector and the overnight interbank rate as a proxy for the cost of capital. Once again, columns 2, 3 and 4 of the Table 22 show that in the presence of a higher overnight interbank rate, the UK exports less in the sectors which depend more on external resources. Likewise, we find that the tendency of decline in the UK sector level exports in response to a rise in the overnight interbank rate became stronger and statistically significant during the 2007-2009 financial crisis when overnight interbank rates shot up. Hence, our findings that sector level exports of the UK are finance dependent and become vulnerable when financial markets face liquidity crisis does not change with the change in the proxy for cost of capital. Indeed, Table 22 shows that financial variables of the UK significantly affect UK exports. Moreover, importing country financial variables like interest rates and claims on the private sector play a significant role in explaining the variations in UK sector level exports. Furthermore, partner country GDP and capital-labor ratio significantly affect UK exports. This implies that demand side of the UK exports is as equally important as the supply side of the UK exports. This indicates that disruptions in financial markets exert their pressure on exports through interest rates, here the overnight interbank rate, and affect both demand and supply of exports significantly.

Overall, the results reported in Table 22 and in Tables B.1, B.2 and B.3 in Appendix B are similar to the results presented in the Tables 17, 18, 19 and 20. Only a slight variation in values of the parameters exists, but the sign and significance of parameters do not change when we use the overnight interbank rate as a proxy for the cost of capital instead of lending rate to measure cost of capital. On the whole, Table 22 and Tables B.1, B.2 and B.3 in Appendix B show that when the overnight interbank rate increases UK sector level exports contract. Furthermore, this contraction in exports in response to a rise in the overnight interbank rate occurs relatively more in sectors which depend

Table 22: External Finance and Overnight Interbank Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
IBrate * EXTFIN	-0.013*	-0.007	-0.007
	(0.007)	(0.007)	(0.007)
D_Crisis * IBrate * EXTFIN		-0.015***	-0.014**
		(0.005)	(0.005)
IBrate * Pvt_Claims			0.010***
			(0.002)
UK Interest Rate	0.003	-0.0003	-0.005
	(0.011)	(0.010)	(0.013)
Partner Interest Rate	-0.024*	-0.024*	-0.143***
	(0.012)	(0.012)	(0.026)
UK GDP	5.541*	5.114	5.652
	(3.055)	(3.039)	(3.551)
Partner GDP	1.002***	1.001***	1.070***
	(0.065)	(0.064)	(0.026)
UK K/L Ratio	-1.872**	-1.887**	-2.350***
	(0.676)	(0.674)	(0.689)
Partner K/L Ratio	0.546***	0.545***	0.617***
	(0.089)	(0.089)	(0.035)
N	13916	13916	12566
r2	0.939	0.939	0.935

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

more on external finance, have lower access to buyer-supplier trade credit and have lower values of the leverage. In addition, this response of UK exports to changes in the overnight interbank rate intensified further during the 2007-2009 financial crisis.

In sum, the results reported in Table 22 and in Tables B.1, B.2 and B.3 in Appendix B indicate that our results are robust and do not change with the change in proxy used to measure the cost of capital. UK exports behave in a similar way in response to variations in overnight interbank rates and in response to fluctuations in the lending rates which we have used to measure the cost of capital.

3.5.5 Instrumental Variable (IV) Technique

Current period exports may depend on exports in the previous period. If this is the case then OLS estimates become inconsistent due to possible endogeneity between errors and the lagged dependent variable. Therefore, to resolve this problem and to get consistent estimates we estimate equation 3.4.2 using an instrumental variable approach.

Table 23 presents the results when we estimate equation 3.4.2 using the instrumental variable approach. Columns 2, 3 and 4 of Table 23 report the results when use LEVERAGE, EXTFIN and TCRED as proxies for financial dependency of the sector. Table 23 shows that previous period exports significantly determine current period exports. Moreover, coefficients of lag period exports in Table 23 indicate that previous period exports positively affect current exports. This finding suggests that the sectors which exported more in the previous period are likely to export more in the current period.

The results presented in Table 23 also suggest that the UK exports more in the sectors which are less dependent on external finance when they experience higher cost of capital. This intensity of decrease in exports due to rise in the cost of capital become more intensified during the financial crisis. For example Column 2 of the Table 23 shows that a one percent rise in the cost of the capital increases the exports of firms which have higher leverage value by 0.025 percent. This makes sense because normally the high leveraged firms are normally bigger in their sizes and can afford and manage to get funds from the banks even when the cost of the capital has increased. However, during the financial crisis of 2007-2009 the leveraged firms were unable to get the loans from banks because the banks were unable to give loans to bigger firms due to the lack of funds. The coefficient of the D_Crisis * IBrate * Fin Vul in Column 1 of the Table 23 shows this phenomenon.

This implies that even the high leveraged firms' exports declined during the financial crisis because they were unable to get funds to finance their production to fulfill their export orders during the financial crisis. The marginal decrease in the exports of the leveraged firms due to unavailability of the funds during the financial crisis of 2007-2009 is 0.024. In addition, Table 23 shows that a rise in the overnight interbank rate leads to

Table 23: IV Results new External Finance and Overnight Interbank Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
Fin vulnerability measure:	(LEVERAGE)	(TCRED)	(EXTFIN)
l.Exports	0.902***	0.901***	0.910***
	0.011	0.011	-0.008
IBrate * Fin Vul	0.025*	0.072***	-0.001**
	(0.013)	(0.017)	(0.001)
D_Crisis * IBrate * Fin Vul	-0.024***	-0.077***	-0.0001
	(0.007)	(0.028)	(0.001)
IBrate * Pvt_Claims	0.002*	0.002**	-0.002***
	(0.001)	(0.001)	(0.0003)
UK Interest Rate	-0.005	-0.005*	-0.003*
	(0.005)	(0.003)	(0.001)
Partner Interest Rate	-0.038**	-0.039**	0.019***
	(0.016)	(0.016)	(0.003)
UK GDP	1.498***	1.503***	0.910***
	(0.193)	(0.199)	(0.146)
Partner GDP	0.004	0.004	0.036
	(0.043)	(0.043)	(0.037)
UK K/L Ratio	-0.342***	-0.338***	-0.232***
	(0.065)	(0.066)	(0.044)
Partner K/L Ratio	0.004	0.005	0.045**
	(0.037)	(0.038)	(0.018)
N	11734	11734	12204
r2	0.351	0.352	0.353
Hansen Test	0.983	0.990	0.912

Robust Standard errors in parentheses, Standard errors are clustered by Partner
Time, Reporter, Partner and Sector fixed effects are controlled
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

a decline in UK exports, especially in the sectors which depend more on external finance, have lower access to buyer-supplier trade credit and have higher leverage values.

Moreover, Column 3 of the Table 23 indicates that UK firms with higher access to buyer-supplier trade credit export more relatively than the firms who are unable to get buyer-supplier trade credit to finance their production activities to fulfill their export orders. The coefficient of IBrate * Fin Vul Column 3 of the Table 23 shows that a one percent rise in the cost of the capital increases exports of firms which have a higher access to the buyer-supplier trade credit by 0.072 percent. However, the coefficient of the D_Crisis * IBrate * Fin Vul in Column 3 of the Table 23 indicates that during the financial crisis UK exports decreased by 0.077 percent. This implies that the financial crisis of 2007-2009 was so intensive that it had depleted the buyer-supplier credit and as a result UK exports decreased because firms were unable to get finances from the sources other than the formal financial institutions to finance their production activities to fulfill their export orders. This implies that financial crisis 2007-2009 has significantly decreased the exports of the firms who have lesser access to buyer-supplier trade credit.

Column 4 of the Table 23 shows the results when we use external finance as a proxy for financial vulnerability of a firm. The coefficient of the IBrate * Fin Vul in Column 4 of the Table 23 indicates that as the cost of capital increases the UK exports significantly decreases because it raises overall cost of the production and their prices which makes the UK goods less competitive in the international markets. As a results their demand decreases leading to decrease in the UK exports. Moreover, the exports decreases because some firms particularly the smaller firms cannot afford to get loan from the banks at a higher cost. So their productions and exports both fall. In addition, coefficient of the IBrate * Fin Vul in Column 4 of the Table 23 indicates that one percent rise in the cost of capital leads to 0.001 percent decrease in the UK exports. This intensity of the decrease in UK exports due to rise in the cost of capital intensified further during the financial crisis 2007-2009 when cost of capital i.e. the interest rate shot up. The coefficient of the D_Crisis * IBrate * Fin Vul in Column 4 of the Table 23 indicates that UK exports have decreased by 0.0001 percent due to one percent in the cost of the capital but this effect is statistically insignificant.

From supply side the other variables which effects the UK exports significantly include GDP of the UK, lending interest rates and the capital labor ratio of the UK. Results given in the Table 23 shows that GDP significantly increases the UK exports. Whereas the lending interest rates and the capital labor ratio of the UK significantly decrease the UK exports. However, lending interest rate is significant only in two models. Furthermore, one percent rise in the GDP of the UK increases the UK exports more than one percent. This implies that the UK exports increase with the increase in GDP of the UK . However, the negative coefficients of the capital labor ratio and the interest rates of the UK indicate that supply of the UK exports contracts with the increase in capital labor ratio and with the increase in interest rate.

On the demand side of the UK exports the Table 23 shows that partner country lending interest rates significantly reduces the UK exports. Whereas partner country claims on the private sector significantly increases the UK exports. This implies that the increase in financial resources of the consumers living in the trading partners of the UK significantly increases UK exports. However, the rise in lending interest rates or the cost of the financial resources of the consumers living in the trading partner countries significantly reduces UK exports.

Overall results shown in the Table 23 indicate that UK exports are significantly influenced by the financial variables of the UK as well as the financial variables of the trading partners. In simple words, both the supply and demand sides matters for UK exports.

Furthermore, we find that the negative impact of a rise in the cost of capital on exports of the sector which depends more on external finance, having limited access to trade credit

and higher values of leverage became stronger during the financial crisis 2007-2009. This implies that the 2007-2009 financial crisis has severely hit UK sector level exports.

Overall, Table 23 shows that exporting country's financial variables significantly explain the variations in exports. Similarly, the financial variables of importing country significantly explain the fluctuations in the UK sector level exports as well. Once more, we find that GDP and the capital labor ratio of the UK and partner country's claims on private sector significantly determine UK exports. In a nutshell our major findings do not change with the change in methodology adopted to estimate the model.

The results explained in Sections 3.5.3, 3.5.4 and 3.5.5 show that overall our findings are robust and remain consistent even if we change the proxy to measure cost of capital or if we change the technique to estimate the parameters of the model.

3.6 Conclusions

In this chapter we analyzed the impact of the 2007-2009 global financial crisis on UK trade with its major trading partners. Our sample covers monthly exports of ten sectors going to twenty five major importers of the UK from January 2002 to September 2011. We applied Ordinary Least Square (OLS) and Instrumental Variable (IV) techniques to estimate our empirical models. Exploiting variations in the cost of capital over time as well as fluctuations in financial vulnerability across different sectors, we show that credit conditions are an important channel through which financial turmoil affects the volume of UK exports. Specifically, we show that with higher lending rates and thus tighter credit market conditions UK exported less during the 2007-2009 financial crisis. Moreover, these negative effects become stronger for sectors with limited access to buyer-supplier trade credit, with fewer collateralizable assets and with higher dependency on external financing.

We also find that adverse credit conditions affect both the supply and demand sides of exports and play a significant role in determining the supply and demand for UK exports. We find that along with the financial conditions in the trading partners, the volume of GDP and capital labor ratios of the importing countries are the main factors in determining the demand for the UK exports, whereas the supply of the UK exports is driven by financial conditions, GDP and the capital-labor ratio of the UK.

In general, our findings imply that adverse credit conditions are an important channel through which financial turmoil transmits its effect to international trade flows of the UK. These effects of the credit crunch on UK exports hold even after controlling for GDP, the factors of production and the cost of capital in trading partners of the UK as well as the GDP and the capital-labor ratio of the UK. Moreover, our findings regarding the impact of financial conditions on the UK exports are robust and do not change with changes in the proxy used to represent the cost of capital or with change in the measure used to

represent financial dependency of the sector on external resources.

Overall, our findings suggest that policy interventions that reduce the cost of capital will be really helpful in reducing substantially the detrimental effects of severe financial disruptions on international trade flows.

Chapter 4

Trade Creation and Diversion Effects of the European Union

4.1 Introduction

Regionalism has re-emerged as one of the key developments in international trade relations. 511 Regional Trade Agreements (RTAs) have been notified to World Trade Organization (WTO) as of January, 2012, out of which 319 RTAs are in force. Among the RTAs 90 percent are Free Trade Areas (FTA) and 10 percent are Customs Unions (CU)[10]. **A Free Trade Area is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade. However, each member of the group is free to adopt and maintain any tariff or regulations on the trade with non-member country. However, a Custom Union is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade, plus a common external tariff on the trade with non-member countries**[11]. Most global trade takes place among the countries associated with these agreements. According to Clarete et al. (2003) 97 percent of international trade in 2000 was among the countries that had joined at least one of the RTAs. However, this share was 72 percent in 1990. Similarly, 21 Asia-Pacific Economic Cooperation (APEC) economies, collectively, account for 44 percent of world trade[12]. Likewise, in the context of European Union (EU), the EUCOM (2009) report states that EU is the chief economic area in the world with 30 percent of global GDP and 17 percent of the global trade.

Unification of the trade policies changes the consumption and production behavior of member and non-member countries. In addition, economic integration affects the welfare of the people living in member and non-member countries. These changes in consumption, production and in welfare can be measured in terms of trade creation and trade diversion generated by the RTAs. Trade creation (TC) takes place when production shifts to a low cost member country, and consumption shifts from domestic goods to imported goods. Trade diversion (TD) is a phenomenon in which production shifts to a low cost member country, which may not be the lowest in the world. Moreover, consumption shifts from imported goods of a non-member country to goods imported from a member country.

[10] For detail, see http://www.wto.org/english/tratop_e/region_e/region_e.htm 07-7-2012.
[11] see Figure 21 in Appendix C for levels of economic integration
[12] For detail, see http://www.ustr.gov/countries-regions/japan-korea-apec/apec 08-03-2010.

The mushroom growth of RTAs in the world and an unprecedented increase in the share of global trade taking place among the members of these RTAs catches the attention of researchers and economists to test the effects of RTAs on trade flows. A number of studies have explored the theoretical and empirical relations between economic integration and trade flows to seek the answers to questions such as how an RTA affects the trade flows of members and non-member countries? What are the channels through which an RTA affects the trade? For example, Viner (1950), Lipsey (1957),Bhagwati (1971), Gehrels (1956), Riezman (1979) and Kowalczyk (2000) have discussed the theoretical framework about trade creation, trade diversion and the welfare effects of an RTA. They have developed the conditions through which we can decide whether an RTA diverts or creates trade. Empirical investigations of RTAs and trade flows include the studies of Sayan (1998), Keuschnigg et al. (1996), Radelet (1997), Goto and Hamada (1999), Watcher (2005), Nguyen and Ezaki (2005), Sarker and Jayasinghe (2007), Georges (2008), Lee et al. (2008), Lambert and McKoy (2009), Datta and Kouliavtsev (2009) and Vollrath et al. (2009). These studies give mixed results for the RTA effects on the trade flows. Some of them conclude that an RTA creates trade and while the other studies point out that an RTA that diverts trade. Moreover,the effects of an RTA on trade flows vary from bloc to bloc and from commodity to commodity. These characteristics of the effects of an RTA on trade flows provides an incentive to carry out this analysis.

There are two main objectives of this chapter. First, to analyze the trade creation and trade diversion effects of an RTA considering all the commodity groups one by one. Second, when a new member joins an existing RTA, how much trade it creates and how much trade it diverts. The motivation behind the first objective is that the most of the existing studies explore the impact of RTAs on trade flows with reference to a single commodity or a single sector while few other studies use aggregate trade flows. However, an analysis based on a single sector will not paint the picture well to understand the impact of RTAs on trade flows. In other words, we cannot conclude from analysis based on a single sector which sectors will benefit and which sectors face losses from an RTA. Similarly, we cannot determine how much displacement in production and employment will occur in different sectors when an RTA is signed. Overall, generalization of conclusions about the effects of an RTA on trade flows, on the basis of single commodity or sector analysis, may lead to the wrong policy implications. A comprehensive, precise and result-oriented trade policy requires a detailed analysis of the effects of an RTA on all sectors of a country. Thus, in chapter we estimate the trade creation and trade diversion effects of the European Union (EU) considering all the ten major commodity groups classified by the Standard International Trade Classification (SITC).

Specifically, in this chapter we analyze the trade creation and trade diversion effects of

the European Union (EU). It is worth analyzing because the EU members have initiated the Single European Market (SEM) program to promote intra-EU trade and to create a competitive environment for firms operating in the EU member countries. In this program member countries agreed on the free flow of goods, persons and capital among the member countries. They also agreed to adopt a common external tariff. These measures may enhance intra-EU trade volume and raise the welfare of the people living in the EU. However, they may prove detrimental for the welfare as well as trade flows of the rest of the world. Thus, we explore trade creation and trade diversion effects of the EU for all commodity groups classified by the Standard International Trade Classification (SITC). Through this analysis we determine the commodity groups in which EU stimulate trade among member countries and the commodity groups in which the EU diverts trade from non-member countries to member countries. By carrying out this analysis we contribute to existing literature.

In fact, the European Union (EU) has gone through many extensions. From time to time new members have joined the EU. When a new country joins an RTA its pattern of trade with member countries and non-member countries changes due to changes in the external tariff for member and non-member countries. According to Baldwin and Wyplosz (2009) the EU applies a common external tariff for about 10000 products being imported from non-member countries. The average common external tariff rate applied on all products is about 6.5 percent. However, the common external tariff varies across the products. The common external tariff for the industrial goods is 4.1 percent whereas common external tariff on the agricultural product is 16.5 percent. The EU member countries' weighted mean applied tariff rates on the imports is given in the Table C.7 in Appendix C. The table shows that EU countries have increased their tariff on the goods imported from non-member countries from 1988 to 1995 and after that they have decreased their tariff on the imports from non-member countries gradually. The applied tariff on average and reached to 6.27 percent in 1995 from 3.59 percent in 1988 and then decreased gradually. This implies that discrimination against the imports from non-member countries has decreased over time, particularly after the 4^th and 5^th enlargement in the EU. Table C.12 in Appendix C also shows the similar trends in applied tariff rates. The table shows that the average effective applied tariff rate was more than four percent from 1988 to 1994, before the 4^th enlargement of the EU. This average effective applied tariff rate had decreased to almost three percent from 1995 to 2003, after the 4^th enlargement. With the extension of the EU membership to ten new eastern European countries

the average effective applied tariff rate had reduced further and became almost two percent from the 2004 to 2008. This reduction in average applied tariff rate implies that with the enlargement in the EU memberships, the competition in the EU markets has increased not only among the EU members but among the non-members as well because now there are greater number of the firms who are selling their goods in the EU markets. This reduction in the tariff on the imports from non-member countries is important for the non-EU countries because it indicates that the discrimination against the imports from the non-member countries has been reduced and their access to the EU markets has become relatively easier over the time though they have to compete with the member countries who have a duty free access to the EU markets. Extensions in the EU membership will increase the intra-EU trade but this increase in the intra-EU trade may be at the cost of decrease in the trade with non-member countries who do not have duty free access of the EU markets. The products coming to EU markets from the non-member countries have to pay tariff and have to face non-tariff barriers as well make them less competitive in the EU markets and their sale in the EU markets declines. As a result output and employment may fall in the non-member countries and the welfare of the people living in the non-member countries may decrease.

Thus, our second objective is to analyze the effects of the 4^{th} and 5^{th} extensions of the EU on the trade flows. The 4^{th} extension of the EU took place in 1995 in which four new members joined EU and the 5^{th} extension of the EU took place in 2004 in which ten new members joined the EU. Through this analysis we look into which commodity group and how much trade a new creates and in which commodity group and how much trade it diverts from non-members to member countries.

While carrying out our investigation, we use a correctly-specified gravity model developed by Kandogan (2005) to measure the effect of the EU on trade flows for a panel of 27 EU member countries. The EU 27 includes Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. We capture country-specific, time-specific, commodity group-specific characteristics affecting trade flows by incorporating country-specific, time-specific, commodity group-specific constants for each country, time and commodity group. Moreover, in our analysis we consider EU as custom union because EU countries impose a common external tariff on the imports coming from the non member countries.

Our results show that, generally, extensions of the EU have a positive impact on in-

ternational trade and increase trade among members. In particular we found that the EU's extension in 1995 increased the exports to member countries and decreased exports to non-member countries. However, the EU's extension in 2004 increases export to members without decreasing the exports to non-members. Furthermore, our results show that the EU extensions occurring in 1995 and in 2004 increased exports to members countries without decreasing exports to non-members in four out of ten commodity groups. However, both the extensions of the EU increased imports from member countries and decreased imports from non-member countries. Only in one commodity group both the extensions in the EU increased imports from member countries without decreasing the imports from non-member countries. Overall, our results show that both extensions resulted in import diversion and have resulted in relatively less export diversion. Export diversion has occurred in all the commodity groups except "Mineral, Fuels, Lubricants and related material", "Machinery and Transport Equipment", "Miscellaneous manufactured article" and in "Commodities and Transactions not classified elsewhere in the SITC". Whereas, import diversion has occurred in all the commodity groups except "Machinery and Transport Equipment".

The rest of the chapter is organized as follows. Section 4.2 presents a brief history of economic integration in the EU, followed by a literature review and the methodology in Sections 4.3 and 4.4, respectively. Section 4.5 discusses the results and Section 4.6 presents the conclusion.

4.2 The Background and A Brief History of Economic Integration in Europe

According to Baldwin and Wyplosz (2009) the European Union (EU) is the world's biggest trader and account for about 40 percent of the world trade. Furthermore, he states that EU's share of trade in services is even greater than 40 percent. EU's external trade policies are harmful to world's poorest countries because EU puts its highest barriers against the goods that these poor countries can export. From the perspective of the European integration, the most important factors that played a key role in increasing the trade between the European countries and in restoring the financial position of the European economies, were the establishment of the Organization for European Cooperation (OEEC) in 1948 and the European Payment Union (EPU) in 1950. The members of OEEC and EPU not only agreed to remove all the discriminatory trade measures and but also agreed to reduce the trade barriers by 25 percent of their original values. As a result the intra-Europe trade boomed and the volume of intra-Europe trade in 1958 reached at a level that was more than double the volume of intra-Europe trade in 1950 (Baldwin and Wyplosz, 2009). The tremendous growth in the trade between the OEEC countries provided an

opportunity to the member nations to accumulate substantial dollar reserves necessary to regain their financial stability.

In spite of the fact that OEEC had succeeded in reviving the economies of member countries, some members felt that OEEC was not enough for the deeper integration necessary to avoid future wars and for a stable restoration of the economic strength. Thus, six members of the OEEC, Belgium, France, Germany, Italy, Luxembourg and Netherlands moved forward and established the European Coal and Steel Community (ECSC) in 1952 and gave their coal and steel sectors that were considered as a backbone of the industrial economy, under a supranational authority. Important decisions like pricing, production and trade for these two critical sectors were given in the hands of this supranational authority. As a result the possibility of the war was reduced and these economies continued to grow remarkably economically.

Then, in 1957 these six countries signed two treaties in Rome and established European Economic Community (EEC) and European Atomic Energy Community (EAEC) and moved forward to a broader economic integration. Later, the institutions of the ECSC and EEC and EAEC were merged into the European Communities (EC) in 1965. Instead of coming from the members' national parliaments, the European Union Parliament was elected directly in the 1979 for the first time. The Rome Treaty was a far reaching document for the integration of the Europe because in this treaty the six nations not only had agreed to remove all tariffs and quotas on intra-EEC trade but also agreed to adopt a common external tariff on the imports from non-member countries. In addition, they agreed on free mobility of the labor, capital market integration, free trade in services and on a wide range of common policies. According to the Rome treaty they promised to remove all quotas and tariffs on intra-EEC trade in three stages and each stage was consisted of four years.

However, they achieved their objective, the removal of quotas and tariffs on intra-EEC trade, almost a year and half before the schedule. The EEC members set a common external tariff using simple arithmetic average of their pre-EEC tariffs. By this formula Italy and France had to lower their tariff, Belgium, Luxembourg and Netherlands had to raise their tariff, whereas the common external tariff of Germany almost remained the same. As a result the unprecedented economic growth and prosperity started in these economies leading to an immense growth in intra-EEC trade. According to during the formation of the EEC Baldwin and Wyplosz (2009) the share of intra-EEC trade increased from about 30 percent to 50 percent whereas the share of other EEC imports coming from other six European countries decreased from 8 percent to 7 percent. Furthermore, Baldwin and Wyplosz (2009) reported that during the era of golden age of growth, 1950-1975, average unemployment in European countries was 2.5 percent and their incomes

were either doubled, as in France, Belgium and Netherlands, or tripled as in Germany and Italy.

Preferential reduction of the tariff and other trade barrier within EEC and within EFTA but not across the EEC and AFTA caused the discrimination for EEC-based and EFTA based firms to access each others markets. As a result the profits and the profit-oriented opportunities for the exporters in each group had reduced over time. The loss of profit and profit-oriented opportunities was relatively more for the exporters of the AFTA group because the GDP and the potential market size of 6 EEC economies was more than twice the GDP and the potential market size of the EFTA economies. Moreover, the incomes of EEC economies were growing twice as fast as that the incomes of the EFTA economies. Therefore, the EEC club became relatively more attractive than the EFTA club for the exporters and ultimately generated the forces in favor of the EEC enlargement and non-EEC countries started to think about joining the EEC.

Realizing that the AFTA is not a substitute for the free trade access to the EEC markets because the EEC performance was excellent and their economies were growing remarkably, the United Kingdom was the first from the EFTA member applied for the EEC membership in 1961 and joined the EEC in 1973. When United Kingdom will become the member of the EEC the other AFTA nations have to face discrimination even in bigger markets because the United Kingdom will also impose tariff on the imports from the non-member countries. This fear of discrimination generated a tendency to join the EEC in other members of the EFTA as well. Keeping in view the keenness of the AFTA member to join the EEC, the ECC enlargement was started and till today EEC membership has been extended six times.

The first enlargement in EEC took place in 1973 in which Denmark, Ireland and United Kingdom joined the EEC. Later, Greece joined the EEC in 1981 in the second enlargement of the EEC followed by Portugal and Spain who joined the EEC in 1986 in the third expansion of the EEC. The extensions in the EEC membership extended the market for the firms of the EEC countries because now they can sell their products in a bigger market. As a result, the production, employment and the exports of the firms operating in the member states increased leading to the overall increase in the output, employment and intra-EEC trade of the member countries. In turn, the economic development became the fate of these countries. Along with removing the tariffs and quotas on intra-EEC trade the EEC countries erected a series of technical barriers to trade (TBT) such as technical standards, industrial regulations, capital controls, preferential public procurements, administrative and frontier formalities. Although these technical barriers were adopted to protect consumers, workers and environment but they differ from member to member because the laws and regulations concerning the protection of consumers, workers and

environment were not same in the member countries. However, these barriers were restricting the intra-EEC trade substantially. Thus to harmonize these technical standards and regulations the Single Market Programme was initiated. The EEC was promoted to the Single Market in 1993 by providing four freedoms. These freedoms include the free movement of goods, services, people and money across the member countries of the European Union. These freedoms enhanced the development process further and proved a mile stone in the economic development of the region.

The Single European Market programme strengthened the economic integration process in the EEC countries and non-EEC countries once again found themselves threatened by the discriminatory effects of the integration in the European Union. The AFTA nations reacted to this programme and formed European Economic Area (EEA) which served as single market for AFTA countries, and many of them also applied for the European Union's membership. However, Austria, Finland and Sweden only managed to join the European Union in the fourth enlargement of the European Union in 1995.

Moreover, with the fall of the Union of Soviet Socialist Republics (USSR), the central and eastern European countries were keen to join the EU and were eager to have a free trade access to a big EU market. To get a free trade access to the European market was a commercial necessity of the newly freed eastern and central countries. Therefore, to extend the enlargement process to these states the European Council formulated the accession criteria in 1993 at Copenhagen. According to these criteria, accession could take place as soon as a perspective member country satisfies the economic and political conditions required for membership. These economic and political conditions are known as the Copenhagen Criteria[13].

The Maastricht Treaty was signed in 1992 to promote a balanced development of economic activities including sustainable growth with low inflation, higher quality of life, and social and economic unity among the members[14]. The Treaty came in to force in 1993. The Maastricht Accord took the EU to a higher level of economic integration by establishing the Monetary and Economic Union. This Monetary Union resulted in the creation of a single currency EURO for the member countries.

In the fourth enlargement of the EU, Austria, Finland and Sweden joined the EU in 1995. The Euro zone was created by replacing the national currencies with EURO notes and coins of 12 member states in 2002. Another big extension in membership of EU took place in 2004 when ten eastern and central European countries gained the membership of EU. The new members were Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Hungary,

[13]Copenhagen Criteria, European Commission Enlargement Process, for detail see http://ec.europa.eu/enlargement/enlargement_process/accession_process/criteria/index_en.h.

[14]The Maastricht Treaty, article 2, for detail see http://www.eurotreaties.com/maastrichtec.pdf.

Malta, Poland, Slovenia and Slovakia. Later in January 2007 Romania and Bulgaria joined the EU. Croatia, Macedonia and Turkey are on the waiting list to join the EU.

Along with the joining the EU, the EU member countries have signed regional trade agreements with other countries as well which play an important role in promoting trade with non-members countries as well. The details of these agreements are given in Table C.1 in Appendix C. However, in this chapter we only consider European Union (EU) in our analysis to measure of the impact of the EU on trade flows of the member and non-member countries. We only consider EU because according to EUCOM (2009) EU is the chief economic area in the world with 30 percent of global GDP and 17 percent of the global trade. Moreover, its membership has been extended several times and currently consists of 27 member countries. According to Baldwin and Wyplosz (2009) EU accounts for more than 40 percent share of world trade in services. Furthermore, he states that almost 90 percent of EU exports consist of manufactured goods and about half of all exports are machinery and transport equipments. With regards to imports Baldwin and Wyplosz (2009) reports that two out three euros spent on imports goes to purchase manufactured goods. Moreover, about one in every five euros spent on imports goes to the pay for fuel. The EU also puts its highest trade barriers on the goods being imported from the non-member countries particularly on the imports from poor countries of the world.

The EU applies a common external tariff on the imports from the non-members countries. This tariff provide an edge to countries who enjoy a duty free access of the EU markets over the countries who do not have this duty free access of EU markets. According to Baldwin and Wyplosz (2009) the EU applies a common external tariff for about 10000 products being imported from non-member countries. The average common external tariff rate applied on all products is about 6.5 percent. However, the common external tariff varies across the products. The common external tariff for the industrial goods is 4.1 percent whereas common external tariff on the agricultural product is 16.5 percent. The EU member countries' weighted mean applied tariff rates on the imports is given in the Table C.7 in Appendix C. The table shows that EU countries have increased their tariff on the goods imported from non-member countries from 1988 to 1995 and after that they have decreased their tariff on the imports from non-member countries gradually. The applied tariff on average and reached to 6.27 percent in 1995 from 3.59 percent in 1988 and then decreased gradually. This implies that discrimination against the imports from non-member countries has decreased over time, particularly after the 4^th and 5^th enlargement in the EU. Table C.12 in Appendix C also shows the similar trends in applied tariff rates. The table shows that the average effective

applied tariff rate was more than four percent from 1988 to 1994, before the 4^th enlargement of the EU. This average effective applied tariff rate had decreased to almost three percent from 1995 to 2003, after the 4^th enlargement. With the extension of the EU membership to ten new eastern European countries the average effective applied tariff rate had reduced further and became almost two percent from the 2004 to 2008. This reduction in average applied tariff rate implies that with the enlargement in the EU memberships, the competition in the EU markets has increased not only among the EU members but among the non-members as well because now there are greater number of the firms who are selling their good in the EU markets. This reduction in the tariff on the imports from non-member countries are important for the non-EU countries because it indicates that the discrimination against the imports from the non-member countries has been reduced and their access to the EU markets has become relatively easier over the time though they have to compete with the member countries who have a duty free access to the EU markets. Extensions in the EU membership will increase the intra-EU trade but this increase in the intra-EU trade may be at the cost of decrease in the trade with non-member countries who do not have duty free access of the EU markets. The products coming to EU markets from the non-member countries have to pay tariff and have to face non-tariff barriers as well make them less competitive in the EU markets and their sale in the EU markets declines. As a result output and employment may fall in the non-member countries and the welfare of the people living in the non-member countries may decrease.

Thus, time and again extensions in EU and its journey towards deeper integration add to the importance of investigating the effects of extensions in the EU on the trade flows of the member and non-member countries. It is important to analyze because when a new member joins the EU its international trade increases with members because its goods can move freely in the markets of members countries and become relatively cheaper which attracts more customers as compared to when it was not a member. Moreover, all the countries who have joined the EU differ in their economic sizes and in terms of their economic resources. Therefore, the benefits and the costs of joining the EU may vary from country to country. Some characteristics of the EU members are given in Tables C.12 and C.7 in Appendix C. These tables show that over the period of time the weighted applied tariff has been reduced and EU countries vary considerably in terms of their economic sizes and in terms of their economic resources. This variation in the economic sizes and in their economic resources may have different trade creation and trade diversion effects when they join the EU. Thus, in this chapter we look into how the 4^{th} and 5^{th} extensions

in the EU affected the trade flows of affiliates. How did the 4^{th} and 5^{th} extensions in the EU alter the trade patterns of non-member countries? Have these extensions in the EU membership led to trade creation or to trade diversion? We consider only the 4^{th} and 5^{th} extension of the EU in this chapter due to two reasons. First, because the thirteen new members have joined in these two extensions. Second, a comprehensive commodity group level data of imports and exports is available from 1988 and onward which covers these two extensions comprehensively.

4.3 Literature Review

The fundamental question regarding how an RTA although the EU is a customs union affects the trade flows is as important now as at the beginning of the process. What are the channels through which regional economic integration transmits its effects on member and non-member nations? How do these trading pacts change the welfare of intra bloc, extra bloc and the welfare of the global community? These questions need to be considered to be able to evaluate the performance of the preferential trading agreements. Many studies in the existing literature provide the theoretical and empirical insights on these issues.

The theoretical framework for economic integration analysis is linked with the seminal paper of Viner (1950). In this paper Viner (1950) explains the trade creation, trade diversion and the welfare effects of a customs union. He argues that if trade creation is higher than trade diversion then the union will raise welfare and if trade diversion is higher than trade creation then it will reduce welfare of the member states.

Lipsey (1957) states that Viner (1950) has assumed fixed consumption as a sufficient condition for trade-diverting custom union. Lipsey (1957) allowed substitution in consumption and demonstrated that a custom union increases welfare when trade diversion is higher than the trade creation. However, this case is valid only if the country forming the custom union increase the volume of total imports from member country than the volume of import which she was importing from non-member country. Secondly, the terms of trade must be better after forming the custom union and importing from the member country than the terms of trade from not forming the custom union and importing from the non-member country. Thus, the assumptions of this case are very strong and may not fulfill in real world. If her imports remains constant after forming a custom union then trade diversion higher than the trade creation will always lead to a decrease in the welfare.

Now that we know that the condition for welfare improvements of a union depends on the assumptions made for the analysis of association, by changing assumptions of the model, the conditions for the welfare enhancing customs union will change. Bhagwati (1971) interprets Viner's theory under the assumption of production variability within the general equilibrium model. He points out that in the absence of substitution in con-

sumption the sufficient condition to make custom union welfare reducing is not the fixed consumption but fixed level of imports. Gehrels (1956) argues that if we consider only the production effects then Viner analysis underestimates the benefits of a custom unions to member countries and gives biased results.

Riezman (1979) incorporates terms of trade effects into customs union analysis and reveals that pre-agreement small mutual trade among members is a sufficient condition to benefit from a customs union. Kowalczyk (2000) also uses terms of trade and volume of trade to explain trade creation and trade diversion effects of the trading bloc. He supports the findings of Riezman (1979) and Lipsey (1957) regarding the pre-agreement trade volume to select the partner country to establish the union. However, he articulates that given the total volume of imports of a country who imports larger share of goods from the member country and lesser share of goods from the non-member country , if the country is small and can discriminate among its trading partners through preferential tariff strategy, the goods imported from member country and non-member country are substitutes and the members are ready to reduce their mutual tariff rate equiproportionately then the best choice for a small country is to go for membership of multiple trade areas.

Recently, Baier and Bergstrand (2004) says that net welfare gain/loss of the two countries FTA depends on trade creation and the trade diversion of the members and has categorized the three economic determinants of the trade creation and trade diversion. These determinants include economic geographic factors, intra-industry trade determinants, and inter-industry trade determinants. Furthermore, Baier and Bergstrand (2004) state that trade creation is greater the closer are the two countries, and trade diversion is less the remote are the two trading partners from the rest of the world because the trade among the countries that are far from each other is less as compared to the trade among the countries that are closer to each other. In addition, the trade creation is greater the larger and more similar two countries are in their economic sizes, and trade diversion is lesser the smaller is the economic size of the rest of the world. Moreover, trade creation is greater the wider are difference between the relative factor endowments of the two countries, and trade diversion is lesser the smaller are the difference between the factor endowments of the member countries and that of the rest of the world.

After discussing the papers on theoretical developments on economic integration analysis, let's see what the data say. Do the data support or contradict the theoretical findings regarding the impact of economic integration on trade flows? So for most of the researchers who assessed the impact of economic integration on trade flows empirically presented mixed results. However, researchers who study the effect of regional integration on flow of goods and services crossing the border of a country conclude that, on the whole, RTAs are beneficial to the member countries. Cooper (2006) divides the existing empirical

findings into three groups: The first group consists of studies that oppose the integration and consider regional integration as a stumbling bloc to global trade liberalization. The second group includes studies that supports economic integration and considers it as a building bloc to global trade liberalization. The third group encircles the papers that generally oppose the bloc formation because they believe that impact of trade liberalization on labor in import-sensitive sectors and on environment is not good instead of presenting the trade diversion effects of an association to oppose the establishment of the union.

Researchers who believe that the establishment of free trade area is good for multilateral free trade argue that the formation of a union spurts competition and increases trade among members. For example, Sayan (1998), Keuschnigg et al. (1996), Radelet (1997), Goto and Hamada (1999), Watcher (2005), Nguyen and Ezaki (2005), Fredrik (2006), Sarker and Jayasinghe (2007), Georges (2008), Lambert and McKoy (2009)and Vollrath et al. (2009) have found that regional trade agreements increase trade among the members of the bloc. **However, Kono (2002) has shown that regional trade agreements can hinder or support multilateral trade liberalization under certain conditions. In these conditions Kono (2002) gives a key position to members intra and extra-FTA comparative advantage. He states that members with similar intra and extra-FTA comparative advantages liberalize trade more rapidly than the members with dis-similar intra and extra-FTA comparative advantages.**

In contrast, the first group of economists in Cooper (2006) classification base their arguments on the trade diversion effect of a free trade area. They believe that free trade areas are a stumbling bloc for global trade liberalization. For instance, Fredrik (2006), Clausing (2001), Cuyvers (1997), Lee et al. (2008), Datta and Kouliavtsev (2009) and Vollrath et al. (2009) who report trade diversion in their analysis of the impact of regional integration on trade flows. Their findings show that formation of free trade area increases trade among member countries at the cost of a decrease in trade with non-member nations.

The third group of economist in Cooper (2006) classification argues that FTA-led shifts in production activities to low cost partner countries lead to unemployment in countries whose firms are comparatively high cost. As a result, the life standard of labor worsens, comparatively, in high cost countries. In addition to poor quality of life, these economists oppose the trade liberalization in the bloc because it degrades environment due to over utilization of natural resources. They say that FTA-led de-location of the firm from high cost countries to relatively low cost member states creates environmental problems. Lindsey (2004) demonstrates that multinational corporations shift jobs to the countries where wages are lowest and environmental regulations are not strict. Honeck (2004) shows that 19 percent of job loss in manufacturing sector of Ohio State was due to

the NAFTA-led increase in imports to Ohio.

The effects of economic integration are not the same across the board. The effects vary from bloc to bloc, depending on the period of investigation as well as the commodities and countries involved. Soloaga and Alan (2001) found no indication that regionalism boosts intra-bloc trade. Their findings also indicate that the EU and European Free Trade Association (EFTA) result in diversion in the case of non-fuel trade. Balassa (1967) demonstrates that the European Common Market (ECM) promotes intra-bloc trade in the cases of non-durable consumption and manufactured goods. In the case of machinery and transport equipment, ECM boosts trade with the rest of the world. Kandogan (2005) shows that majority of the Europe's liberalization agreements have been welfare improving for all the partners involved, in all sectors, particularly, in human and physical capital-intensive sectors. Furthermore, he shows that EU partners have experienced welfare losses in labor-intensive sectors. Similarly, Baier and Bergstrand (2007) also have presented the evidence that free trade agreements increase trade among the members.

Moreover, Baldwin and Venables (1995) states that regional integration agreements seem to have generated welfare gains for the member countries but possibly negative spillovers on to the non-member countries. Clarete et al. (2003) estimate the effects of regionalism on trade flows in Asia and show that 9 out of 11 preferential trade agreements (PTAs) divert trade. In their analysis, it turns out that only two PTAs increase trade among members without affecting trade with the rest of the world. Similarly, Carrere (2006) analyzed seven different regional trade agreements and found that in general, these regional trade agreements increase trade among members and reduce trade with the rest of the world, suggesting the evidence of trade diversion. In a similar vein, Lambert and McKoy (2009) analyze the impact of preferential trade associations on food and agricultural trade. Their findings demonstrate that preferential trade association formation is helpful in increasing the trade among members as well as with non-members in both agricultural and food trade. Furthermore, they show that associations formed by developing countries result in trade diversion.

In fact, economic integration of the countries affects trade and changes the consumption and production patterns of member countries through two channels. First, the scale and competition channel. Second, the trade and location channel. Scale and competition encourage production, employment and stimulate the flow of free trade but only among members. Trade and location channel deals with the shifts in production activities, changes in employment and trade patterns of member and non-member countries.

The removal of trade barriers generates greater competition among the member economies and expands the market for producers of the member countries. Competition among domestic industries improves the productive efficiency of local producers and enhances the

quality and quantity of the product available in the economy. Cooper (2006) and Clarete et al. (2003) argue that economic integration creates a bigger market for the producers of member nations and generates more opportunities for them to export their products, ultimately leading to more business and employment. Similarly, Wacziarg (1999) reports that by increasing the size of the market and competition, trade openness policies provide an opportunity to the trading nations to reap the expected benefits of increasing return to scale. However, the benefits of the trade openness among the members of a custom union will be lower than the trade openness at global level because the market size of a custom union in which a member country can supply its products will be smaller than the size of global market.

However, policy-generated competition among producers may create non-optimal pattern of specialization. The distribution of resources among different products and countries within an RTA may not be the true representative of the distribution of resources under the global free trade. Panagariya (1994) argues that specialization stimulated by preferential trade associations is not optimal under universal free trade because a capital rich country within the association may also be a labor rich country in the world. Hence, the RTA-led reshuffling of resources among different products may switch labor-intensive products into capital-intensive products after joining the RTA. Consequently, an RTA may go against the spirit of the Heckscher-Ohlin model of trade[15].

The economic benefits of regional trade agreement depend on the degree of comparative advantage of the perspective member states. The Ricardian model of international trade illustrates that the difference in comparative advantage in different products results in gains for both countries through specialization. The comparative advantage of a member country relative to the other member states of the RTA and relative to rest of the world determines the benefits and cost for a particular member country of the RTA.

The comparative advantage of a country in some products may change after joining the PTA due to the transportation cost involved in supplying the product to other members of the PTA. The distance between the origin and destination country determines the transportation costs and results in the variation of prices of the same goods across the region.

However, transportation cost adversely affects agricultural trade more as compared to the trade of other durable products because agricultural goods are perishable in nature and require extra care and special vehicles to transport them. The extra care and refrigeration increase the transportation cost and the prices of agricultural product for the end user

[15]Heckscher-Ohlin model says that a country should produce and export the goods which uses the abundant factor of production of the country in more proportion and import that product which uses its scarce factor of production more.

although not all agricultural goods require refrigeration. As a result agricultural goods trade becomes more sensitive to the distances among the trading partners as compared to the industrial products trade. Vollrath et al. (2009) have confirmed this hypothesis while analyzing the factors determining the trade flows in agriculture and clothing.

The existing literature presents the mixed kind of the results with reference to the effects of economic integration on trade flows. Some studies say regional economic integration generates trade among the members without affecting the trade with nonmembers, while, some other papers present that economic integration leads to trade diversion. Most of the studies cover a single sector agriculture or manufacturing sector in their analysis. However, a comprehensive studies covering all sectors of the economy and all the commodity groups to evaluate the impact of regional trade agreements on trade flows, particularly with reference to the new members joining the existing trade agreement are scarce in the existing literature. The earlier studies analyze the impact of extensions in the trade agreements on overall trade flows or on sector level imports and exports. In this chapter we analyze the impact of the 4^{th} and 5^{th} extensions of the European Union (EU) on the imports and exports of all commodity groups classified by the Standard International Trade Classification (SITC) and for each new member joining the EU in these two extension.

4.4 Empirical Model and Methodology

The effects of economic integration is normally viewed in the form of trade creation (TC) and trade diversion (TD) and its overall gross impact on trade (GTC)[16]. The TC effect reflects an increase in the trade flows among member countries. The TD represents the replacement of the trade flows from non-members especially low cost non-partners to the partner countries. While, gross effect considers the combined impact of the TD and TC, which shows as an increase of trade among the signatories of the agreement.

To date researchers have used different methodologies to evaluate the effects of regional integration. For example Truman (1969) used market share of imports in consumption to judge trade creation and trade diversion in the EEC. Balassa (1967) and Mordechai (1969) used import demand equations for analysis of the trade creation and trade diversion effects of EEC. However, none of these methodologies can be applied to measure the effect of the extensions in the EU on trade flows countries because the data requirement to use these methodologies could not be met from the available sources of the data. The procedures require data on prices of the commodities, which is not available for EU countries. Therefore, following Kandogan (2005), our methodology to measure trade creation and trade diversion effects of the extensions in the EU is based on analyzing the error terms of the correctly specified fixed effect gravity model which does not require the data on the prices

[16]See Pelzman (1977).

of goods directly to make the analysis.

The gravity equation model is the most widely used approach to assess the impact of bilateral trade or multilateral trade. Tinbergen (1962) and Poyhonen (1963) initiated the usage of the simple gravity model without any economic foundations for evaluation of the volume of international trade flows. Later on, with some modifications Pelzman (1977), Anderson (1979), Krugman (1987), Bergstrand (1989), Deardorff (1998), Evenett and Keller (2002), Frankel and Rose (2002), Anderson and Van Wincoop (2004) applied the gravity model to reveal the impact of regionalization on the trade flows. The researchers developed micro foundations for the gravity model and amended the gravity model to make it consistent with different trade theories.

Although the gravity model is the favored tool in measuring the trade creation and trade diversion effects of an RTA, the literature differs vastly on the variables that should be included in the empirical model. The traditional gravity model of Tinbergen (1962) and Poyhonen (1963) explain as the volume of bilateral trade between two countries by the size of their economies and the geographical distance between them. These models also included trade-promoting time invariant factors such as a common border, common language, colonial relationship etc to explain bilateral trade. These variables explain bilateral trade from different aspects. For example, in order to give the touch of competing trade theories such as Heckscher-Ohlin Theory and Increasing Return Theory, Balassa (1986), Balassa and Bauwens (1987) and Helpman (1987) introduced the measure of relative factor endowment and the measure of similarity of the trading economies, in to the gravity model. The monetary variables play an important role in explaining the trade flows. Therefore, over time researchers have added the variables such as real exchange rates, exchange rates uncertainty, and foreign exchange reserves to gravity model. Particularly, Bergstrand (1985) and Bayoumi and Eichengreen (1997) augmented the gravity model with real exchange rates, Thursby and Thursby (1987) added exchange rate uncertainty and Mátyás (1997) and Kandogan (2005) included foreign exchange reserves in the gravity model.

It is a very common practice in literature to include the bloc dummy in the gravity model to test the significance of regional trade agreements on trade volumes. For instance, Baldwin and Venables (1995), Frankel (1997), Soloaga and Alan (2001), Lambert and McKoy (2009) and Vollrath et al. (2009) include a dummy variable to measure the impact of a regional trade agreement in the gravity model. A positive and significant of coefficient for the dummy variable is interpreted as the trade creation effect of the trade agreement. However, on the basis of econometric issues like averaging over time and restricting the same parameters for all time periods, and also the same coefficients for imports and exports, Wang and Winters (1992), Baldwin (1994) and Polak (1996) criticized the use of

the dummy variables directly in the gravity model and termed the inferences drawn from this model as incorrect and misleading. Later, in order to address these issues Mátyás (1997) proposed a triple indexed gravity model in which he used separate constants for each time period, each importer and for each exporter in the gravity model. Furthermore, Egger (2000) Egger and Pfaffermayr (2003) and Kandogan (2005) introduced a bilateral interaction dummy in the correctly specified gravity model of Mátyás (1997) to control for time-invariant country pair fixed effects. We use this model in our analysis to capture trade creation and trade diversion effects of the EU. More detailed discussion on the development of Gravity model is given in Kandogan (2005), Carrere (2006) and Vollrath et al. (2009).

4.4.1 Empirical Model

We use correctly-specified fixed effect gravity model used by Kandogan (2005) to estimate the effects of extension in the EU on the trade flows. Along with time, importer, exporter, bilateral fixed effects we also include commodity-group fixed effects as well. This will capture commodity group-specific time invariant characteristics which affect trade flows of the commodities pertaining to that particular group. The model is given below.

$$M_{ijts} = \lambda_t + \alpha_i + \gamma_j + \delta ij + \theta_s + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 d_{ij} + \beta_4 \triangle e_{ijt} + \beta_5 R_{it} + \beta_6 R_{jt} + \beta_7 SIM_{ijt} + \beta_8 RF_{ijt} + \beta_9 COL_{ij} + \beta_{10} CL_{ij} + \beta_{11} CB_{ij} + \varepsilon_{ijt} \tag{4.4.1}$$

where M_{ijts} is real imports of commodity group s of country i from country j at time t. $\lambda_t, \alpha_i, \gamma_j$, θ_s and δij denote year, importer, exporter, commodity group, and bilateral interaction fixed effects, respectively. Year fixed effects, λ_t, captures time varying factors that influence the volume of imports from all countries. Importer fixed effects, α_i, captures the effect of time-invariant characteristics of the importer that influence the volume of imports. Exporter fixed effects, γ_j, captures the effect of time-invariant characteristics of the exporter that influence the volume of its exports. θ_s capture commodity group specific characteristics that influence the trade flows of that particular commodity group. Finally, bilateral fixed effects, δ_{ij}, allows us to capture the effect of time-invariant bilateral characteristics country pair that influences the volume of trade between exporting and importing countries.

Furthermore, the demand and supply sides of the imports are represented by real GDP of the importing and exporting countries and denoted by Y_{it} and Y_{jt}, respectively in the model. Theoretically, when income changes the structure of final demand changes leading to changes in the demand for imports. In fact, real GDP of the importing country indicates the potential demand for imports and has a positive impact on the demand for

imports. Thus, we expect a positive sign for β_1. Furthermore, real GDP of the importing country also represents the size of the market for export. The greater the GDP of importer country the bigger the size of market for potential exports. When the size of market for exports grow, exports also increase which also indicates a positive relation between the real GDP of the importer country and imports. On the other hand, the supply side of international trade is covered by using the real GDP of the exporting country. As the GDP of a country grows, its capacity to export goods and services to other countries, after meeting the domestic demand increases. Therefore, we expect a positive sign for β_2. However, if the rise in GDP leads to relatively higher domestic demand, then this may lead to a decrease in exports. Thus, β_2 can also have a negative sign. $\triangle e_{ijt}$ represents the bilateral real exchange rate and is used to capture the effects of fluctuations in domestic currency on trade flows. We use the official exchange rate as a measure of the exchange rate. Generally, imports decrease with depreciation of domestic currency and increase with the appreciation of the domestic currency. Therefore, expected sign of the coefficient of the $\triangle e_{ijt}$ is negative.

d_{ij} is the geographical distance between importing and exporting countries. This is used as the proxy for the transportation cost of goods being imported. The larger the distance between the importer and exporter countries is, the higher will be the transportation cost. This raises the price of the product to the end user and ultimately reduces trade flows among the countries which are far from each other. Thus, we expect a negative sign for the coefficient of d_{ij}. This also caters for the fact that neighboring countries will trade more.

R_i and R_j are foreign exchange reserves of importing and exporting countries respectively. Basically R_i and R_j provide the stability to the exchange rates of the importing and exporting countries. The more the foreign exchange reserves of a country are, the more stable its exchange rate will be and stability of exchange rate leads to increase in the trade flows. Thus, R_i and R_j affect trade flows among the trading partners indirectly through providing the stability to the exchange rate which is closely related with cross border sale of the goods and services. We expect positive signs for the coefficients of the R_{it} and R_{jt}.

SIM is a similarity index and denotes the similarity in economic sizes of the importer and exporter countries. Following the Kandogan (2005) we calculate SIM using the formula given below.

$$SIM = ln[1 - (\frac{Y_{it}}{Y_{it} + Y_{jt}})^2 - (\frac{Y_{jt}}{Y_{it} + Y_{jt}})^2] \tag{4.4.2}$$

In fact, SIM captures the similarity of country i and j at time t in terms of their

GDP. The above formula shows that when two countries are of equal sizes then the term in side the brackets takes the value of 0.5 and decreases as the countries diverge in their sizes.

RF denotes the relative factor endowment and in the words of Kandogan (2005) measures the distance between trading partners in terms of their relative factor endowments. RF is calculated as below.

$$RF_{ij} = |ln[\frac{K_{it}}{L_{it}}] - ln[\frac{K_{jt}}{L_{jt}}]| \tag{4.4.3}$$

where K_{it} and L_{it} shows the capital stock and labor force of the importer country at time t, respectively. K_{jt} and L_{jt} shows the capital stock and labor force of the exporter country at time t, respectively. When country i and country j have the same factor endowment then RF_{ij} takes the value zero, and RF increases as the difference between the relative factor endowments of country i and j increases. In order to calculate capital stock required to calculate RF, we follow Kandogan (2005) and use perpetual inventory method given below.

$$K_{i1} = 5(GFCF_{i0} + GFCF_{i1}) \tag{4.4.4}$$

$$K_{it} = 0.9K_{it-1} + GFCF_{it} \tag{4.4.5}$$

where $GFCF_{it}$ is the gross fixed capital formation in country i at time t. We assume that the capital stock depreciates at a constant rate of 10 percent.

COL, CL and CB are the dummy variables and capture the effects of previous colonial relationship, common language, and common border between the trading partners, respectively. COL is equal to 1 if the trading partner have colonial relationship in the past, otherwise zero. CL is equal to 1 if trading partner have common official language, otherwise zero. CB is equal to 1 if trading partners have common border, otherwise zero. It is easier to communicate with each other if both importer and exporter country have same language. Thus we expect positive sign for the coefficient of CL. Baldwin and Venables (1995) states that colonial ties always involved important trade relation. Usually, the mother country's market was the main export destination for the colony's traded goods. When the colonial system came to an end the former colonist typically continued the preferential treatment for the goods coming from their former colonies. Therefore, we expect a positive sign for the coefficient of COL as well. Within EU countries, Austria shares colonial relation with Czech Republic and Slovenia, United Kingdom with Cyprus, Ireland and Malta, Greece with Cyprus, Hungary with Slovakia, Netherlands with Luxembourg, Germany with Poland and Sweden with Estonia and Finland. Moreover, when

both importer and the exporter country share a common border then it reduces transportation costs and makes the availability of the goods at a cheaper price as compared to if both countries do not share a common border. Thus we expect a positive sign for the coefficient of the CB.

Finely, ε_{ijt} is the error term. According to Kandogan (2005) in presence of the bilateral variables in the model, the error term, ε_{ijt}, is more refined and can be interpreted as the time-invariant bilateral effects on country i's imports from country j at time t, not taken into account elsewhere. In simple words, according to Kandogan (2005) the error term ε_{ijt} reflects the effect of liberalization agreements. We also use these error terms to measure the impact of extensions in the EU.

All the variables we use in the empirical model except COL, CL and CB are real variables and in log form.

4.4.2 Trade Creation and Trade Diversion

Following Kandogan (2005) to measure trade creation (TC), trade diversion (TD) and net trade (Net) we estimate the empirical model given in the empirical model section before and after the extension in the EU and estimate the regression errors, ε_{ijt}, for each model. Then we calculate the average errors, $\bar{\varepsilon}_{ijt}$, for member countries and for the non-member countries for the model before the extension and after the extension. Then we take the difference of the average errors after the extension and before the extension for the trade creation. Mathematically we can write this process as under in equation 4.4.6.

$$TC = \bar{\varepsilon}_{ijt \text{ after the extension for members}} - \bar{\varepsilon}_{ijt \text{ before the extension for members}} \tag{4.4.6}$$

$TC > 0$ shows that trade has improved among members after the extension. In simple word $TC > 0$ shows trade creation

For trade diversion we take the difference of the average errors after the extension and before the extension for non-member countries. Mathematically we can write this process as under in equation 4.4.7.

$$TD = \bar{\varepsilon}_{ijt \text{ after the extension for non-members}} - \bar{\varepsilon}_{ijt \text{ before the extension for non-members}} \tag{4.4.7}$$

$TD < 0$ shows that trade of member countries with non-member countries has decreased. In simple word $TD < 0$ shows trade diversion.

To measure the net impact of the extension we take the difference of the TC and TD. Mathematically we can write this process as under in equation 4.4.8.

$$Net = TC - TD \tag{4.4.8}$$

We repeat this process to measure trade creation and trade diversion for each commodity group and for each new member of the EU.

We estimate the parameters of the model proposed in 4.4.1 by applying the Ordinary Least Square (OLS) technique on panel data for 27 EU member countries.

4.4.3 Data and Sample Size

Data used in this Chapter are taken from three different sources and cover the period from 1988 to 2008 for EU 27 countries. The EU 27 includes Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Since all these countries have not joined the EU at the same time therefore our definition of EU 27 changes over time. Our sample includes a country as a member of the EU 27 from the year it has joined the EU. Before joining the EU this particular country is considered as non-member and not included in EU 27 countries. Thus the number of countries included in the EU 27 increases with the extensions in the EU membership over the time. The list of trading partners of the EU 27 countries is given in Table C.14 in the Appendix C. We take into account all developed, developing and poor countries as the trading partners in our analysis because the developed countries accounts for about 90 percent of the EU trade. From the remaining 10 percent of the EU trade nearly 40 percent of EU trade is with the poor countries to whom EU have signed preferential trade agreements under the Generalized System of preference (SGSP) and Everything But Arms (EBA) which grants them zero tariff access to the EU markets. Bilateral imports (M) and bilateral exports (X) of the 27 EU member countries have been taken from the United Nations Commodity Trade Statistics Database; UN COMTRADE 2009. Data on GDP, foreign exchange reserves, labor force, gross fixed capital formation, and exchange rates are extracted from World Development Indicator (WDI) 2009. Data on geographical distance between the trading partners, past colonial relationship, common language, and common border are taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) online. Imports, exports, GDP, foreign exchange reserves, gross domestic capital formation and exchange rates have been deflated by the CPI of the respective country. Moreover, Imports, exports, GDP, foreign exchange reserves, gross domestic capital formation, exchange rates, labor force, and the distance between the importer and exporter country are in log form. Now before moving towards estimation let's have a look on the trends of intra and extra EU imports and exports.

Table 24, Figure 14 and Figure 15 shows total exports and imports of the EU. Table

24, Figure 14 and Figure 15 shows that over the period of time exports and the imports of the EU has increased. But if we have a closer look at the Table 24, Figure 14 and Figure 15 they show a jump in exports and imports of the EU from the EU member countries in years 1995 and 2004. In fact these two jumps in the EU exports and imports shows that in these two year new members have joined the EU and due these extensions in EU, EU exports and imports has increased more than the increase in any other years. The extension in the EU has boosted the intra EU trade is reflected from the Tables 25,and 27 which shows share of imports and exports coming from the member countries, respectively.

Table 24: Total Imports and Exports of the EU

	Exports		Imports	
Year	EU	non-EU	EU	non-EU
1991	897.178	599.212	728.406	691.319
1992	978.662	659.016	780.385	735.160
1993	853.682	631.667	625.977	669.779
1994	997.841	717.866	718.951	759.469
1995	1248.802	857.755	999.024	808.655
1996	1286.715	897.245	1024.682	850.885
1997	1312.686	913.134	1018.747	874.318
1998	1385.83	917.242	1084.673	902.841
1999	1692.766	812.773	1320.102	864.025
2000	1685.791	859.093	1326.308	999.440
2001	1733.482	867.738	1317.510	985.415
2002	1884.879	947.549	1404.801	1013.325
2003	2248.341	1114.12	1694.494	1222.631
2004	2690.877	1330.278	2208.513	1334.170
2005	2916.706	1470.914	2357.005	1526.033
2006	3302.405	1667.333	2665.484	1791.460
2007	3821.73	1934.349	3184.714	2030.862
2008	4167.848	2173.137	3199.224	2191.428

Figures in billion dollars.

This trend indicates that extensions in the EU has resulted in trade creation. In spite of the fact that EU's exports and imports from non-member countries have increased over time, the share of the EU's imports and exports from non-member countries in the EU's total imports and exports have decreased. Tables C.11, C.9 in Appendix C and Tables 28 and 26 reflect this trend. This also gives some indication of the trade diversion.

Table 25 in the main text and Table C.8 in the Appendix C show the share of intra-EU imports of each commodity group and total intra-EU imports of each commodity group, over time. Table 25 shows that over time the intra-EU import share of each group has increased which indicates that over time trade among members of the EU has increased. Table C.8 in the Appendix C also shows that imports of EU from member countries have increased over the last two decades. Imports of all the categories from the member countries are showing the increasing trend. However, major intra EU imports

Figure 14: Total Exports (in Billion Dollars) of the EU to Member and Non-member Countries from 1991 to 2008

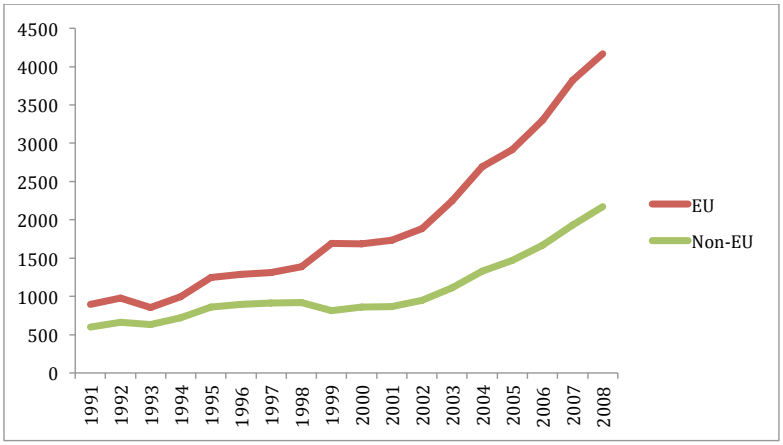
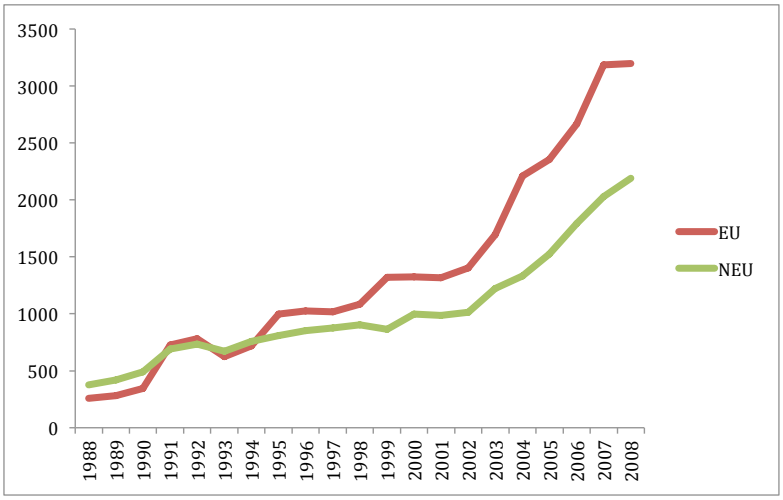


Figure 15: Total Imports (in Billion Dollars) of the EU to Member and Non-member Countries from 1988 to 2008



are "food and live animal", "chemical and related products, n.e.s", "manufactured goods chiefly classified by material", "miscellaneous manufactured articles" and "machinery and transport equipments". The transport and machinery equipment is the highest tradable commodity group among the EU member countries. Manufactured goods and the chemical related products are on second and third position among the intra EU imports.

Table 26 in the main text and Table C.9 in the Appendix C show the share of imports the EU coming from non-EU member countries for each commodity group and total imports into the EU coming from non-EU member countries for each commodity group, over time. Table 26 shows the EU's import share for each commodity group coming from non-member countries has decreased over time which indicate that with the passage of time

EU trade with non-members is shrinking. However, Table C.9 in the Appendix C shows that imports of all the commodities and services from rest of the world have increased over time. EU member countries fulfill almost 50 percent of their demand for the imports of the "food and live animal" and 75 percent demand for "mineral fuels, lubricants and related material" by importing these products from the rest of the world. The EU's other major imports coming from the non-members include "chemical and related products", "manufactured goods chiefly classified by materials", " miscellaneous manufacture articles" and " machinery and transports equipments".

Table 25: Percentage Share of Intra EU Imports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1988	48.1	68.2	26.5	16.5	42.6	50.5	42.9	42.8	42.9	20.5
1989	49.3	69.0	26.3	13.4	45.5	50.5	43.0	43.5	42.7	21.5
1990	50.5	69.6	27.0	14.6	50.3	50.9	44.3	44.9	43.3	22.8
1991	58.1	72.2	35.1	21.5	57.2	60.7	54.9	56.0	48.6	32.0
1992	58.4	70.0	34.3	20.6	51.7	60.1	54.9	56.5	48.1	36.7
1993	56.9	70.8	31.9	19.4	51.9	57.2	50.9	52.1	41.9	61.2
1994	56.2	70.7	31.4	18.8	50.6	57.8	50.4	52.5	42.6	57.3
1995	58.3	73.2	41.6	21.3	51.7	62.0	61.3	59.0	47.0	67.5
1996	57.8	70.7	40.9	21.3	56.2	61.7	60.8	59.0	46.8	66.8
1997	57.6	69.6	40.3	21.2	55.9	60.9	59.9	57.4	45.7	68.3
1998	57.8	70.8	40.4	22.3	52.8	61.4	59.3	57.7	45.0	67.2
1999	66.3	76.8	46.0	28.8	61.4	71.6	66.2	61.8	49.0	83.9
2000	64.5	74.9	43.3	28.0	61.9	70.4	62.5	58.6	45.9	78.2
2001	64.4	75.7	43.6	28.0	63.4	70.5	63.7	60.4	46.2	50.1
2002	65.2	76.6	46.0	28.3	63.1	71.8	63.4	60.8	46.8	55.0
2003	65.7	78.0	46.3	29.6	62.2	71.6	63.2	59.2	46.4	75.6
2004	69.0	79.9	51.8	31.8	61.5	73.4	68.8	64.8	51.7	78.5
2005	68.6	80.2	51.7	31.9	61.4	73.3	67.8	64.4	50.5	68.9
2006	68.7	80.5	52.2	31.7	59.7	72.9	66.2	63.7	49.2	68.6
2007	68.3	80.9	52.5	31.0	59.2	72.3	65.7	65.1	50.7	81.9
2008	68.7	81.2	51.2	31.4	58.7	71.2	66.0	63.2	49.1	80.9

Figures are in percentages.
See Table C.6 in the Appendix C for SITC Code Explanation.

Table 26: Percentage Share of Extra EU Imports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1988	51.9	31.8	73.5	83.5	57.4	49.5	57.1	57.2	57.1	79.5
1989	50.7	31.0	73.7	86.6	54.5	49.5	57.0	56.5	57.3	78.5
1990	49.5	30.4	73.0	85.4	49.7	49.1	55.7	55.1	56.7	77.2
1991	41.9	27.8	64.9	78.5	42.8	39.3	45.1	44.0	51.4	68.0
1992	41.6	30.0	65.7	79.4	48.3	39.9	45.1	43.5	51.9	63.3
1993	43.1	29.2	68.1	80.6	48.1	42.8	49.1	47.9	58.1	38.8
1994	43.8	29.3	68.6	81.2	49.4	42.2	49.6	47.5	57.4	42.7
1995	41.7	26.8	58.4	78.7	48.3	38.0	38.7	41.0	53.0	32.5
1996	42.2	29.3	59.1	78.7	43.8	38.3	39.2	41.0	53.2	33.2
1997	42.4	30.4	59.7	78.8	44.1	39.1	40.1	42.6	54.3	31.7
1998	42.2	29.2	59.6	77.7	47.2	38.6	40.7	42.3	55.0	32.8
1999	33.7	23.2	54.0	71.2	38.6	28.4	33.8	38.2	51.0	16.1
2000	35.5	25.1	56.7	72.0	38.1	29.6	37.5	41.4	54.1	21.8
2001	35.6	24.3	56.4	72.0	36.6	29.5	36.3	39.6	53.8	49.9
2002	34.8	23.4	54.0	71.7	36.9	28.2	36.6	39.2	53.2	45.0
2003	34.3	22.0	53.7	70.4	37.8	28.4	36.8	40.8	53.6	24.4
2004	31.0	20.1	48.2	68.2	38.5	26.6	31.2	35.2	48.3	21.5
2005	31.4	19.8	48.3	68.1	38.6	26.7	32.2	35.6	49.5	31.1
2006	31.3	19.5	47.8	68.3	40.3	27.1	33.8	36.3	50.8	31.4
2007	31.7	19.1	47.5	69.0	40.8	27.7	34.3	34.9	49.3	18.1
2008	31.3	18.8	48.8	68.6	41.3	28.8	34.0	36.8	50.9	19.1

Figures are in percentages.
See Table See Table C.6 in the Appendix C for SITC Code Explanation.

Table 27 in the main text and Table C.10 in the Appendix C show the share of intra-EU exports of each commodity group and total intra-EU exports of each commodity group, over time. Table 27 shows that over time the intra-EU export share of each group has increased, which indicates that over time trade among members of the EU has increased. Table C.10 in the Appendix C also shows that exports of EU from member countries have increased over the last two decades. presents the exports of EU member countries to other member states. About 2/3 of EU's "food and live animal" goods are traded among the member countries. The "machinery and transport equipment", "manufactured goods classified chiefly by material", "miscellaneous manufactured articles" and "chemical and related product" are the major exports of the EU. The European Union is the biggest market of "machinery and transport equipments" produced by other member countries. Intra EU exports increased tremendously over time.

Table 28 in the main text and Table C.11 in the Appendix C show the share of exports of EU going to non-EU member countries for each commodity group and total exports the EU going to non-EU member countries for each commodity group, over time. Table 28 indicates that shares of the EU exports going to non-EU countries is falling over time. However, Table C.11 in the Appendix C shows that exports of the EU to the rest of the world are increasing over time. "Chemical and related products, n.e.s", "manufactured goods classified chiefly by material", "machinery and transport equipments" and "miscellaneous manufactured article" are the EU's major exports the non-member countries. The "machinery and transport equipments" is the biggest export item of EU countries to non-member countries. "Animal and vegetable oils, fats and waxes" commodities are the least traded commodities of the EU with non-member countries.

Overall, these tables and figures show that the EU trade, both, among the members and with rest of the world, has increased over time. In spite of the extension to the EU in 1995 and in 2004, the overall volume of imports from and export to non-member countries has increased. This may due to fact that most of the EU member countries have already formed free trade areas with each other and details of these agreements is given in the Table C.1. However, the share of total of imports from and export to the non-member countries has decreased (see Tables 26 and 28). This rise in the volume of EU's imports and exports from non-member countries but the decrease in the share of EU's imports and exports from non-member countries induce to empirically analyze the situation. In addition, whether the increase in the trade of EU with member and non-member nations is statistically significant or not and whether this increasing trend of EU trade with member and non-member countries is just because of the formation of EU or other factors are also playing their role, needs statistical analysis of the EU trade with member countries and with the rest of world. Therefore, to find answers to these questions we analyzed

the effect of EU on trade flows by controlling for other factors affecting trade. Using the total imports of each commodity group as the dependent variable we determine in which commodity groups the EU creates trade and in which commodity groups the EU diverts trade from non-member states to member nations. For the sensitivity of our result we also use total exports of each commodity group as dependent variable to determine in which commodity groups the EU creates trade and in which commodity groups the EU diverts trade from non-member states to member nations. Note that summary statistics of the other variables included in the model are given in the Table C.13 in the Appendix C.

Table 27: Percentage Share of Intra EU Exports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	70.8	54.4	70.0	60.7	65.2	55.7	55.7	64.0	57.6	60.6
1992	70.1	53.4	70.1	61.2	61.6	55.2	55.2	63.9	57.4	61.0
1993	70.1	51.0	67.9	58.2	64.6	52.8	52.8	62.0	54.3	59.3
1994	69.9	50.8	70.2	57.7	63.9	54.3	54.3	63.1	55.0	59.1
1995	69.6	52.0	70.4	59.0	62.8	55.8	55.8	64.5	56.5	59.3
1996	69.7	52.6	68.4	59.9	65.8	55.6	55.6	63.4	56.3	59.6
1997	68.1	51.6	68.2	62.2	60.6	55.1	55.1	63.6	57.0	60.0
1998	69.7	53.3	69.5	61.0	58.7	55.6	55.6	65.5	59.0	60.2
1999	78.9	63.0	74.9	69.6	68.0	63.9	63.9	71.6	66.1	67.8
2000	77.5	60.6	74.2	68.7	66.5	63.1	63.1	70.0	64.9	65.5
2001	78.3	60.9	74.0	70.0	71.0	63.1	63.1	70.9	65.4	66.0
2002	78.6	61.2	73.1	68.9	71.7	63.0	63.0	70.0	65.8	66.1
2003	79.6	61.6	73.7	68.2	73.2	63.5	63.5	70.7	65.5	67.2
2004	80.4	62.1	73.4	67.5	73.3	64.2	64.2	70.6	65.2	66.7
2005	80.6	61.4	71.7	67.5	74.4	64.5	64.5	69.6	64.3	66.7
2006	80.4	59.4	71.7	66.0	76.6	64.1	64.1	70.4	64.6	66.1
2007	80.7	60.2	72.6	64.4	78.2	64.7	64.7	70.9	63.6	66.5
2008	79.8	60.8	71.1	64.9	79.7	64.9	64.9	70.2	61.9	66.4

Figures are in percentages.
See Table See Table C.6 in the Appendix C for SITC Code Explanation.

Table 28: Percentage Share of EU Exports to Rest of the World

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	29.2	45.6	30.0	39.3	34.8	44.3	44.3	36.0	42.4	39.4
1992	29.9	46.6	29.9	38.8	38.4	44.8	44.8	36.1	42.6	39.0
1993	29.9	49.0	32.1	41.8	35.4	47.2	47.2	38.0	45.7	40.7
1994	30.1	49.2	29.8	42.3	36.1	45.7	45.7	36.9	45.0	40.9
1995	30.4	48.0	29.6	41.0	37.2	44.2	44.2	35.5	43.5	40.7
1996	30.3	47.4	31.6	40.1	34.2	44.4	44.4	36.6	43.7	40.4
1997	31.9	48.4	31.8	37.8	39.4	44.9	44.9	36.4	43.0	40.0
1998	30.3	46.7	30.5	39.0	41.3	44.4	44.4	34.5	41.0	39.8
1999	21.1	37.0	25.1	30.4	32.0	36.1	36.1	28.4	33.9	32.2
2000	22.5	39.4	25.8	31.3	33.5	36.9	36.9	30.0	35.1	34.5
2001	21.7	39.1	26.0	30.0	29.0	36.9	36.9	29.1	34.6	34.0
2002	21.4	38.8	26.9	31.1	28.3	37.0	37.0	30.0	34.2	33.9
2003	20.4	38.4	26.3	31.8	26.8	36.5	36.5	29.3	34.5	32.8
2004	19.6	37.9	26.6	32.5	26.7	35.8	35.8	29.4	34.8	33.3
2005	19.4	38.6	28.3	32.5	25.6	35.5	35.5	30.4	35.7	33.3
2006	19.6	40.6	28.3	34.0	23.4	35.9	35.9	29.6	35.4	33.9
2007	19.3	39.8	27.4	35.6	21.8	35.3	35.3	29.1	36.4	33.5
2008	20.2	39.2	28.9	35.1	20.3	35.1	35.1	29.8	38.1	33.6

Figures are in percentages.
See Table See Table C.6 in the Appendix C for SITC Code explanation.

4.5 Empirical Results

Unification of the trade policies by removing the border-related trade barriers from the flow of goods and services among the countries alters production and consumption patterns. These amendments in consumption and production behavior can be measured in terms of trade creation and trade diversion effects of preferential trade agreements. Furthermore, when a new country joins an existing trading bloc, it also leads to changes in production and consumption behavior in this particular country and in its trading partners as well. In this chapter using correctly specified gravity model we have estimated the trade creation and trade diversion effects of the 4^{th} and 5^{th} extensions in the EU which took place in 1995 and in 2004, respectively. In this section we discuss these results.

Table 29: Total Imports of the EU from 1988 to 2008

	Dependent Variable: log (Imports)		
	Before 4^{th} Extension	Before 5^{th} Extension	With 4^{th} and 5^{th} Extension
Y_i	1.880***	1.270***	0.616***
	(0.240)	(0.136)	(0.103)
Y_j	0.133	0.082	0.108
	(0.161)	(0.078)	(0.088)
d_{ij}	-1.260***	-1.457***	-1.549***
	(0.094)	(0.079)	(0.086)
SIM	-0.104	-0.040	-0.023
	(0.108)	(0.059)	(0.060)
e_{ij}	-0.077***	-0.111***	-0.133***
	(0.021)	(0.020)	(0.021)
R_i	0.302***	0.475***	0.475***
	(0.038)	(0.031)	(0.033)
R_j	0.144***	0.163***	0.177***
	(0.025)	(0.034)	(0.038)
RF	-0.085	-0.020	-0.006
	(0.075)	(0.041)	(0.040)
COL	0.682***	0.561***	0.561***
	(0.110)	(0.122)	(0.132)
CL	0.471***	0.563***	0.597***
	(0.102)	(0.097)	(0.108)
CB	0.397**	0.555***	0.574***
	(0.160)	(0.122)	(0.128)
N	41824	129811	165901
r2_o	0.597	0.577	0.563

Robust Standard errors in parentheses, Standard errors are clustered by Partner
Time, Reporter, Partner and Sector fixed effects are controlled
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 29 shows the result for overall imports. Column 2 of the Table 29 shows the results of regression for overall imports of the EU before the 4^{th} extension. Column 3 of the Table 29 presents the results of regression for overall imports of the EU before the 5^{th} extension in the EU which took place in 2004. Column 4 of the Table 29 shows the

results of regression for overall imports of the EU for the entire sample period from 1988 to 2008 which includes period before and after the 4^{th} and 5^{th} extensions of the EU. The results presented in the Table 29 shows EU imports of the EU are highly sensitive to the GDP of the member countries. In simple words GDP of importing country is a significant determinant of its imports. It is shows that demand side plays important role in the EU imports. Regression results presented Columns 2 and 3 in the Table 29 show that a one percent rise in GDP of importer country leads to more than one percent rise in its imports. However, results presented in Column 3 of the Table 29 shows that a one percent increase in GDP leads to a less than one percent increase in imports. This finding is consistent with findings of Kandogan (2005) who found similar results. However, Table 29 shows that exporter country GDP has a positive but insignificant impact on EU's imports. The GDP of the trading partners of the EU does not play any role in explaining the EU's exports.

Another factor that plays a significant role in explaining the imports of the EU is the real exchange rate. Columns 2, 3 and 4 in Table 29 shows that as the domestic currency depreciates the EU imports decreases. In fact, when domestic currency depreciates the imported goods becomes relatively dearer leading to decrease in their demand. Moreover, Table 29 shows that one percent decrease in the value of the domestic currency leads to less than one percent decrease in the EU's imports. About 10 percent of the decrease the decrease in EU's imports is caused by the fluctuations in the real exchange rates. Once gain our results are consistent the existing literature. For instance, Kandogan (2005) and Vollrath et al. (2009) report that the depreciation of the domestic currency results in lowering the volume of the imports of a country.

Furthermore, Table 29 shows that foreign currency reserves of both importer and exporter country significantly determine the volume of the EU's imports. Actually, foreign currency reserves indicate the stability of the exchange rates. The more the foreign currency reserves of a country are the more stable the currency of that country is. The more stable the currency of a country is the more will be its imports. Kandogan (2005) also reports similar results.

Trade promoting factors, past colonial relationship, common language, and common border play a significant role in determining the EU's imports. Table 29 shows that the coefficients of the COL, CL and CB are positive and significant. This implies that EU countries imports more from the countries with whom they have past colonial relationships, share a common language, and have a common border. Actually, these factors reduce the cost of imports which results in reducing the prices of the imported goods from the trading partners with whom EU countries share a common language, have past colonial relationship and have common border. Kandogan (2005) also reports the positive impact

of the these variables on imports and exports of the EU.

However, we could not find a significant impact of similarity of the importer and exporters' economies (SIM), and the impact of relative factor endowment (RF) on EU's imports.

Another important variable which affects the imports of a country through price channel is the transportation cost involved in carrying the product from origin place to the final user of the product. The transportation cost is an important ingredient of the international trade and is positively related with the distance between countries where production unit are installed and the countries where users of the product reside. The transportation cost increases the prices of the product for the consumers which results in decreasing the demand for that particular product. Results given in Table 29 support this hypothesis. We have used the distance between the importing and the exporting country as a proxy for the transportation cost. The greater the distance between the importer and exporter country, the higher will be transportation costs. The negative and highly significant coefficient for the distance shown in Table 29 implies that transportation cost impedes the EU's trade with countries that are far way. Our results are consistent with the findings of Vollrath et al. (2009) and Kandogan (2005). Our result also shows that neighboring countries will trade more as compared to the far flung countries. Clarete et al. (2003) report similar results.

Table 30 and Tables C.5 and C.4 in the Appendix C show commodity group level results after and before the 4^{th} and 5^{th} extensions in the EU taking place in 1995 and in 2004, respectively. These tables show that importer country GDP significantly explains the variations in the imports of different commodity groups. Overall, these tables show that commodity group level results are similar to the results for the total imports reported in Table 29. Results reported in Table 30 and Tables C.5 and C.4 in the Appendix C show that EU countries' commodity group level imports increase with the increase in their GDPs. This result hold for entire group of commodities and for before EU's extension in 1995 and in 2004 and for the entire sample period which ranges from 1988 to 2008. This implies that EU's demand for the imports for all the commodity groups has increased with the rise in the income. However, the income elasticities of imports of different commodities groups varies across the commodity groups and over time. For example, Table 30 show that income elasticities of demand for imports of "Minerals Fuels, Lubricants and related Material", "Miscellaneous manufactured article" and "Commodities and Transactions not classified elsewhere in the SITC" are greater than one.

Table 30: Commodity Level Imports of the EU from 1988 to 2008

	Dependent Variable: log(Imports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	0.611***	0.290	0.400*	1.094***	0.342	0.469**	0.523***	0.336	1.281***	2.480***
	(0.188)	(0.391)	(0.218)	(0.364)	(0.535)	(0.229)	(0.179)	(0.210)	(0.171)	(0.787)
Y_j	0.050	-0.134	-0.013	0.121	1.034***	-0.053	0.147	0.202	0.153	0.322**
	(0.109)	(0.160)	(0.103)	(0.320)	(0.350)	(0.175)	(0.114)	(0.142)	(0.137)	(0.159)
d_{ij}	-1.587***	-1.174***	-1.639***	-2.459***	-1.445***	-1.655***	-1.740***	-1.505***	-1.500***	-1.398***
	(0.136)	(0.133)	(0.145)	(0.236)	(0.153)	(0.132)	(0.128)	(0.137)	(0.144)	(0.222)
SIM	-0.0001	-0.082	0.042	-0.204	-0.235	0.154	-0.021	0.067	-0.114	0.033
	(0.099)	(0.123)	(0.103)	(0.205)	(0.180)	(0.097)	(0.089)	(0.094)	(0.086)	(0.161)
e_{ij}	-0.152***	-0.137***	-0.170***	-0.221***	-0.103**	-0.110***	-0.101***	-0.115***	-0.113***	-0.070*
	(0.024)	(0.040)	(0.028)	(0.061)	(0.043)	(0.023)	(0.026)	(0.031)	(0.027)	(0.041)
R_i	0.401***	0.541***	0.561***	0.441***	0.351***	0.478***	0.491***	0.550***	0.462***	0.089
	(0.051)	(0.092)	(0.048)	(0.105)	(0.099)	(0.058)	(0.047)	(0.051)	(0.045)	(0.118)
R_j	0.200***	0.288***	0.185***	0.202	0.105	0.229***	0.161***	0.152***	0.115**	0.021
	(0.052)	(0.080)	(0.045)	(0.136)	(0.080)	(0.046)	(0.049)	(0.047)	(0.053)	(0.079)
RF	-0.023	-0.052	0.042	-0.055	-0.050	0.117	-0.024	0.040	-0.033	0.049
	(0.072)	(0.094)	(0.073)	(0.148)	(0.152)	(0.073)	(0.061)	(0.073)	(0.061)	(0.120)
COL	0.956***	0.697***	0.581***	0.221	0.451*	0.520**	0.562***	0.634***	0.881***	0.896**
	(0.200)	(0.229)	(0.201)	(0.329)	(0.234)	(0.208)	(0.180)	(0.192)	(0.179)	(0.371)
CL	0.927***	0.629**	0.413**	0.482*	0.343	0.471**	0.799***	0.556***	0.508***	1.154***
	(0.168)	(0.249)	(0.183)	(0.283)	(0.249)	(0.202)	(0.179)	(0.173)	(0.159)	(0.294)
CB	0.421**	0.578**	0.778***	1.198***	1.457***	0.552***	0.148	0.353**	0.210	0.623*
	(0.191)	(0.234)	(0.192)	(0.315)	(0.220)	(0.206)	(0.174)	(0.178)	(0.186)	(0.336)
N	23712	12334	20778	8361	7401	16948	22201	21409	23754	9003
r2_o	0.724	0.589	0.685	0.614	0.607	0.788	0.820	0.825	0.855	0.582

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

This implies that one percent increase in the GDPs of EU countries leads to more than one percent rise in imports of " "Minerals Fuels, Lubricants and related Material", "Miscellaneous manufactured article" and "Commodities and Transactions not classified elsewhere in the SITC".

These results are consistent with the existing literature. For example, our finding that rise in the imports of the "Mineral Fuels, Lubricants and related material" due to the increase in the EU countries GDPs, is consistent with the reports of World Energy Technology Outlook (WETO) which states that EU countries meet 60 percent of their demand for oil and gas from domestic sources[17] . Almost 75 percent of remaining demand is met through importing it from non-member countries.

For all other commodity groups the income elasticity of demand for import is less than one which implies that a one percent rise in the GDP of importing countries leads to less than one percent increase in imports of commodities included in these commodity groups. Similarly, tables C.5 and C.4 in the Appendix C also report a positive relation between the imports of different commodity groups and the GDPs of the importer countries. Kandogan (2005) also reports similar results.

However, we could not find a significant impact of the exporter countries GDPs on most of the commodity group level imports of the EU countries. This finding is clear from the results reported in Table 30 and Tables C.5 and C.4 in the Appendix C. Only in the case of "Food and Live Animal", "Mineral Fuels, Lubricants and related material" "Animal and Vegetable Oils, Fats and Waxes", "Machinery and Transport Equipments", "Miscellaneous manufactured articles" and "Commodities and transactions not classified elsewhere in the SITC" we found a significant impact of the exporter countries GDP. This implies that in supply of these commodity groups in the EU countries markets increases with increase in the GDP of the exporter countries. These results support the findings of Clarete et al. (2003) Kandogan (2005), Vollrath et al. (2009) and the supply side preposition that the higher the GDP of a country, the higher will be its exports. This also indicates that EU countries are diverting their resources from the production of ordinary or low value products to towards the production of more sophisticated and high value manufactured goods as their GDP rise.

In addition, results reported in Table 30 and Tables C.5 and C.4 in the Appendix C show that the impact of the exporter country GDP on the EU imports of the " Beverages and Tobacco", "Crude Materials, Inedible except Fuel", "Chemical and related products, n.e.s", "Food and Live Animal" is negative. However, the coefficients of the exporter country GDP is insignificant for the commodity groups. This implies that in these commodity

[17]For further details see; European Commission, World Energy technology Outlook 2050, at ftp://ftp.cordis.europa.eu/pub/fp7/energy/docs/weto-h2_en.pdf.

groups EU countries may have gained self sufficiency. The negative income elasticity of exports for "food and live animal" may be due to Common Agricultural Policy (CAP) of European countries which makes difficult for agriculture related product of non-EU countries to access the market of EU countries.

Furthermore, results reported in Table 30 and Tables C.5 and C.4 in the Appendix C show that distance between the importer and exporter country, real exchange rate, foreign currency reserves of the importer significantly explain the commodity group level imports of the EU. The negative distance elasticity of imports shows that as the distance between importer and exporter increases their trade relations contract. In simple words, EU countries prefers to import from relatively nearer countries. The negative exchange rate elasticity of imports implies that as the domestic currency depreciates the imports of the commodities included in these commodity groups decrease. The positive coefficients of the foreign exchange reserves of the importer and exporter implies that increase in foreign exchange reserves increases the EU countries imports by providing stability to their domestic currencies.

Similar to the results for overall imports of the EU countries reported in the Table 29 we find the positive impacts of the past colonial relationship of importer and exporter, common language, and common border on commodity group level imports of the EU countries. Table 30 and Tables C.5 and C.4 in the Appendix C show that EU countries import more from the countries with whom they have past colonial ties, share a common language and have a common border.

Now we discuss results for the trade creation and trade diversion effects of the two extensions in European Union (EU) which took place in the 1995 and in 2004. We also discuss here our results regarding the trade creation and trade diversion effects of the new members joining the EU in 1995 and in 2004. Table 31 shows trade creation and trade diversion effects of the extensions of the EU taking place in 1995 and in 2004, for overall imports and for the commodity group level imports. The Table 32 shows the trade creation and trade diversion effects of the new members joining the EU in 1995 and in 2004. Columns 3^{rd}, 4^{th} and 5^{th} Columns of the Table 31 shows trade creation, trade diversion and Net trade effects of the extension in the EU respectively, for overall imports as well as for the commodity-group level imports.

Results reported in Table 31 show that both the extensions in EU membership have resulted in increasing trade between the EU members. However, this increase in the trade among the member is at the cost of the decrease in the trade with non-member countries. Overall, these two extensions in the EU has resulted increasing the trade of the EU countries. The increase in trade among the members of the EU is more than the decrease in the trade with non-member countries. Thus, in net these two extension have

increased the trade of the EU countries. Table 31 also shows that the EU's extension which took place in 2004 created more trade among members of the EU as compared to the EU's extension which took place in 1995. However, the decrease in imports from the non-member countries due to the extension in the membership of the EU is relatively more in the extension which occurred in 2004 as compared to the extension which took place in 1995. These results make sense because in 1995 only new three countries joined the EU whereas in 2004 ten new countries became the part of EU, in turn, the overall total GDP of the EU has increased relatively more after the 5^{th} extensions than the increase in increase in overall total GDP of the EU after the 5^{th} extensions. This rise in the GDP of the EU has is playing its role in increasing the intra-EU trade flows because our findings indicate that an increase GDP of a country significantly increases its trade volume.

Furthermore, 3^{rd}, 4^{th} and 5^{th} Columns of the Table 31 show that the extensions of EU in 1995 and in 2004 along with the increasing imports from the member countries decrease imports from the non-member countries, for eight out of ten commodity groups. However, these extensions in the EU, membership increases imports from member countries more than the decrease in imports from the non-member countries. This implies that in general, extensions in the EU has resulted in improving the net trade of the EU countries. Specifically, the extension of the EU taking place in 1995 increases the imports of two commodity groups, "Minerals Fuels, Lubricants and related materials" and "Machinery and Transport Equipments", from member and non-member countries and for all other commodity groups this extension of the EU increases the imports from member countries but decreases the imports from non-member countries.

However, the extension of the EU which took place in 2004 increases the imports from both member and non-member countries for only one commodity group named "Machinery and Transport Equipments" and for all other commodity groups, the extension of the EU which took place in 2004 increased imports from member countries at the cost of imports for non-member countries. Our results indicates that both the extensions of the EU enhance trade with members and non-members in "Machinery and Transport Equipments" and led to trade diversion in all other commodity groups. Thus, Table 31 shows that the extension in EU has resulted trade creation and trade diversion as well not only for overall imports but at commodity level imports as well.

Our results confirm the findings of Commission of the European Communities (2009) that "machinery and transport equipments" is the key sector of the EU with 27 percent of world automotive production and a 30 percent global market share automotive product trade[18]. Our results are consistent with the findings of European Commission for

[18]For further details see; Commission of the European Communities (2009), European industry in a changing world updated sectoral overview, Commission Staff Working Document, SEC(2009), at

Enterprise and Industry (2010) that the "Machinery and Transport Equipments" is the key sectors contributing to excellent performance of the EU[19]. Our findings support the observations of Sura (2009). He found that EU members are the most specialized countries for these products such as Germany as the most specialized in manufacture of "Machinery and Transport Equipments", Ireland for chemical and related products, and Bulgaria and Hungary for refined petroleum and nuclear fuel. Our results are consistent with the findings of Balassa (1967) that in the case of machinery and transport equipment, the European Common Market (ECM) boosts trade with the rest of the world. Our finding that the extensions in the EU membership amplifies the trade among members significantly is consistent with the findings of Baier and Bergstrand (2007) that regional integration results in accelerating trade among its members. Our finding that extensions in the EU diverts trade from non-members to member countries in most of the commodity groups implies that EU countries have become less dependent on the rest of the world in most of the commodity groups. Similar results have been reported by the Zahniser et al. (2002) for MERCOUSER and NAFTA.

Now we discuss our findings regarding trade creation and trade diversion effects of the new members joining the EU in 1995 and in 2004. Table 32 shows how much trade has been created and how much trade has been diverted by the new members joining the EU in 1995 and in 2004. This table shows that of the new members joining the EU in the 4^{th} extension only Finland increased its imports from members without affecting its imports from non-members. The remaining two new members, Austria and Sweden increased their imports from member countries but decreased their imports from non-member countries. Thus, in the light results reported in Table 32 we can say that Austria and Sweden caused the trade diversion but Finland leads to trade creation. However, in net terms all the countries joining the EU in 4^{th} extension of the EU increased their trade.

Moreover, Table 32 shows that 4 out of the 10 members joining the EU in the 5^{th} extension increased their imports from members countries and also increased their imports from non-member countries. These new members who increased imports from members as well as from non-member countries are Estonia, Latvia, Poland and Slovakia. These four countries results in trade creation. All other members joining the EU in 5^{th} extension increased imports from member countries but decreased imports from non-member countries. The subset of new members who increase imports from the member countries at the cost of imports from non-member countries consists of Cyprus, Hungary, Lithuania,

http://ec.europa.eu/enterprise/policies/industrialcompetitiveness/files/industry/doc/sec_2009_1111_en.pdf

[19]For further details see; European Commission for Enterprise and Industry (2010), 'EU manufacturing Industry: What are the challenges and opportunities for the Coming years', First tentative findings of sector-specific analysis carried out in DG Enterprise and Industry., at http://ec.europa.eu/enterprise/policies/industrial-competitiveness/economic-crisis/files/eu_manufacturing_challenges_and_opportunities_en.pdf

Table 31: Overall Trade Creation and Trade Diversion Effects of 4^{th} and 5^{th} Extension in the EU, for Total and Commodity-Group level Import

Imports	Extension	TD	TC	Net
Total	4^{th}	-0.0262	0.1185	0.1447
Total	5^{th}	-0.0322	0.1504	0.1826
S3-0	4^{th}	-0.0394	0.2064	0.2458
	5^{th}	-0.0454	0.2492	0.2945
S3-1	4^{th}	-0.0796	0.2373	0.3169
	5^{th}	-0.1069	0.2662	0.3731
S3-2	4^{th}	-0.0288	0.0885	0.1173
	5^{th}	-0.0525	0.1280	0.1805
S3-3	4^{th}	0.0010	0.0061	0.0052
	5^{th}	-0.0061	0.0236	0.0298
S3-4	4^{th}	-0.0687	0.0835	0.1522
	5^{th}	-0.1020	0.1256	0.2276
S3-5	4^{th}	-0.0139	0.0834	0.0973
	5^{th}	-0.0266	0.1124	0.1389
S3-6	4^{th}	-0.0041	0.0462	0.0503
	5^{th}	-0.0148	0.0739	0.0886
S3-7	4^{th}	0.0056	0.1101	0.1045
	5^{th}	0.0213	0.1600	0.1386
S3-8	4^{th}	-0.0077	0.0417	0.0494
	5^{th}	-0.0069	0.0553	0.0621
S3-9	4^{th}	-0.0334	0.2047	0.2381
	5^{th}	-0.0461	0.4397	0.4859

see Section 4.3 for definitions of TD, TC and Net.

see Table C.6 in Appendix C for SITC codes.

Table 32: Overall Trade Creation and Trade Diversion Effects of New members joining EU in 4^{th} and 5^{th} Extension in the EU, for Imports

Extension	New Member	TD	TC	Net
4^{th}	Austria	-0.097	0.147	0.244
	Finland	0.018	0.112	0.094
	Sweden	-0.026	0.308	0.334
5^{th}	Cyprus	-0.249	-0.090	0.159
	Czech Republic	-	-	-
	Estonia	0.031	0.184	0.153
	Hungary	-0.261	0.388	0.648
	Latvia	0.003	0.210	0.207
	Lithuania	-0.124	0.220	0.344
	Malta	-0.121	0.212	0.333
	Poland	0.049	0.345	0.296
	Slovakia	0.043	0.321	0.277
	Slovenia	-0.517	0.104	0.621

see Section 4.3 for definitions of TD, TC and Net.

The data of Czech Republic is not available.

Malta and Slovenia. Thus, these five countries are causing import diversion. However, Table 32 shows that all the countries joining the EU in 5^{th} extension of the EU, whether they are causing imports diversion or not, in net they increase the imports. This indicates that overall these members increase international trade.

4.5.1 Robustness

In order to check the sensitivity of our results we have applied the model given in equation 4.4.1 using logged exports of the EU member countries as the dependent variable and calculated the trade creation and trade diversion of the 4^{th} and 5^{th} extensions of the EU. The results are given in Tables 33 and 34 below and in Tables C.3 and C.2 in Appendix C. Results reported in these tables show that real GDP of EU countries significantly explains EU exports. This indicates that with the increase in the GDP of EU countries their capacity to exports increased. A one percent increase in the GDP of EU countries leads to a less than one percent increase in their exports before the 4^{th} extension of the EU. However, a one percent increase in the GDP of EU countries leads to more than one percent increase in their exports before the 5^{th} extension of the EU. This indicates that the EU countries' export performance has improved after the 4^{th} extension of the EU. However, the GDP elasticity of exports of the EU countries has decreased from 1.469 to after the 4^{th} extension to 0.929 after the 5^{th} extension of the EU. This suggest that 5^{th} extension has been relatively less beneficial for the EU's exports performance.

Table 33 shows that importer countries' GDP also significantly explains the exports of the EU. Positive and significant coefficients of importer countries GDP indicates that demand for EU's exports increases with an increase in the importer countries GDP. However, Table 33 shows that a one percent increase in the importer countries' GDP increases EU's exports less than one percent.

However, Table 33 shows that distance between the importers and EU countries and EU's exports are negatively related. As the distance between the importer countries and the EU countries increases the exports of the EU decreases. This indicates that EU countries exports less to far flung countries. This also implies that as the transportation cost increases the exports of EU countries decreases.

Table 33 also shows that EU's exports are sensitive to the variations in real exchange rates. EU countries' exports increase with the depreciation of the domestic currency. This implies that as the domestic currency depreciates the EU's goods become relatively cheaper in the foreign markets leading to an increase in their demand. However, the exchange rate elasticity of the EU's exports is less than one. Furthermore, Table 33 shows that sensitivity of the EU's exports to real exchange rate has decreased with extensions in the EU's membership. The elasticity of the EU's exports to real exchange rates decrease

Table 33: Total Exports of the EU from 1988 to 2008

	Dependent Variable: log(Exports)		
	Before 4^{th} Extension	Before 5^{th} Extension	With 4^{th} and 5^{th} Extension
Y_i	0.273**	1.469***	0.929***
	(0.113)	(0.120)	(0.213)
Y_j	0.205**	0.239**	0.296**
	(0.086)	(0.097)	(0.121)
d_{ij}	-1.711***	-1.629***	-1.506***
	(0.100)	(0.094)	(0.097)
SIM	-0.036	-0.084	-0.066
	(0.058)	(0.064)	(0.084)
Δe_{ij}	0.222***	0.173***	0.124***
	(0.037)	(0.026)	(0.040)
R_i	0.601***	0.565***	0.267***
	(0.024)	(0.023)	(0.032)
R_j	0.063***	0.055**	0.028
	(0.024)	(0.023)	(0.037)
RF	-0.008	-0.030	-0.044
	(0.039)	(0.041)	(0.063)
COL	0.848***	0.834***	0.914***
	(0.123)	(0.117)	(0.135)
CL	0.690***	0.703***	0.726***
	(0.107)	(0.104)	(0.118)
CB	0.595***	0.596***	0.298*
	(0.127)	(0.123)	(0.178)
N	196770	155293	51099
r2_o	0.643	0.665	0.708

Robust Standard errors in parentheses, Standard errors are clustered by Partner
Time, Reporter, Partner and Sector fixed effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

to 0.173 from 0.222 after the 4^{th} extension and it further decreased to 0.124 after the 5^{th} extension in the EU.

In addition, Table 33 indicates that foreign reserves of the importer and exporter countries R_{it} and R_{jt} significantly explain variations in the EU's exports by providing the stability to the real exchange rates of the EU's countries with it trading partners.

Moreover, Table 33 shows that past colonial relationship of exporter and importer country, common language, and a common border also significantly explain variations in the EU countries' exports. These trade promoting factors positively effects the EU's exports. EU countries exports more to the countries with whom they have past colonial relationships, share a common language and have common border.

Now we discuss our results for commodity group level exports of the EU. Tables C.3 and C.2 in the Appendix C show the results for commodity group level exports of the EU before the 4^{th} and 5^{th} extensions of the EU and Table 34 shows the results for commodity group level exports of the EU for the whole sample period which contains the time period

before and after the 4^{th} and 5^{th} extensions of the EU.

Results reported in these Tables C.3 and C.2 in the Appendix C and Table 34 indicate that for most of the commodity groups, commodity group level results for exports are similar to results reported in Table 33 for overall exports of the EU. These tables show that importer and exporter country GDP significantly explains the variations in the commodity level exports of the EU. This implies that both the demand and supply side play their role in determining the commodity level exports of the EU. However, the GDP elasticity of the exports varies across the commodity groups. For example, Table 34 shows that one percent change in exporter's GDP leads to 2.488 percent change in exports of the commodities included in SITC-9 commodity groups. For all other commodity groups one percent change in exporter's GDP leads to less than one percent change in exports of the commodities included in these groups.

Table 34: Commodity Level Exports of the EU from 1988 to 2008

	Dependent Variable: log(Exports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	0.332*	0.944***	0.097	0.821**	0.927*	0.236	0.085	0.569***	0.612***	2.448***
	(0.196)	(0.358)	(0.235)	(0.335)	(0.501)	(0.184)	(0.207)	(0.169)	(0.175)	(0.476)
Y_j	0.101	0.205	0.232*	0.368**	0.080	0.256***	0.298**	0.336***	0.244**	0.212*
	(0.104)	(0.183)	(0.131)	(0.188)	(0.170)	(0.083)	(0.148)	(0.117)	(0.120)	(0.110)
d_{ij}	-1.639***	-1.624***	-1.691***	-3.018***	-1.622***	-1.928***	-1.783***	-1.802***	-1.610***	-1.263***
	(0.146)	(0.148)	(0.118)	(0.176)	(0.179)	(0.125)	(0.114)	(0.118)	(0.131)	(0.179)
SIM	-0.001	-0.101	0.019	0.109	0.217	-0.054	0.047	-0.081	-0.090	-0.078
	(0.096)	(0.131)	(0.100)	(0.165)	(0.196)	(0.073)	(0.101)	(0.073)	(0.085)	(0.130)
Δe_{ij}	0.221***	0.164***	0.199***	0.155***	0.154***	0.282***	0.292***	0.232***	0.205***	0.130***
	(0.043)	(0.046)	(0.048)	(0.048)	(0.045)	(0.057)	(0.055)	(0.042)	(0.036)	(0.026)
R_i	0.592***	0.311***	0.503***	0.542***	0.429***	0.799***	0.644***	0.680***	0.659***	-0.110
	(0.059)	(0.074)	(0.061)	(0.089)	(0.124)	(0.045)	(0.044)	(0.046)	(0.037)	(0.083)
R_j	0.077***	0.047	0.101**	0.089	0.014	0.047*	0.037	0.105***	0.061**	0.010
	(0.026)	(0.047)	(0.043)	(0.061)	(0.048)	(0.027)	(0.033)	(0.025)	(0.030)	(0.038)
RF	-0.014	-0.075	0.011	-0.009	0.072	-0.009	0.056	-0.009	-0.028	-0.060
	(0.062)	(0.089)	(0.064)	(0.113)	(0.135)	(0.048)	(0.057)	(0.052)	(0.060)	(0.103)
COL	0.886***	0.706***	0.721***	0.610***	0.612***	0.976***	1.025***	1.048***	1.218***	0.825***
	(0.173)	(0.177)	(0.150)	(0.234)	(0.201)	(0.160)	(0.173)	(0.178)	(0.188)	(0.192)
CL	0.856***	0.616***	0.658***	0.270	0.626***	0.650***	0.549***	0.637***	0.903***	0.968***
	(0.171)	(0.173)	(0.150)	(0.238)	(0.225)	(0.147)	(0.172)	(0.167)	(0.167)	(0.204)
CB	0.779***	0.527**	0.763***	1.132***	1.318***	0.352*	0.231	-0.018	0.188	0.742***
	(0.183)	(0.215)	(0.192)	(0.225)	(0.198)	(0.194)	(0.165)	(0.200)	(0.212)	(0.240)
N	21214	16638	18301	13025	9393	25853	26716	27820	26203	11607
r2_o	0.690	0.621	0.705	0.575	0.540	0.760	0.794	0.797	0.806	0.629

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

Similarly, results given in Tables C.3 and C.2 in the Appendix C and Table 34 indicate that an increase in the distance between the importer and exporter country significantly decreases the commodity level exports of the EU. A one percent increase in the distance between the importer and exporter country leads to more than one percent decrease in EU's exports of all the commodity groups This implies that transportation cost is really an important factor in determining the commodity level exports of the EU. This also indicates that EU countries export more to neighboring countries.

Furthermore, Tables C.3 and C.2 in the Appendix C and Table 34 show that the real exchange rate is another important factor in explaining the variation in commodity level exports of the EU. Depreciations of the domestic currency significantly increase the commodity level exports of the EU, and vice versa. Moreover, increase in the exporter country foreign exchange reserves significantly increase the EU commodity level exports. In fact, foreign exchange reserves of the EU countries provide the stability to exchange rate of their currency which in turn provide confidence to importer and exporter that price of the product of the EU countries in international markets remains stable and leads to increase in the exports of the EU. In addition, the foreign exchange reserves of the importer countries also significantly explain variations in the EU's commodity level exports.

Moreover, results reported in Tables C.3 and C.2 in the Appendix C and Table 34 show that past colonial relationships between the EU countries and the countries that import EU products significantly increase the EU commodity level exports. Similarly, EU countries exports more to the countries with whom they share a common language and have common borders. In simple words, trade-promoting factors significantly explain the variations in the EU's commodity level exports.

Overall, Tables C.3 and C.2 in the Appendix C and Table 34 show that the above mentioned results holds for commodity level exports of the EU before and after the 4^{th} and 5^{th} extensions in the EU. However, the results reported Tables C.3 and C.2 in the Appendix C and in Table 34 show that the signs of the coefficients of the exporter's GDP and importer's GDP for some commodity groups differ the signs of the parameters of the exporter's GDP and importer's GDP for overall exports results reported in Table 33. Variations in the signs of the coefficients of exporter's GDP for different commodity groups basically indicate the nature of the products included in different commodity groups.

Now we discuss the trade creation and trade diversion caused by the 4^{th} and 5^{th} extensions of the EU with reference to exports of the EU. The 3^{rd}, 4^{th} and 5^{th} Columns of the Table 35 show the trade creation, trade diversions and net trade effects of the 4^{th} and 5^{th} extensions of the EU considering the total exports of the EU as well as the commodity group level of the exports of the EU countries. The negative value of the TD in 3^{rd} Column of the Table 35 indicates trade diversion. Positive values of TC in 4^{th} Column

of the Table 35 indicates trade creation and the values given 5^{th} Column of the Table 35 presents the net trade effects. Table 35 indicates that with regard to total exports the 4^{th} extension of the EU increases exports of the EU to EU member countries but decreases the decreases the exports to non-member countries. This implies that 4^{th} extension of the EU caused the exports diversion. The new members joining the EU in 1995 increase exports to member countries at the cost of reducing exports to non-member countries. However, the increase in the exports of new members joining the EU to member countries is more than the reduction in exports to non-member countries.

Table 35: Overall Trade Creation and Trade Diversion of 4^{th} and 5^{th} Extension in the EU, for Total and Commodity-Group level Export

Exports	Extension	TD	TC	Net
Total	4^{th}	-0.0078	0.1192	0.1270
Total	5^{th}	0.0092	0.1607	0.1515
SITC3-0	4^{th}	-0.0212	0.2587	0.2798
	5^{th}	-0.0203	0.3234	0.3437
SITC3-1	4^{th}	-0.0294	0.1962	0.2256
	5^{th}	-0.0013	0.2721	0.2734
SITC3-2	4^{th}	-0.0114	0.0624	0.0738
	5^{th}	-0.0242	0.0748	0.0990
SITC3-3	4^{th}	0.0210	0.0029	-0.0181
	5^{th}	0.0251	0.1125	0.0873
SITC3-4	4^{th}	-0.0606	0.1852	0.2458
	5^{th}	-0.0352	0.0847	0.1199
SITC3-5	4^{th}	-0.0086	0.1382	0.1468
	5^{th}	-0.1035	0.1832	0.2867
SITC3-6	4^{th}	-0.0187	0.1221	0.1408
	5^{th}	-0.0175	0.1384	0.1559
SITC3-7	4^{th}	0.0240	0.0851	0.0611
	5^{th}	0.0439	0.0880	0.0441
SITC3-8	4^{th}	0.0088	0.0684	0.0597
	5^{th}	0.0143	0.0714	0.0571
SITC3-9	4^{th}	0.0021	0.2441	0.2419
	5^{th}	0.4027	0.7173	0.3146

see Section 4.3 for definitions of TD, TC and Net.
see Table C.6 in Appendix C for SITC codes.

Furthermore, Table 35 shows that in contrast to 4^{th} extension of the EU, the 5^{th} extension of the EU, along with increasing the exports to member countries increases exports to non-member countries as well. This implies that the 5^{th} extension of the EU lead to trade creation. Overall, Table 35 indicates that the 4^{th} extension of the EU diverts trade from the non-member countries to member countries but the 5^{th} extension of the EU increases trade with members and non-member countries.

However, with regard to commodity level trade creation, trade diversion and net effects of the 4^{th} and 5^{th} extension of the EU varies across the commodity groups. Table 35

indicates that 4^{th} and 5^{th} extensions of the EU increase exports to member countries with decreasing the exports to member countries in "Minerals Fuels, Lubricants and related material", "Machinery and Transport Equipments", "Miscellaneous manufactured items" and Commodities and "Transactions not classified elsewhere in the SITC" commodity groups. For all other commodity groups, 4^{th} and 5^{th} extension of the EU increase exports to member countries but decrease the exports to non-member countries. Our results consistent with the findings of Commission of the European Communities (2009)[20], Sura (2009) and with the findings of Balassa (1967).

Table 36: Overall Trade Creation and Trade Diversion of New members joining EU in 4^{th} and 5^{th} Extension in the EU, for Exports

Extension	New Member	TD	TC	Net
4^{th}	Austria	-0.123	0.085	0.207
	Finland	-0.009	0.078	0.087
	Sweden	0.105	0.319	0.214
5^{th}	Cyprus	-0.444	-0.443	0.001
	Czech Republic	-	-	-
	Estonia	-0.081	0.016	0.097
	Hungary	-0.023	0.289	0.312
	Latvia	0.056	0.352	0.296
	Lithuania	0.035	0.515	0.480
	Malta	0.171	0.209	0.038
	Poland	0.060	0.560	0.501
	Slovakia	0.016	0.364	0.348
	Slovenia	-0.030	0.181	0.211

see Section 4.3 for definitions of TD, TC and Net.
The data of Czech Republic is not available.

Table 36 shows the trade creation, trade diversion and net trade effects of new members joining the EU in 4^{th} and 5^{th} extensions of the EU. This table indicates that from the members who joined the EU in the 4^{th} extension only Sweden increased its trade with both members and non-member countries. The other two countries, Austria and Finland increased exports to members countries but decreased their exports to non-member countries. This implies that Austria and Finland have diverted their exports from non-members to member countries and caused trade diversion. However, Sweden the third member joining the EU in the 4^{th} extension of the EU presents evidence of trade creation. However, the increase in the exports of Austria and Finland to members countries is greater than the decrease in exports to non-member countries.

In addition, Table 36 points out that from the countries who joined EU in the 5^{th} extension of the EU, Cyprus, Estonia, Hungry and Slovenia caused export diversion as the values of TD are less than zero for these countries. This implies that these new members of the EU increase their exports to member countries at the cost of decrease in

[20]see footnote 19 for the reference

the exports to non-member countries. However, their increase in the exports to member countries is greater than the decrease in the exports to non-member countries.

Moreover, Table 36 indicates that Latvia, Lithuania, Malta, Poland and Slovakia led to trade creation and increase their exports to member and non-member countries. However, the increase in the exports of these countries to member countries in greater than the increase in their exports to non-member countries. Thus, these countries lead to trade creation after joining the EU in 2004.

Overall, Table 35 indicates that for total exports trade creation and trade diversion effects varies across the 4^{th} and 5^{th} extensions of the EU. This table also presents the evidence that trade creation and trade diversion effects of the 4^{th} and 5^{th} extensions of the EU differ across the commodity groups. Moreover, Table 36 indicate that trade diversion and trade creation effects of the extensions in the EU not only vary from country to country but also differ across the extension in the EU.

4.6 Conclusions

Regionalization has re-emerged as a trade policy option in the last two decades. Many new regional trade agreements have been formed and existing regional trade agreements' memberships have been extended. These trends in the development of the regional trade agreements raises the importance to analyze the impact of the regional trade agreements and their extensions on the trade with members of trade agreements and trade with the rest of the world. In this chapter we have analyzed the impact of 4^{th} and 5^{th} extensions of the EU on the trade with members as well as with the rest of the world. Particularly, we have estimated the trade creation and trade diversion impact of 4^{th} and 5^{th} extensions of the EU. Using both imports and the exports of the EU member countries we have estimated trade creation and trade diversion of 4^{th} and 5^{th} extensions of the EU for total imports and exports as well as for each commodity group classified by SITC. Furthermore, we have also analyzed the trade creation and trade diversion impact of new members joining the EU in these two extension.

We have used correctly specified fixed effect gravity model on the panel of 27 EU member countries spanning from 1988 to 2008. The regression errors of the model have been used to measure the trade creation and trade diversion overall impact of 4^{th} and 5^{th} extensions of the EU as well to measure trade creation and trade diversion impact of the new members joining the EU in these two extensions. The results provide evidence that the effects of the 4^{th} and 5^{th} extensions of the EU on trade flows are mixed. In some product groups the EU creates trade among members without affecting their trade with non-member countries and in some other product categories EU diverts trade from the rest of world to member countries. In most of commodity groups, our results support

the finding of the existing literature that regional economic integration boosts trade flows among the members. These results are consistent with the results of Clarete et al. (2003) for APEC and the EU and with the findings of Kandogan (2005) for EU.

Specifically, we find that both 4^{th} and 5^{th} extensions of the EU causes the import diversion. After 4^{th} and 5^{th} extensions of the EU, the member countries have decreased their imports from non-member countries and have increased their imports from the member countries. However, the decrease in imports from non-member countries is lower than the increase in imports from member countries. This implies that intra EU trade has strengthened after 4^{th} and 5^{th} extension of the EU and EU member countries' trade with rest of the world has suffered. These findings provide the evidence of trade diversion taking place in results of 4^{th} and 5^{th} extensions of the EU.

Moreover, we find that after the 4^{th} extension of the EU the member countries divert their exports from non-member countries to member countries. However, this diversion of exports from non-member countries to member countries is lower than the increase in their export to member countries. Furthermore, we find that after the 5^{th} extension of the EU the exports of the EU countries has increased to both member and non-member countries. These findings indicate that 5^{th} extension has resulted in trade creation but 4^{th} extension has resulted in trade diversion.

In addition, our findings indicate that from new members joining the EU in 4^{th} extension in 1995 Austria and Sweden lead to import diversion and Austria and Finland cause the export diversion. Similarly, from the countries who became the member of the EU in 5^{th} extension of the EU in 2004, Cyprus, Hungary, Lithuania Malta and Slovenia increase their imports from member countries but decrease their imports from non-member countries. Moreover, after joining the EU in 2004, Cyprus, Estonia, Hungary, and Slovenia have decreased their exports to non-member countries and their exports to member countries have increased.

Our results regarding trade creation and trade diversion impact of the extensions in the EU for commodity level imports and exports indicate that after the 4^{th} extension of EU, intra EU imports has increased at the cost of decreasing imports from the rest of the world in all the commodity groups except " Minerals Fuel, Lubricants and related material" and "Machinery and Transport equipments". This indicates that except these two commodity groups the 4^{th} extension of the EU leads to trade diversion. The trade creation effects for these two commodity groups may indicates that EU countries imports intermediate products from the rest of the world. The evidence of the trade diversion impact for all other commodity groups is an indication that EU countries are becoming self sufficient in fulfilling the domestic need for the products included in the commodity groups. The dependence of the EU countries on the non-member countries has further decreased after

the 4^{th} extension of EU that has led to imports diversion in all the commodity groups except "Machinery and Transport Equipments".

Similarly, our finding show that both 4^{th} and 5^{th} extensions in the EU diverts exports of all the commodity groups except " Minerals Fuel, Lubricants and related material" and "Machinery and Transport equipments" from non-member countries to member countries. In fact, in these two commodity groups EU countries imports as well exports more to non-member countries relative to member countries. So, we can say that in these two commodity groups EU countries promotes trade with the rest of the world. Actually, for these two commodity groups, EU countries imports raw material or intermediate products, process them and then re-export to members as well as to the non-member countries.

Our findings that 4^{th} and 5^{th} extensions in the EU lead to trade diversion in most of the commodity groups implies that employment opportunities in the EU countries have increased after the 4^{th} and 5^{th} extensions in the EU, whereas the employment opportunities in the rest of the world may have decreased after the 4^{th} and 5^{th} extension of the EU because the demand for their products in the EU countries have decreased after the extensions in the EU.

In addition, we found that the geographical distance between importer and exporter country's significantly affects the trade flows of the EU member countries. This observation implies that transportation cost is a major hurdle in promotion of the trade. The negative distance elasticity of imports and exports indicate that neighboring countries will trade more as compared to far away countries. We also found that real GDP significantly affects the trade flows. Both the imports and exports of the EU countries increase with the increase in the real GDP of these countries. This indicates that not only the demand for imports increases with the increase in the real GDP but the capacity to export also rises with the increase in the GDP.

Another crucial finding is related with the impact of real exchange rate on the trade flows. Our findings indicate that depreciation of the domestic currency decreases the imports but increases the exports of the EU which implies that fluctuations in real exchange rates play a significant role in determining the trade flows of the EU countries. Foreign currency reserves of a country also play their role in determining the trade flows by providing the stability to the exchange rate. Moreover, we found that common language, common border and colonial relationship between the importer and exporter significantly determine the trade flows of the EU countries.

Similarly we found that "machinery and transport equipments", "chemical and related products" and the "manufactured goods chiefly classified by material" are the major contributors in the excellent export performance of the EU. EU imports the intermediate goods used in these sectors from the non member countries and process them and then

re-export the final product to non member nations. Our results strengthen the arguments of the Commission of the European Communities (2003) that the automotive sector is backbone of the EU economy.

On the whole our finding suggest that trade creation and trade diversion effects of the extensions in the EU vary across the extensions, across the commodity groups, and across the new members joining the EU in fourth and fifth extensions of the EU.

Chapter 5

Summary, Conclusions and Policy Implication

5.1 Summary

The advocates of trade believe that international trade provides lifeblood to world economies. They suggest that global trade increases the income and welfare of the countries by increasing the efficiency of the productive resources through specialization and sharing the knowledge and technology, and by providing a wide range of products at relatively lower prices. Moreover, these benefits of trade are not free. Several costs are attached with them that trading partners have to bear. These costs reduce the net benefits of the trade. Many factors impede cross-border flows of trade leading to a reduction in the overall volume of trade. Therefore, it is important to study the factors that influence costs and benefits of international trade.

Specifically, three main issues related to international trade are examined in this thesis. First, we analyzed the impact of real exchange rate-led changes in exports on employment in the UK manufacturing sector and identified whether the adjustment process in the employment works through job creation or job destruction job. We also checked whether the effect of real exchange rate of the UK relative to the EU and non-EU trading partners on the employment is same. Moreover, we tested whether the impact real exchange rate on employment in exporting and non-exporting industries differs.

Second, we explored how firms external finance dependence affects the UK exports. Particularly, we tested whether the effect of financial dependence on the UK exports becomes stronger during the financial crisis of 2007-2009. Moreover, we also examine whether financial dependence affects the exports of different sectors differently, particularly during the 2007-2009 financial crisis.

Finally, we explored the impact of a Regional Trade Agreement(RTA) on trade flows of member and non-member countries of the RTA. Specifically, we studied the impact of the 4^{th} and 5^{th} extensions in the European Union (EU) on the trade flows of the member and non-member countries and determined whether 4^{th} and 5^{th} extensions in EU creates trade among members or diverts trade from member countries. We also examined whether the 4^{th} and 5^{th} extensions in EU increases trade among member without effecting the trade with non-member countries. We also examined whether the new members joining the EU in 4^{th} and 5^{th} extensions of the EU have similar effects on the trade flows of the member and non-member countries.

In Chapter 2, the GMM method was used to estimate the dynamics of employment in the UK manufacturing sector arising from a shock to the real exchange rate. The findings of the analysis show that the real exchange rate significantly affects employment in the UK. Specifically, we show that a rise in UK wage costs relative to its trading partner leads to a significant reduction in net employment in the UK manufacturing sector. This tendency of a reduction in employment is more pronounced for industries that export relatively more.

Chapter 2 shows that adjustments in net employment to a shock in competitiveness mainly occurred due to job creation. Our results also show that the adjustment is not significantly affected by job destruction. Moreover, Chapter 2 reports that smaller firms contribute more towards job creation and slightly less towards job destruction than larger firms. Furthermore, the size of labor adjustment in UK manufacturing sector in response to real exchange rate led fluctuations in competitiveness of the UK with European and non-European countries differs.

Moreover, the findings of Chapter 2 show that fluctuations in real exchange rate may not affect net employment in non-exporting firms. However, an increase in real exchange rate significantly reduces net employment in exporting firms.

In Chapter 3 OLS with dummies to control sector-time, country-time and country-sector fixed effect and IV techniques have been used to analyze the impact of the 2007-2009 global financial crisis on UK trade with its 25 major trading partners. The findings of this chapter show that credit conditions are an important channel through which financial turmoil affects the UK exports. Specifically, the results indicate that with higher lending rates and tighter credit market conditions the UK exported less during the 2007-2009 financial crisis. Moreover, these negative effects become stronger for sectors with limited access to buyer-supplier trade credit, with lesser collateralizable assets, with higher dependency on external financing and with lower values of the leverage.

Chapter 3 also shows that adverse credit conditions affect the supply and demand side of exports significantly and play a significant role in determining the supply and the demand of the UK exports. Moreover, it shows that the demand for exports is primarily driven by the importing country's GDP, capital labor ratio, interest rates and the credit to private sector. Whereas UK's GDP, capital labor ratio, interest rates and availability and the accessibility of the external funds significantly determine the supply of UK exports. The observation that financial markets disruptions reduce UK exports is robust and does not change with the change in proxy used for the cost of capital and the

change in measures used for the financial dependency of a sector on external resources.

In Chapter 4, we use correctly specified fixed effect gravity model to estimate the effects of the 4^{th} and 5^{th} extensions in the European Union (EU) on the trade flows of member and non member countries. The findings show that the effects of 4^{th} and 5^{th} extensions in the EU on trade flows are mixed. Only in two out of ten commodity groups does the EU create trade among members without affecting the EU trade with non-member countries while in all other product categories the 4^{th} and 5^{th} extensions in the EU diverts trade from member countries to rest of the world. In general, Chapter 4 shows that the EU boosts the intra-bloc trade at the cost of reducing the trade with extra bloc trading partners. However, in case of "Minerals Fuels, Lubricants and Related material" and "Machinery and Transport Equipments" commodity groups, 4^{th} and 5^{th} extensions in EU results in increasing the trade with member countries without affecting the trade with non-member countries. In these two commodity groups 4^{th} and 5^{th} extensions in the EU increase trade with non-member countries along with increasing the trade with member countries. These finding make sense because the EU member countries are oil deficient countries and they meet their energy and fuel demand by importing fuels and related products from the non-member countries. Moreover, the EU countries import raw material or the intermediate goods, process them and then re-exports the final products.

Furthermore the findings of the chapter show that trade creation and trade diversion effects of the extensions in the EU vary across the extensions, across the new members joining the EU in these extensions and across the commodity groups. This finding make sense because the extensions of the EU vary across time, in the number and the sizes of the countries joining the EU in these extensions and in variations in the nature of the products included in different commodity groups.

Finally, in this chapter, we show that the major share of "food and live animal" products is imported from non-member countries and the EU is the net importer of the food and agriculture products. Furthermore, the analysis shows that "machinery and transport equipments", "chemical and related products" and the "manufactured goods chiefly classified by material" are the major contributors in the excellent export performance of the EU.

5.2 Conclusions

The fluctuations in real exchange rates significantly affect the employment in UK manufacturing sector and the adjustment in net employment to a shock in the real exchange rate mainly works through job creation. The UK labor market responds to shocks significantly and induces the employment smoothing accordingly. That is, the workers fired in bad times will be rehired in good times. So, employment will be high in good times and unemployment will be high in bad times. Moreover, the employment in small firms is more sensitive to fluctuations in competitiveness than large firms. The employment in exporting and in non-exporting firms behave differently in response to the change in the real exchange rate. Furthermore, the insiders (employed) benefit from the higher wages while outsiders (unemployed) bear the cost of the job reallocation process.

Overall, the financial crisis of 2007-2009 has significantly affected the UK exports. Specifically, the exports of the sectors that depend more on external finance, have limited access to buyer-supplier trade credit and have lesser tangible assets, were severely damaged during the crisis. Adverse credit conditions are important channel through which financial turmoil transmit its effect to international trade flows of the UK. Rises in cost of the capital significantly reduce the UK exports and this reduction even became more intensive during the financial crisis of 2007-2009.

On the whole our finding suggest that trade creation and trade diversion effects of the extensions in the EU vary across the extensions, across the commodity groups, and across the new members joining the EU in fourth and fifth extensions of the EU. These findings indicate that 5^{th} extension has resulted in trade creation but 4^{th} extension has resulted in trade diversion. In some commodity groups the EU increases trade among member countries while in other commodity groups the EU diverts trade from member countries to non-member countries. Specifically, the EU results in trade creation in 8 out of 10 commodity groups. The EU is net importer of the food and agricultural products. Moreover, the "machinery and transport equipments", "chemical and related products" and the "manufactured goods chiefly classified by material" are major exports of the EU.

5.3 Policy Implications

Our findings show that the loss in international competitiveness significantly decreases the employment in the UK manufacturing sector. Particularly, we observe that decrease in the international competitiveness leads to a significant reduction in employment in the exporting industries. These findings are useful in policing making as they suggest that

there is a need to take policy measures that encourage job creations in non-trading industries, improve labor productivity and encourage domestic consumption-led growth. These policy measures will be helpful in reducing the negative effects of the loss of international competitiveness on employment and strengthens the labor markets to absorb the negative shocks to international trade.

Our findings also suggest that policy interventions that reduce the cost of capital will be really helpful in reducing substantially the detrimental effects of severe financial disruptions on international trade flows. Particularly, ensuring the provision of the credit at affordable rate to financially constrained firms during the crisis will enhance the exports.

Our findings suggest that the EU countries should take measures to improve the productivity of the members countries so that they fulfill export order from the members and well from the non-member countries. By improving the productivity and the productive capacity of the member countries the EU can reduce at least the exports diversion caused by the new members joining the EU in the extensions of the EU.

Appendix A: Trade Competitiveness and Employment: Job Creation or Job Destruction ?

Table A.1: Job Creation in Manufacturing Sector of the UK (Exporting Industries)

	Dependent Variable: Job Creation Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	0.163	0.131	0.148	0.064	0.321**
	(0.165)	(0.185)	(0.181)	(0.149)	(0.15)
L. Job Destruction	-0.229	-0.193	-0.160	-0.123	-0.208
	(0.193)	(0.222)	(0.209)	(0.194)	(0.304)
Average Wage	-0.102*	-0.094**	-0.069*	-0.083*	-0.165***
	(0.061)	(0.042)	(0.039)	(0.049)	(0.061)
GDP Growth	.003***	0.003***	0.003***	.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sales Growth	0.001	0.001	0.001	0.002	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Size	-0.003	-0.159	-0.105	-0.026	0.026
	(0.039)	(0.089)	(0.085)	(0.058)	(0.054)
Competitiveness	-0.174*				
(32 Partners)	(0.104)				
Competitiveness		-0.159		-0.056	0.060
(EU Partners)		(0.116)		(0.15)	(0.349)
Competitiveness			-0.105***	-0.097**	-0.068
(non-EU Partners)			(0.032)	(0.046)	(0.102)
Competitiveness					1.983
(Interaction)					(3.318)
Constant	0.072	0.072	0.066	0.072***	0.072***
	(0.02)	(0.019)	(0.017)	(0.02)	(0.025)
Arellano AR(2) Probability	0.785	0.595	0.783	0.596	0.864
Hansen Test Probability	0.974	0.881	0.826	0.960	0.811
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.2: Job Destruction in Manufacturing Sector of the UK (Exporting Industries)

	Dependent Variable: Job Destruction Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	0.078	0.089	0.071	0.087	0.113
	(0.155)	(0.128)	(0.125)	(0.128)	(0.139)
L. Job Destruction	0.401***	0.392***	0.391***	.404***	.476***
	(0.133)	(0.134)	(0.125)	(0.124)	(0.148)
Average Wage	-0.178*	-0.181*	-0.191**	-0.176**	-0.169**
	(0.101)	(0.098)	(0.092)	(0.088)	(0.083)
GDP Growth	-0.004***	-0.004***	-0.004***	-0.004***	-0.005***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Sales Growth	0.005	0.005	0.005	0.005	0.005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Size	-0.062	-0.044	-0.043	-0.046	-0.041
	(0.082)	(0.076)	(0.076)	(0.073)	(0.087)
Competitiveness	0.071				
(32 Partners)	(0.0732)				
Competitiveness		0.087		0.011	0.276
(EU Partners)		(0.083)		(0.125)	(0.323)
Competitiveness			0.022	-0.015	-0.045
(non-EU Partners)			(0.041)	(0.064)	(0.087)
Competitiveness					2.200
(Interaction)					(3.165)
Constant	0.094***	0.091	.093***	.090***	0.082***
	(0.034)	(0.032)	(0.032)	(0.031)	(0.03)
Arellano AR(2) Probability	0.209	0.214	0.235	0.252	0.234
Hansen Test Probability	0.521	0.534	0.586	0.534	0.532
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.3: Gross Job Flows in Manufacturing Sector of the UK (Exporting Industries)

	Dependent Variable: Gross Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	0.125	0.107	0.070	0.107	0.129
	(0.273)	(0.253)	(0.267)	(0.25)	(0.272)
L. Job Destruction	0.149	0.127	0.163	0.160	0.245
	(0.226)	(0.231)	(0.211)	(0.203)	(0.313)
Average Wage	-0.398***	-0.411***	-0.366***	-0.393***	-0.371***
	(0.091)	(0.08)	(0.106)	(0.083)	(0.093)
GDP Growth	-0.003*	-0.003**	-0.003*	-0.003**	-0.003**
	(0.003)	(0.002)	(0.002)	(0.002))	(0.002)
Sales Growth	0.005	0.005	0.005	0.005	0.004
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Size	-0.035	-0.030	-0.032	-0.030	-0.027
	(0.155)	(0.148)	(0.152)	(0.145)	(0.135)
Competitiveness	-0.091				
(32 Partners)	(0.103)				
Competitiveness		-0.102		-0.029	0.165
(EU Partners)		(0.116)		(0.148)	(0.495)
Competitiveness			-0.050	-0.063	-0.100
(non-EU Partners)			(0.044)	(0.063)	(0.09)
Competitiveness					2.479
(Interaction)					(5.348)
Constant	0.195***	.199***	.191***	0.194***	0.182***
	(0.031)	(0.03)	(0.031)	(0.03)	(0.402)
Arellano AR(2) Probability	0.318	0.380	0.313	0.260	0.278
Hansen Test Probability	0.792	0.820	0.829	0.836	0.722
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.4: Job Creation in Manufacturing Sector of the UK (Non-Exporting Industries)

	Dependent Variable: Job Creation Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	-0.110**	-0.118***	-0.093*	-0.117***	-0.166***
	(0.044)	(0.046)	(0.054)	(0.046)	(0.047)
L. Job Destruction	-0.211	-0.201	-0.164	-0.175	-0.387
	(0.277)	(0.273)	(0.257)	(0.269)	(0.438)
Average Wage	-1.429*	-2.112*	-1.358**	-2.539*	-2.296*
	(0.781)	(1.136)	(0.647)	(1.472)	(1.371)
GDP Growth	0.009*	0.013*	0.003**	0.012*	0.042*
	(0.005)	(0.007)	(0.002)	(0.007)	(0.025)
Sales Growth	-0.008	-0.011	-0.002	-0.010	-0.012
	(0.007)	(0.008)	(0.004)	(0.008)	(0.008)
Size	-0.062	-0.060	-0.065	-0.060	-0.058
	(0.047)	(0.049)	(0.051)	(0.051)	(0.045)
Real Exchange Rate	-0.172				
(32 Partners)	(0.153)				
Real Exchange Rate		-0.296		-0.310	15.062
(EU Partners)		(0.214)		(0.219)	(10.117)
Real Exchange Rate			0.204	0.264	78.990
(non-EU Partners)			(0.189)	(0.24)	(52.63)
Real Exchange Rate					-72.226
(Interaction)					(48.305)
Constant	0.318	0.419	0.059	0.383	-16.449
	(0.229)	(0.265)	(0.059)	(0.257)	(11.035)
Arellano AR(2) Probability	0.125	0.127	0.280	0.192	0.527
Hansen Test Probability	0.821	0.742	0.885	0.875	0.939
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.5: Job Destruction in Manufacturing Sector of the UK (Non-Exporting Industries)

	Dependent Variable: Job Destruction Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	-0.019	-0.019	-0.018	-0.018	0.008
	(0.059)	(0.056)	(0.058)	(0.06)	(0.086)
L. Job Destruction	0.289*	0.288*	0.276*	0.282*	0.336*
	(0.151)	(0.154)	(0.157)	(0.161)	(0.154)
Average Wage	0.726	0.823	0.185	0.355	0.363
	(0.801)	(0.922)	(0.9)	(1.091)	(1.105)
GDP Growth	-0.003	-0.002	-0.001	-0.003	(-0.015)*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.009)
Sales Growth	0.003	0.002	0.002	0.003	0.007
	(0.009)	(0.009)	(0.01)	(0.009)	(0.01)
Size	0.116	0.114	0.102	0.110	0.104
	(0.108)	(0.103)	(0.105)	(0.101)	(0.099)
Real Exchange Rate	0.069				
(32 Partners)	(0.098)				
Real Exchange Rate		0.046		0.046	-5.362
(EU Partners)		(0.126)		(0.127)	(3.619)
Real Exchange Rate			0.176	0.177	-27.724
(non-EU Partners)			(0.192)	(0.197)	(18.508)
Real Exchange Rate					25.545
(Interaction)					(16.945)
Constant	-0.062	-0.026	-0.001	-0.053	5.887
	(0.133)	(0.147)	(0.057)	(0.144)	(3.982)
Arellano AR(2) Probability	0.216	0.187	0.251	0.261	0.261
Hansen Test Probability	0.293	0.289	0.276	0.223	0.215
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.6: Gross Job Flows in Manufacturing Sector of the UK (Non-Exporting Industries)

	Dependent Variable: Gross Job Flow Rate				
	1	**2**	**3**	**4**	**5**
L.Job Creation	-0.331	-0.289	-0.405	-0.293	-0.301
	(0.254)	(0.259)	(0.286)	(0.26)	(0.27)
L. Job Destruction	0.220*	0.285*	0.230*	0.315*	0.299**
	(0.126)	(0.158)	(0.117)	(0.165)	(0.139)
GDP Growth	0.005	0.008	-0.002	0.008	0.010
	(0.005)	(0.006)	(0.007)	(0.006)	(0.013)
Sales Growth	-0.002	-0.004	0.003	-0.003	-0.003
	(0.008)	(0.009)	(0.007)	(0.008)	(0.009)
Size	0.262	0.280	0.332	0.307	0.307
	(0.323)	(0.342)	(0.401)	(0.361)	(0.362)
Real Exchange Rate	-0.189				
(32 Partners)	(0.242)				
Real Exchange Rate		-0.300		-0.291	0.757
(EU Partners)		(0.321)		(0.321)	(5.407)
Real Exchange Rate			0.244	0.199	5.593
(non-EU Partners)			(0.244)	(0.207)	(27.991)
Real Exchange Rate					-4.941
(Interaction)					(25.688)
Constant	0.314	0.373	0.022	0.313	-0.837
	(0.276)	(0.289)	(0.091)	(0.279)	(5.917)
Arellano AR(2) Probability	0.353	0.328	0.415	0.361	0.327
Hansen Test Probability	0.834	0.904	0.884	0.932	0.909
Total Observation	198	198	198	198	198
No. Of Groups	22	22	22	22	22
Observation per group	9	9	9	9	9

Robust Standard Errors are given in parentheses.
Standard Errors are clustered by industry.
$***$ = Significant at 1 percent. $**$ = Significant at 5 percent. $*$= Significance at 10 percent.

Table A.7: Manufacturing Industry Classification (UK SIC 2003)

Code	Industry
15	Food products and Beverages
16	Tobacco products
17	Textiles
18	Wearing apparel; dressing & dyeing of fur
19	Tanning & dressing of leather & leather products
20	Wood and of products of wood and cork except furniture
21	Pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Coke refined petroleum products
24	Chemicals and chemical products
25	Rubber and plastic products
26	Other non-metallic mineral products
27	Basic metals
28	Fabricated metal products, except machinery and equipment
29	Machinery and equipment not elsewhere classified
30	Office machinery and computers
31	Electrical machinery and apparatus not elsewhere classified
32	Radio, television and communication equipment and apparatus
33	Medical, precision and optical instruments, watches and clocks
34	Motor vehicles, trailers and semi-trailers
35	Other transport equipment
36	Furniture; manufacturing not elsewhere classified

Figure 16: Average Share of Export in Total Sale in UK Manufacturing Industries

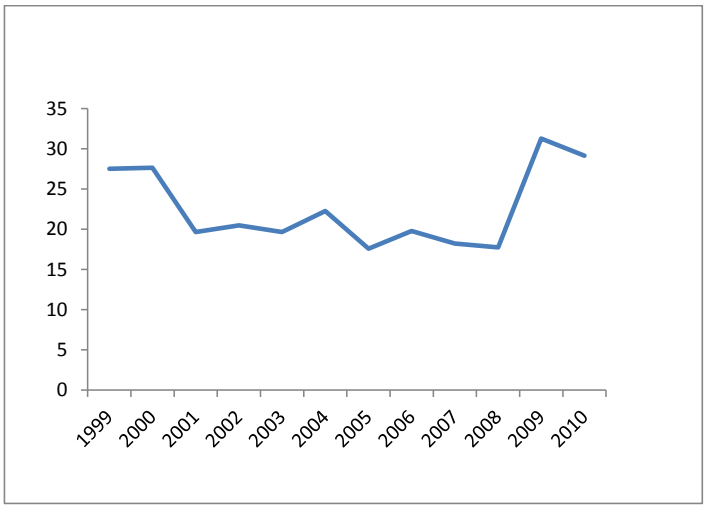


Figure 17: Employment in Manufacturing sector of the UK

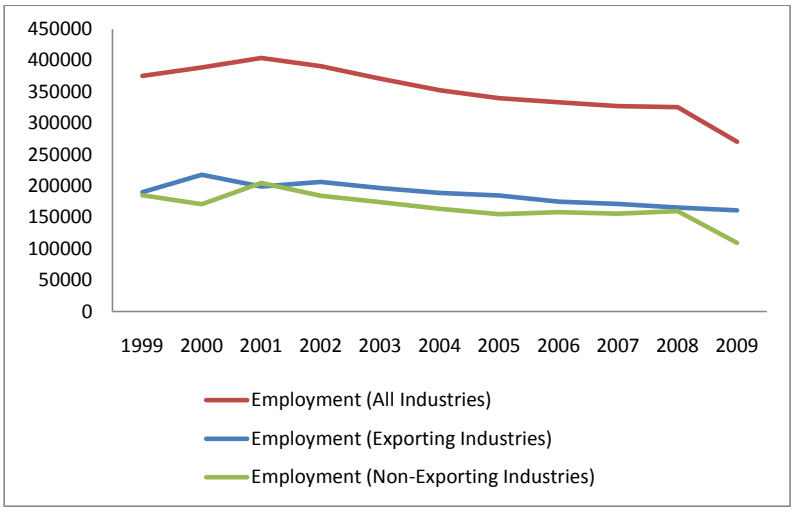


Figure 18: Average UK's Real Exchange Rate with top 5 Trading Partners from 1999 to 2010

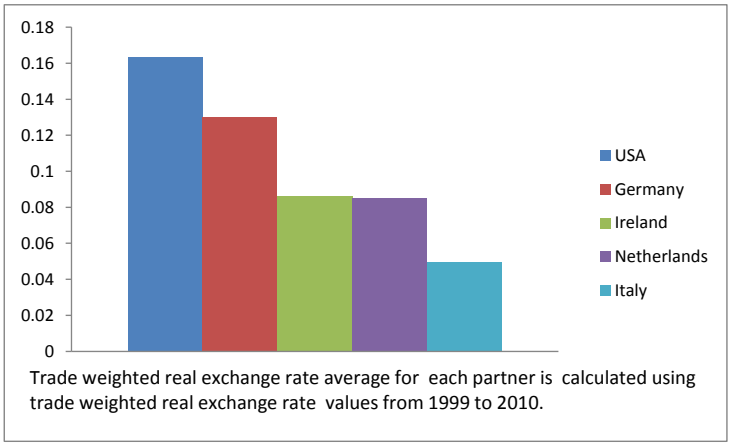
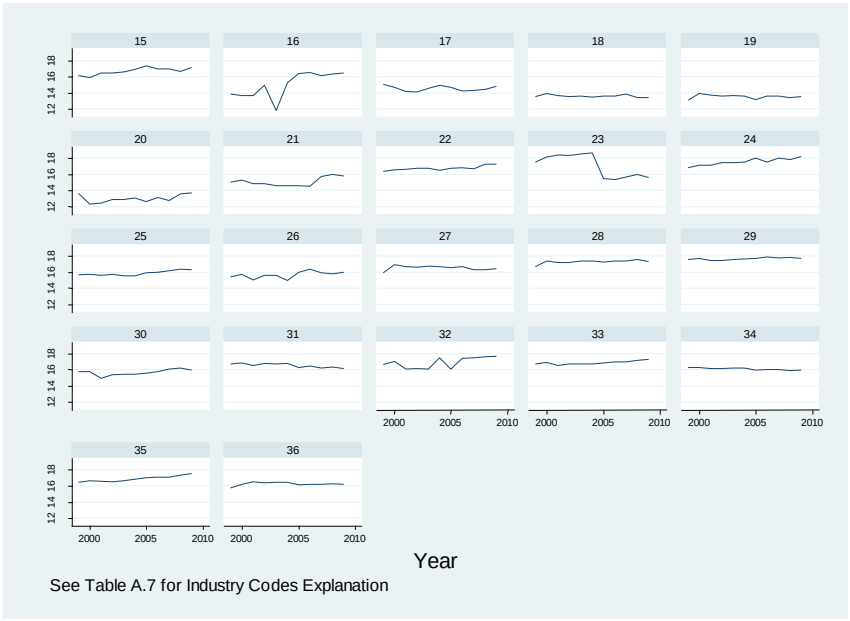


Figure 19: UK Manufacturing Exports by Industry from 1999 to 2010



Appendix B: Financial Turmoil, External Finance and UK Exports

Table B.1: Trade Credit and Overnight Interbank Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
IBrate * TCRED	0.572***	0.444**	0.463***
	(0.141)	(0.146)	(0.148)
D_Crisis * IBrate * TCRED		0.179***	0.138**
		(0.054)	(0.057)
IBrate * Pvt_Claims			0.010***
			(0.002)
UK Interest Rate	-0.050**	-0.058***	-0.061***
	(0.016)	(0.017)	(0.018)
Partner Interest Rate	-0.024*	-0.024*	-0.142***
	(0.012)	(0.012)	(0.026)
UK GDP	4.107	3.620	4.300
	(2.907)	(2.952)	(3.484)
Partner GDP	1.002***	1.002***	1.070***
	(0.065)	(0.065)	(0.027)
UK K/L Ratio	-1.902**	-1.903**	-2.366***
	(0.680)	(0.678)	(0.695)
Partner K/L Ratio	0.547***	0.546***	0.618***
	(0.090)	(0.090)	(0.036)
N	13916	13916	12566
r2	0.939	0.939	0.935

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.2: Tangible Assets and Overnight Interbank Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
IBrate * TANG	0.022	-0.013	-0.006
	(0.040)	(0.044)	(0.044)
D_Crisis * IBrate * TANG		0.048***	0.040**
		(0.013)	(0.014)
IBrate * Pvt_Claims			0.010***
			(0.002)
UK Interest Rate	0.004	-0.002	-0.007
	(0.017)	(0.017)	(0.021)
Partner Interest Rate	-0.024*	-0.024*	-0.143***
	(0.012)	(0.012)	(0.025)
UK GDP	5.179*	4.312	5.001
	(2.887)	(2.945)	(3.281)
Partner GDP	1.002***	1.002***	1.070***
	(0.064)	(0.064)	(0.026)
UK K/L Ratio	-1.865**	-1.861**	-2.326***
	(0.675)	(0.674)	(0.691)
Partner K/L Ratio	0.546***	0.545***	0.618***
	(0.088)	(0.088)	(0.035)
N	13916	13916	12566
r2	0.939	0.939	0.935

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.3: Leverage and Overnight Interbank Rate

Crisis Period=May 07 to Feb 09	Dependent Variable: log (Sectoral Exports of the UK)		
	(1)	(2)	(3)
IBrate * Leverage	0.154***	0.123**	0.131**
	(0.049)	(0.054)	(0.051)
D_Crisis * IBrate * Leverage		0.050***	0.041**
		(0.014)	(0.015)
IBrate * Pvt_Claims			0.010***
			(0.002)
UK Interest Rate	-0.049**	-0.059***	-0.064**
	(0.020)	(0.019)	(0.023)
Partner Interest Rate	-0.024*	-0.024*	-0.142***
	(0.012)	(0.012)	(0.025)
UK GDP	4.466	3.849	4.497
	(2.938)	(2.975)	(3.509)
Partner GDP	1.002***	1.002***	1.070***
	(0.065)	(0.065)	(0.026)
UK K/L Ratio	-1.889**	-1.882**	-2.348***
	(0.678)	(0.677)	(0.692)
Partner K/L Ratio	0.547***	0.546***	0.618***
	(0.090)	(0.090)	(0.035)
N	13916	13916	12566
r2	0.939	0.939	0.935

Robust Standard errors in parentheses, Standard errors are clustered by Importers
Country-time, Sector-time and Country-Sector effects are controlled
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B.4: Summary Statistics

Period	Variable	Obs.	Mean	Std. Dev.	Min	Max
Before the Crisis	Exports	15942	55.52	133.27	0.0002	2629.13
	UK lending rate	16000	4.34	0.48	3.50	5.25
	UK interbank rate	16000	4.34	0.48	3.50	5.25
	UK GDP	16000	1931250.00	84551.08	1800000.00	2100000.00
	UK K/L	16000	19081.73	2667.50	15619.59	23439.23
	Partner lending rate	11720	6.20	2.92	1.60	18.30
	Partner interbank rate	10830	6.29	9.54	0.10	60.00
	Partner GDP	16000	1500676.00	2533183.00	3.98	13000000.00
	Partner K/L	12800	31900000.00	138000000.00	860.42	719000000.00
	Partner Claims on Pvt. Sector	14660	24800000.00	102000000.00	19772.20	560000000.00
During the Crisis	Exports	5452	64.29	129.60	0.001	1185.68
	UK lending rate	5500	4.69	1.40	1.00	5.75
	UK interbank rate	5500	4.69	1.40	1.00	5.75
	UK GDP	5500	2090909.00	28750.59	2000000.00	2100000.00
	UK K/L	5500	22102.69	1433.94	18215.04	23439.23
	Partner lending rate	3370	6.85	3.07	1.80	17.10
	Partner interbank rate	3740	5.69	5.62	0.13	27.00
	Partner GDP	5500	1725639.00	2821868.00	6.90	13000000.00
	Partner K/L	4400	36100000.00	155000000.00	1162.52	721000000.00
	Partner Claims on Pvt. Sector	4890	27600000.00	103000000.00	97720.90	510000000.00
After the Crisis	Exports	7629	67.15	135.43	0.001	1300.89
	UK lending rate	7750	0.50	0.00	0.50	0.50
	UK interbank rate	7750	0.50	0.00	0.50	0.50
	UK GDP	5500	2000000.00	0.00	2000000.00	2000000.00
	UK K/L	5500	19859.46	1501.28	18215.04	21229.81
	Partner lending rate	4350	5.47	3.18	1.50	16.10
	Partner interbank rate	5210	3.32	4.15	0.13	25.00
	Partner GDP	5380	1814419.00	2965926.00	8.26	13000000.00
	Partner K/L	4400	33600000.00	145000000.00	1179.98	682000000.00
	Partner Claims on Pvt. Sector	6330	28100000.00	99000000.00	174177.00	503000000.00

Interest rates are in percentages and all other variables are in million.
Crisis Period is from May 2007 to February 2009 (Wisniewski and Lambe, 2011).

Figure 20: Monthly Share Price Index of the UK

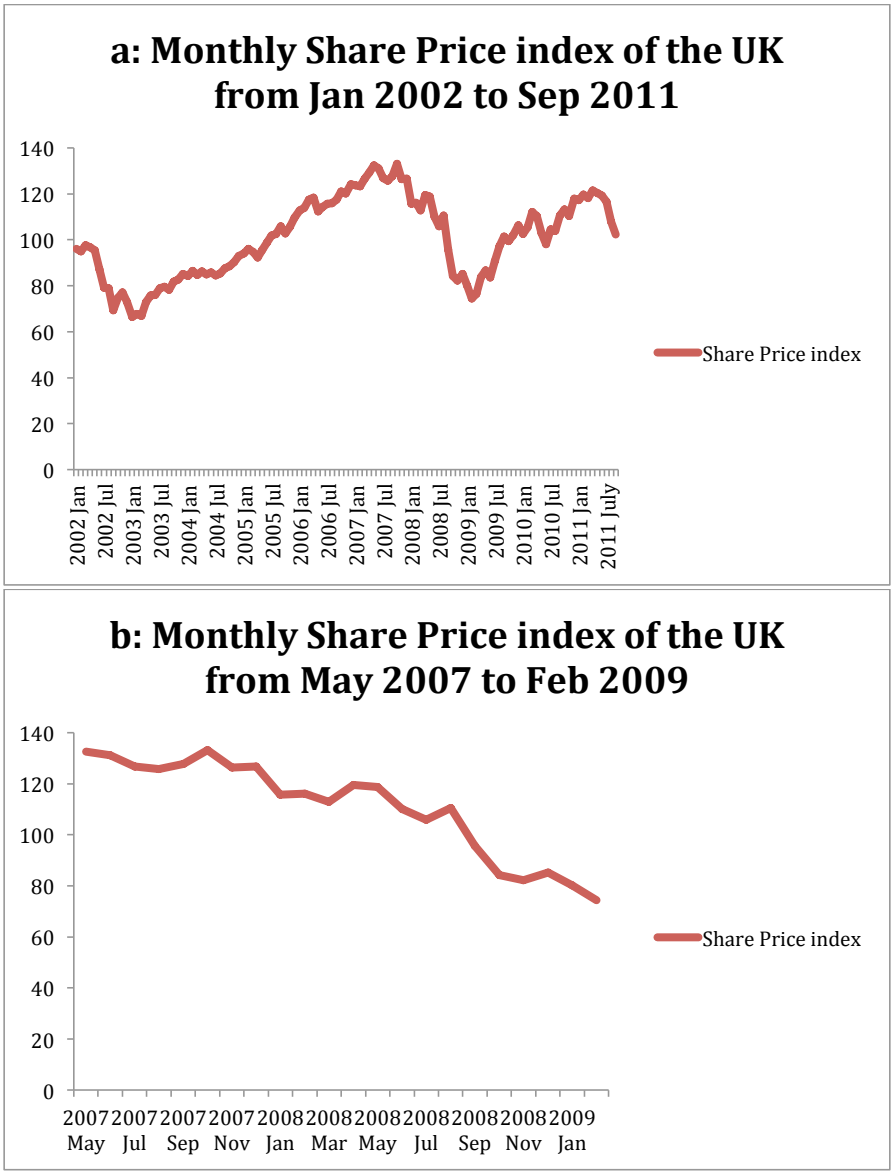


Table B.5: Sector Characteristics, Summary Statistics

	Proxies of External Finance				No. of firms used to calculate the Proxies			
Sector	EXTFIN	TANG	TCRED	LEVERAGE	Small	Medium	Large	Total
Food and Live Animal	-2.263	0.541	0.066	0.265	2385	2208	849	5442
Beverages and Tobacco	-2.493	0.286	0.105	0.294	6208	9569	6029	21806
Crude Materials, Inedible except Fuel	-3.998	0.216	0.131	0.28	16371	32213	12940	61524
Minerals Fuels, Lubricants and Related material	-5.422	0.155	0.121	0.266	8591	17529	7325	33445
Animal and vegetable oils, Fats and Waxes	-5.975	0.107	0.167	0.238	13060	19403	6788	39251
Chemical and Related Products, n.e.s	-7.632	0.181	0.14	0.302	46129	48735	21476	116340
Manufactured goods classified chiefly by material	-2.403	0.087	0.079	0.367	30538	19855	11536	61929
Machinery and Transport Equipments	-0.381	0.174	0.053	0.399	88168	61252	36985	186405
Miscellaneous manufactured article	0.615	0.447	0.025	0.289	13225	16720	5649	35594
Commodities and Transactions not Classified elsewhere in the SITC	-0.49	0.242	0.053	0.318	23525	17871	7329	48725

See variable construction section for the explanation of EXTFIN, TANG, TCRED and LEVERAGE.
Note: the values presented in this table are mean values of EXTFIN, TANG, TCRED and LEVERAGE calculated over the period of 2002 to 2011 using FAME data.
We have used European Classification of firms to classify firms into small, medium and large. According to this classification a firm is a small firm if it employs less than 50 people, a firm is a medium firm if it employs 50 to 249 people and a firm is a large firm if it employs 250 or more people.

Table B.6: Standard International Trade Classification, Revision 3

SITC Code	Explanation
SITC-0	Food and Live Animal
SITC-1	Beverages and Tobacco
SITC-2	Crude Materials, Inedible except Fuel
SITC-3	Minerals Fuels, Lubricants and Related material
SITC-4	Animal and vegetable oils, Fats and Waxes
SITC-5	Chemical and Related Products, n.e.s
SITC-6	Manufactured goods classified chiefly by material
SITC-7	Machinery and Transport Equipments
SITC-8	Miscellaneous manufactured article
SITC-9	Commodities and Transactions not Classified elsewhere in the SITC

Appendix C: Trade Creation and Diversion Effects of European Union

Table C.1: Trade agreements of Europe

Country	EEA	ECCU	ECFTA	EA	CEFTA	MCA	EMA
Algeria	-	-	-	-	-	1976	2002
Austria	1994	1995	1973	-	-	-	-
Belgium	1994	1957	1957	-	-	-	-
Bulgaria	-	-	-	1993	1999	-	-
Croatia	-	-	2002	-	2003	-	-
Cyprus	2004	2004	1973	-	-	-	-
The Czech Rep.	2004	2004	-	1992	1993	-	-
Denmark	1994	1973	1973	-	-	-	-
Egypt	-	-	-	-	-	1977	2004
Estonia	2004	2004	-	1995	-	-	-
Finland	1994	1995	1973	-	-	-	-
France	1994	1957	1957	-	-	-	-
Germany	1994	1957	1957	-	-	-	-
Greece	1994	1981	1981	-	-	-	-
Hungary	2004	2004	-	1992	1993	-	-
Iceland	1994	-	1973	-	-	-	-
Ireland	1994	1973	1973	-	-	-	-
Israel	-	-	-	-	-	-	2002
Italy	1994	1957	1957	-	-	-	-
Jordan	-	-	-	-	-	1977	2002
Latvia	2004	2004	-	1995	-	-	-
Lebanon	-	-	-	-	-	1977	2003
Lithuania	2004	2004	-	1995	-	-	-
Luxembourg	1994	1957	1957	-	-	-	-
FYR Macedonia	-	-	2001	-	-	-	-
Malta	1994	2004	1971	-	-	-	-
Morocco	-	-	-	-	-	-	2000
Netherlands	1994	1957	1957	-	-	-	-
Norway	1994	-	1973	-	-	-	-
Palestine	-	-	-	-	-	-	1997
Poland	2004	2004	-	1992	1993	-	-
Portugal	1994	1986	1973	-	-	-	-
Romania	-	-	-	1993	1997	-	-
The Slovakia	2004	2004	-	1992	1993	-	-
Slovenia	2004	2004	-	1997	1996	-	-
Spain	1994	1986	1986	-	-	-	-
Sweden	1994	1995	1973	-	-	-	-
Switzerland	1994	-	1973	-	-	-	-
Syria	-	-	-	-	-	1977	-
Tunisia	-	-	-	-	-	-	1998
Turkey	-	1996	1963	-	-	-	-
The UK	1994	1973	1973	-	-	-	-

source; Kandogan (2005)

EEA= European Economic Area. ECCU= European Community's Customs Union.

ECFTA= European Free Trade Area. EA= Europe Agreements. EMA= Euro-Mediterranean Agreements

CEFTA= Central European Free Trade Area. MCA= Mediterranean Cooperation Agreements

Table C.2: Commodity Level Exports of the EU before 5^{th} Extension in the EU

	Dependent Variable: log(Exports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	0.763***	1.382***	0.593*	1.217***	3.372***	2.120***	1.483***	1.838***	1.201***	0.983
	(0.212)	(0.366)	(0.307)	(0.430)	(0.611)	(0.222)	(0.239)	(0.220)	(0.205)	(0.690)
Y_j	-0.010	0.445*	0.112	0.737***	0.045	0.176***	0.292*	0.353**	0.218*	0.269**
	(0.145)	(0.232)	(0.114)	(0.166)	(0.195)	(0.067)	(0.166)	(0.146)	(0.116)	(0.117)
d_{ij}	-1.536***	-1.590***	-1.606***	-2.881***	-1.498***	-1.828***	-1.740***	-1.721***	-1.557***	-1.233***
	(0.140)	(0.153)	(0.120)	(0.175)	(0.179)	(0.123)	(0.106)	(0.109)	(0.134)	(0.160)
SIM	0.019	-0.187	0.084	0.065	0.023	-0.076	-0.052	-0.080	-0.153*	-0.169
	(0.108)	(0.134)	(0.097)	(0.150)	(0.161)	(0.064)	(0.099)	(0.082)	(0.088)	(0.136)
Δe_{ij}	0.183***	0.130***	0.144***	0.134***	0.140***	0.195***	0.214***	0.179***	0.170***	0.125***
	(0.033)	(0.040)	(0.035)	(0.047)	(0.038)	(0.040)	(0.043)	(0.034)	(0.025)	(0.031)
R_i	0.543***	0.318***	0.461***	0.503***	0.316***	0.754***	0.607***	0.631***	0.615***	-0.374***
	(0.057)	(0.072)	(0.065)	(0.090)	(0.109)	(0.042)	(0.042)	(0.042)	(0.038)	(0.088)
R_j	0.065**	0.047	0.077**	0.065	0.043	0.036	0.015	0.095***	0.057**	0.026
	(0.028)	(0.045)	(0.036)	(0.051)	(0.041)	(0.025)	(0.032)	(0.025)	(0.028)	(0.039)
RF	0.016	-0.177**	0.065	-0.005	-0.050	-0.008	0.018	0.013	-0.093	-0.114
	(0.071)	(0.089)	(0.063)	(0.104)	(0.112)	(0.049)	(0.057)	(0.055)	(0.058)	(0.105)
COL	0.831***	0.675***	0.755***	0.598**	0.606***	0.930***	0.917***	1.085***	1.231***	0.821***
	(0.169)	(0.181)	(0.144)	(0.240)	(0.209)	(0.158)	(0.157)	(0.172)	(0.185)	(0.172)
CL	0.916***	0.635***	0.680***	0.308	0.606**	0.664***	0.674***	0.625***	0.902***	0.964***
	(0.172)	(0.174)	(0.151)	(0.241)	(0.240)	(0.144)	(0.152)	(0.166)	(0.161)	(0.201)
CB	0.849***	0.586***	0.706***	1.192***	1.168***	0.427**	0.239	0.029	0.180	0.551***
	(0.184)	(0.226)	(0.186)	(0.226)	(0.209)	(0.188)	(0.159)	(0.200)	(0.215)	(0.212)
N	16879	13601	14424	10132	7899	20189	21046	21607	20307	9209
r2_o	0.711	0.645	0.732	0.607	0.568	0.787	0.815	0.810	0.820	0.640

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

Table C.3: Commodity Level Exports of the EU before 4^{th} Extension in the EU

	Dependent Variable: log(Exports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	1.307**	-0.397	0.168	-0.878	2.357	1.954***	1.070**	1.991***	0.627	18.935***
	(0.593)	(0.512)	(0.494)	(1.522)	(1.549)	(0.422)	(0.500)	(0.520)	(0.433)	(1.431)
Y_j	-0.015	0.718**	0.515***	1.131**	0.169	0.231*	0.448*	0.390*	0.406**	0.562***
	(0.450)	(0.355)	(0.165)	(0.549)	(0.299)	(0.132)	(0.237)	(0.230)	(0.182)	(0.213)
d_{ij}	-1.228***	-1.544***	-1.339***	-2.888***	-1.706***	-1.751***	-1.658***	-1.521***	-1.204***	-1.063***
	(0.132)	(0.191)	(0.130)	(0.262)	(0.148)	(0.137)	(0.138)	(0.127)	(0.158)	(0.187)
SIM	0.076	-0.256	-0.008	-0.097	0.109	-0.007	-0.088	-0.011	-0.140	0.202
	(0.183)	(0.177)	(0.116)	(0.263)	(0.252)	(0.102)	(0.122)	(0.123)	(0.112)	(0.178)
Δe_{ij}	0.208***	0.169**	0.083**	0.047	0.116	0.131***	0.144***	0.102**	0.166***	0.079**
	(0.049)	(0.068)	(0.039)	(0.099)	(0.071)	(0.043)	(0.051)	(0.050)	(0.049)	(0.033)
R_i	0.240***	0.233***	0.388***	0.142	-0.169	0.112**	0.189***	0.454***	0.276***	-0.515***
	(0.080)	(0.090)	(0.078)	(0.147)	(0.155)	(0.053)	(0.062)	(0.074)	(0.060)	(0.136)
R_j	-0.029	-0.074*	0.072	0.102	0.064	0.018	0.030	0.028	0.025	-0.058*
	(0.059)	(0.044)	(0.054)	(0.080)	(0.081)	(0.040)	(0.047)	(0.039)	(0.039)	(0.032)
RF	0.044	-0.200*	-0.047	-0.113	-0.065	0.023	-0.057	-0.009	-0.059	0.172
	(0.123)	(0.121)	(0.091)	(0.174)	(0.168)	(0.070)	(0.089)	(0.095)	(0.084)	(0.123)
COL	0.894***	0.624***	0.977***	0.814***	0.214	1.024***	1.102***	1.144***	1.359***	0.740***
	(0.185)	(0.205)	(0.160)	(0.295)	(0.269)	(0.174)	(0.173)	(0.180)	(0.196)	(0.201)
CL	0.798***	0.636***	0.538***	0.228	0.873***	0.635***	0.674***	0.744***	1.017***	1.256***
	(0.186)	(0.195)	(0.179)	(0.338)	(0.289)	(0.150)	(0.163)	(0.177)	(0.177)	(0.225)
CB	0.725***	0.473*	0.327*	0.677**	0.880***	0.060	-0.268	-0.196	-0.069	0.214
	(0.222)	(0.254)	(0.194)	(0.330)	(0.278)	(0.231)	(0.204)	(0.249)	(0.267)	(0.335)
N	5504	4832	4839	3346	2919	6364	6621	6785	6496	3393
r2_o	0.764	0.721	0.790	0.671	0.612	0.838	0.859	0.840	0.863	0.717

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

Table C.4: Commodity Level Imports of the EU before 5^{th} Extension in the EU

	Dependent Variable: log(Imports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	1.230***	0.846*	1.050***	1.090*	1.199*	1.092***	0.787***	0.643**	2.329***	2.452***
	(0.259)	(0.452)	(0.265)	(0.630)	(0.620)	(0.240)	(0.232)	(0.303)	(0.221)	(0.676)
Y_j	-0.025	-0.194	-0.040	0.482	0.654	0.026	0.128	0.308**	0.131	0.120
	(0.084)	(0.154)	(0.085)	(0.351)	(0.463)	(0.168)	(0.100)	(0.132)	(0.152)	(0.129)
d_{ij}	-1.544***	-1.103***	-1.611***	-2.351***	-1.304***	-1.635***	-1.673***	-1.388***	-1.369***	-1.550***
	(0.135)	(0.154)	(0.144)	(0.232)	(0.162)	(0.122)	(0.128)	(0.135)	(0.145)	(0.245)
SIM	0.067	-0.130	-0.061	-0.391**	-0.364**	0.012	0.057	0.047	-0.107	-0.048
	(0.087)	(0.125)	(0.091)	(0.188)	(0.185)	(0.088)	(0.094)	(0.094)	(0.098)	(0.163)
e_{ij}	-0.118***	-0.113***	-0.128***	-0.213***	-0.056	-0.096***	-0.093***	-0.124***	-0.086***	-0 .063
	(0.025)	(0.036)	(0.026)	(0.054)	(0.048)	(0.024)	(0.022)	(0.028)	(0.030)	(0.039)
R_i	0.437***	0.554***	0.568***	0.463***	0.386***	0.478***	0.427***	0.458***	0.452***	0.291**
	(0.048)	(0.089)	(0.044)	(0.092)	(0.106)	(0.052)	(0.040)	(0.047)	(0.045)	(0.118)
R_j	0.170***	0.227***	0.151***	0.282***	0.060	0.210***	0.143***	0.185***	0.092	0.057
	(0.050)	(0.073)	(0.044)	(0.093)	(0.088)	(0.047)	(0.039)	(0.045)	(0.059)	(0.072)
RF	0.016	-0.071	-0.019	-0.170	-0.164	-0.009	0.004	0.047	-0.040	-0.002
	(0.066)	(0.089)	(0.070)	(0.124)	(0.156)	(0.064)	(0.071)	(0.070)	(0.072)	(0.120)
COL	0.954***	0.494**	0.616***	0.260	0.464**	0.542***	0.609***	0.608***	0.894***	1.007***
	(0.198)	(0.239)	(0.200)	(0.249)	(0.222)	(0.186)	(0.163)	(0.183)	(0.168)	(0.277)
CL	0.884***	0.814***	0.337*	0.345	0.200	0.421**	0.644***	0.635***	0.532***	0.956***
	(0.169)	(0.237)	(0.179)	(0.253)	(0.230)	(0.201)	(0.153)	(0.158)	(0.145)	(0.246)
CB	0.428**	0.499**	0.702***	1.171***	1.327***	0.511***	0.241	0.409**	0.298	0.397
	(0.188)	(0.244)	(0.192)	(0.302)	(0.249)	(0.195)	(0.175)	(0.172)	(0.189)	(0.319)
N	18857	9520	16571	6607	5917	13130	17400	16505	18368	6936
r2_o	0.742	0.620	0.703	0.658	0.630	0.810	0.836	0.843	0.867	0.635

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

Table C.5: Commodity Level Imports of the EU before 4^{th} Extension in the EU

	Dependent Variable: log(Imports)									
	SITC-0	SITC-1	SITC-2	SITC-3	SITC-4	SITC-5	SITC-6	SITC-7	SITC-8	SITC-9
Y_i	0.944*	1.214**	1.855***	1.552	1.145	0.765*	1.325**	1.062*	3.612***	8.864***
	(0.486)	(0.526)	(0.554)	(1.176)	(0.829)	(0.462)	(0.590)	(0.603)	(0.465)	(1.715)
Y_j	0.440**	-0.097	-0.186	1.562**	0.246	0.240	-0.241	0.476	0.241	-0.774**
	(0.199)	(0.343)	(0.222)	(0.750)	(0.385)	(0.243)	(0.205)	(0.299)	(0.266)	(0.369)
d_{ij}	-1.173***	-0.556***	-1.487***	-2.045***	-1.376***	-1.452***	-1.405***	-1.211***	-1.126***	-1.329***
	(0.154)	(0.212)	(0.179)	(0.257)	(0.210)	(0.162)	(0.137)	(0.124)	(0.159)	(0.327)
SIM	-0.060	-0.136	-0.279*	-0.513*	-0.403	-0.126	0.049	0.107	-0.241*	0.168
	(0.137)	(0.263)	(0.167)	(0.294)	(0.276)	(0.139)	(0.142)	(0.201)	(0.145)	(0.252)
e_{ij}	-0.066***	-0.063*	-0.101***	-0.234***	-0.009	-0.122***	-0.051*	-0.098**	-0.108***	0.113**
	(0.023)	(0.035)	(0.028)	(0.081)	(0.057)	(0.029)	(0.029)	(0.041)	(0.033)	(0.051)
R_i	0.156**	0.534***	0.178**	0.539***	0.265*	0.345***	0.374***	0.354***	0.171***	0.077
	(0.077)	(0.112)	(0.076)	(0.209)	(0.143)	(0.079)	(0.075)	(0.081)	(0.057)	(0.177)
R_j	0.064	0.138*	0.133***	0.329***	0.021	0.264***	0.128***	0.197***	0.205***	-0.056
	(0.041)	(0.072)	(0.042)	(0.111)	(0.110)	(0.056)	(0.048)	(0.073)	(0.062)	(0.105)
RF	-0.091	-0.164	-0.210*	-0.307	-0.351*	-0.130	-0.010	0.132	-0.143	0.148
	(0.106)	(0.198)	(0.111)	(0.216)	(0.213)	(0.106)	(0.108)	(0.162)	(0.115)	(0.205)
COL	1.073***	0.408	0.723***	0.202	0.234	0.682***	0.691***	0.835***	1.019***	1.439***
	(0.185)	(0.297)	(0.203)	(0.268)	(0.265)	(0.204)	(0.164)	(0.190)	(0.159)	(0.284)
CL	0.869***	0.852***	0.198	0.463*	0.324	0.338	0.650***	0.509***	0.525***	0.650**
	(0.170)	(0.269)	(0.205)	(0.273)	(0.297)	(0.215)	(0.160)	(0.173)	(0.149)	(0.287)
CB	0.327	0.573*	0.267	0.956***	1.215***	0.051	-0.006	0.287	-0.019	0.437
	(0.238)	(0.298)	(0.251)	(0.310)	(0.243)	(0.207)	(0.214)	(0.230)	(0.247)	(0.481)
N	6035	3143	5490	2175	2049	4058	5538	5079	5735	2522
r2_o	0.773	0.680	0.728	0.708	0.695	0.857	0.857	0.876	0.895	0.704

Robust Standard errors in parentheses, Standard errors are clustered by Partner

Time, Reporter, Partner and Sector fixed effects are controlled

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

See Table C.6 in the Appendix C for SITC Code Explanation.

Table C.6: Standard International Trade Classification, Revision 3

SITC Code	Explanation
SITC-0	Food and Live Animal
SITC-1	Beverages and Tobacco
SITC-2	Crude Materials, Inedible except Fuel
SITC-3	Minerals Fuels, Lubricants and Related material
SITC-4	Animal and vegetable oils, Fats and Waxes
SITC-5	Chemical and Related Products, n.e.s
SITC-6	Manufactured goods classified chiefly by material
SITC-7	Machinery and Transport Equipments
SITC-8	Miscellaneous manufactured article
SITC-9	Commodities and Transactions not Classified elsewhere in the SITC

Table C.7: Weighted Mean Applied Tariff Rates (%) in EU Member Countries

Country Name	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Belgium	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Bulgaria	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Cyprus	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Czech Republic	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Denmark	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Estonia	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Finland	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
France	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Germany	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Greece	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Hungary	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Italy	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Latvia	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Lithuania	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Luxembourg	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Malta	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Netherlands	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Poland	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Portugal	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Romania	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Slovakia	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Slovenia	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Spain	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
Sweden	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61
United Kingdom	3.59	3.77	5.05	4.74	4.46	4.12	4.44	6.27	4.01	3.62	3.29	3.13	2.14	3.02	1.99	2.03	2.07	1.84	1.85	1.81	1.77	1.51	1.61

Figures are taken from World Bank website, http://data.worldbank.org/indicator/TM.TAX.MRCH.WM.AR.ZS. Weighted mean applied tariff is the average of effectively applied rates weighted by the product import shares corresponding to each partner country. Data are classified using the Harmonized System of trade at the six- or eight-digit level. Tariff line data were matched to Standard International Trade Classification (SITC) revision 3 codes to define commodity groups and import weights. To the extent possible, specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of weighted mean tariffs. Import weights were calculated using the United Nations Statistics Division's Commodity Trade (Comtrade) database. Effectively applied tariff rates at the six- and eight-digit product level are averaged for products in each commodity group. When the effectively applied rate is unavailable, the most favored nation rate is used instead.

Table C.8: Intra EU Imports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	74.843	12.186	22.748	27.383	3.24	83.857	127.678	274.756	96.254	5.46
1992	82.635	13.136	23.254	25.724	2.935	91.714	134.429	295.59	104.086	6.882
1993	69.645	11.549	17.965	20.538	2.828	77.775	101.711	226.78	78.812	18.374
1994	76.999	13.109	22.153	19.856	3.609	94.81	121.334	263.91	87.628	15.544
1995	92.942	15.41	35.939	23.906	4.47	128.829	189.981	368.016	110.183	29.348
1996	93.965	15.873	32.249	29.136	4.927	128.242	182.239	393.822	116.316	27.914
1997	87.495	15.823	32.022	28.037	4.631	127.585	179.265	396.11	115.201	32.578
1998	89.091	16.776	31.246	22.385	4.621	135.821	187.988	447.876	118.69	30.179
1999	107.418	20.846	35.591	35.251	5.305	181.112	221.898	534.551	141.231	36.899
2000	96.241	18.275	36.715	56.208	4.302	180.54	215.28	521.64	130.032	67.075
2001	100.321	19.696	34.909	53.388	4.616	193.068	214.704	533.16	135.108	28.54
2002	110.228	22.136	37.453	55.04	5.624	226.404	226.116	549.72	146.376	25.704
2003	135.038	26.107	44.16	70.446	6.905	273.096	265.572	637.92	171.972	63.278
2004	162.615	30.932	61.296	102.11	8.261	338.111	355.38	841.596	221.777	86.436
2005	174.636	32.639	65.838	143.847	9.082	375.6	376.707	892.766	233.757	52.135
2006	191.129	34.24	81.315	175.147	10.661	417.54	437.895	995.256	250.92	71.38
2007	228.914	40.573	98.971	181.278	12.756	490.685	532.245	1164.8	299.78	134.711
2008	245.989	40.329	96.195	234.598	16.927	495.571	525.839	1104.579	296.712	142.485

Figures in billion dollars.
see Table C.6 in Appendix C for SITC explanation.

Table C.9: Extra EU Imports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	54.023	4.701	42.14	99.881	2.428	54.358	104.913	215.65	101.603	11.621
1992	58.954	5.643	44.502	99.389	2.738	61.014	110.581	227.986	112.499	11.854
1993	52.687	4.758	38.349	85.212	2.617	58.118	98.235	208.78	109.397	11.626
1994	59.901	5.423	48.352	85.811	3.518	69.152	119.304	238.357	118.064	11.587
1995	66.402	5.635	50.436	88.347	4.169	79.102	120.128	256.187	124.148	14.099
1996	68.657	6.579	46.682	107.624	3.844	79.748	117.605	273.872	132.382	13.892
1997	64.395	6.915	47.395	104.124	3.648	81.878	120.151	293.59	137.11	15.112
1998	65.049	6.906	46.128	78.12	4.127	85.366	129.085	328.423	144.906	14.731
1999	54.662	6.313	41.748	87.269	3.34	71.898	113.476	331.068	147.158	7.093
2000	52.996	6.125	47.993	144.676	2.653	75.736	129.119	368.238	153.17	18.735
2001	55.442	6.328	45.1	137.035	2.67	80.771	122.154	349.918	157.606	28.393
2002	58.717	6.747	44.006	139.513	3.295	88.93	130.317	354.324	166.429	21.045
2003	70.625	7.348	51.261	167.478	4.203	108.238	154.706	439.668	198.691	20.412
2004	72.986	7.79	56.985	219.311	5.169	122.831	160.982	457.186	207.32	23.609
2005	79.883	8.05	61.529	307.636	5.701	136.951	179.313	494.399	229.06	23.51
2006	87.135	8.277	74.467	377.918	7.19	155.602	223.513	565.975	258.638	32.745
2007	106.224	9.604	89.566	404.197	8.797	187.912	277.706	625.073	291.933	29.85
2008	111.914	9.354	91.555	511.835	11.896	200.932	270.291	642.708	307.378	33.566

Figures in billion dollars.
see Table C.6 in Appendix C for SITC explanation.

Table C.10: Intra EU Exports

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	76.868	12.928	27.711	29.719	3.196	85.596	155.141	312.645	107.778	5.48
1992	87.221	14.257	29.951	29.953	3.114	93.988	168.384	336.897	120.909	5.65
1993	80.185	12.241	25.329	27.818	3.208	84.173	146.464	282.999	107.092	15.425
1994	87.624	14.053	31.661	28.516	3.971	102.061	175.002	333.257	119.635	14.305
1995	102.844	16.471	38.911	31.718	4.99	129.002	225.322	428.656	141.886	25.631
1996	103.18	17.85	34.681	38.315	5.237	131.538	216.149	456.347	151.88	24.827
1997	95.428	17.394	34.877	38.3	4.842	134.962	216.222	478.907	156.792	23.333
1998	96.447	17.661	33.714	30.011	4.742	142.59	225.76	534.905	157.41	20.268
1999	117.197	22.73	36.783	41.658	5.373	189.199	264.684	636.412	189.531	26.243
2000	106.689	20.374	39.931	63.438	4.252	185.966	260.152	639.986	179.037	61.269
2001	112.024	20.89	37.667	58.695	4.706	199.436	259.678	652.709	188.241	43.841
2002	121.703	23.721	40.881	59.976	5.862	231.84	274.824	692.172	202.06	41.431
2003	149.965	28.173	50.09	74.303	7.089	282.128	327.221	804.549	242.695	76.692
2004	172.984	31.3	62.551	97.705	8.485	342.598	399.139	955.5	278.017	106.727
2005	187.068	32.631	65.07	129.595	9.212	379.818	422.352	1014.832	296.31	83.657
2006	204.078	34.72	80.465	156.52	10.724	421.755	496.188	1155.19	321.01	106.049
2007	245.187	41.54	98.272	164.403	12.793	502.119	596.188	1290.844	368.265	152.262
2008	285.091	45.718	103.229	230.138	18.879	556.29	628.959	1342.422	400.832	178.794

Figures in billion dollars.
see Table C.6 in Appendix C for SITC Code Explanation.

Table C.11: EU Exports to Rest of the World

Year	SITC 0	SITC 1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8	SITC 9
1991	31.629	10.848	11.873	19.225	1.705	68.148	87.419	230.075	70.142	15.775
1992	37.159	12.423	12.749	18.987	1.944	76.372	95.216	250.503	77.291	15.69
1993	34.235	11.739	11.951	19.982	1.761	75.167	89.936	238.201	73.528	24.575
1994	37.688	13.601	13.417	20.874	2.244	85.798	102.418	273.064	82.964	25.757
1995	44.828	15.185	16.361	22.042	2.959	102.238	123.878	330.464	97.562	31.753
1996	44.795	16.075	15.994	25.66	2.723	105.187	124.851	353.903	102.87	29.648
1997	44.672	16.331	16.248	23.275	3.153	109.938	123.528	361.593	104.458	22.842
1998	41.953	15.464	14.811	19.189	3.33	113.91	118.99	371.595	104.09	20.882
1999	31.411	13.342	12.303	18.201	2.53	106.721	104.946	326.409	90.189	25.327
2000	30.957	13.241	13.88	28.956	2.145	108.604	111.368	346.865	94.473	69.465
2001	30.995	13.427	13.201	25.113	1.922	116.734	106.442	346.021	97.149	85.867
2002	33.062	15.051	15.036	27.045	2.311	136.44	118.026	360.558	103.58	79.448
2003	38.333	17.538	17.869	34.588	2.593	162.292	135.829	424.221	118.565	79.017
2004	42.125	19.082	22.715	47.069	3.088	190.652	166.242	510.06	138.593	82.678
2005	44.916	20.532	25.623	62.268	3.162	209.323	184.339	563.318	148.11	85.876
2006	49.668	23.762	31.693	80.486	3.272	235.965	208.512	633.02	164.99	89.323
2007	58.563	27.499	37.025	90.855	3.572	274.131	244.592	738.476	185.505	108.747
2008	72.389	29.45	42.031	124.372	4.808	301.5	267.441	826.758	202.888	139.806

Figures in billion dollars.
see Table C.6 in Appendix C for SITC explanation.

Table C.12: Some characteristics of the European Union countries

Extension	COUNTRY	Y	PY	RES	DIST	K/L	Tarif1	Tarif2	Tarif3	Tarif4
Founding Members	Belgium	2972.260	284.847	144.301	5904.044	1338.724	2.738		2.738	2.310
	France	15295.480	251.581	769.223	6173.096	1058.741	3.465	4.226	3.465	2.310
	Germany	21810.030	266.135	1167.555	6171.918	1082.405	3.348	4.205	3.348	2.310
	Italy	12952.260	225.344	806.659	5902.234	1122.651	3.481	4.227	3.481	2.310
	Luxembourg	290.293	631.120	2.354	4858.806	3005.668	2.718		2.718	2.310
	Netherlands	4387.335	277.736	363.237	6156.097	1158.058	3.473	4.228	3.473	2.310
1^{st}	Denmark	13662.040	2569.814	234.022	5960.626	9324.386	3.439	4.209	3.439	2.310
	Ireland	1099.932	280.205	61.899	6011.805	1373.723	3.443	4.238	3.443	2.310
	United Kingdom	10083.810	170.910	510.138	6427.224	585.882	3.487	4.228	3.487	2.310
2^{nd}	Greece	1586.142	146.513	134.759	5120.412	715.890	3.437	4.225	3.437	2.310
3^{rd}	Portugal	1343.456	130.725	222.818	5826.640	635.546	3.413	4.230	3.413	2.310
	Spain	7105.264	173.426	562.199	5886.856	983.490	3.503	4.236	3.503	2.330
4^{th}	Austria	2235.897	278.285	203.819	5421.344	1326.915	3.384	4.226	3.384	2.310
	Finland	1328.738	257.305	98.478	5647.318	1024.297	3.437	4.234	3.437	2.310
	Sweden	23284.260	2622.476	230.076	5996.414	9050.720	3.452	4.230	3.452	2.310
5^{th}	Cyprus	111.258	117.650	29.602	4172.727	479.308	3.392	4.413	3.392	2.310
	Czech Rep.				4961.782					
	Estonia	1457.574	1073.310	16.913	4677.071	6603.488	3.001		3.001	2.310
	Hungary	185980.500	18268.250	195.046	4757.844	98691.300	3.243	4.038	3.243	2.311
	Latvia	78.117	33.609	23.253	4281.622	183.063	3.004	4.350	3.004	2.310
	Lithuania	613.984	177.681	31.539	4189.571	859.890	3.063	4.225	3.063	2.309
	Malta	42.979	110.486	22.179	4347.709	589.568	3.321	4.575	3.321	2.309
	Poland	8968.603	234.178	381.387	4871.189	1034.336	3.099	4.014	3.099	2.310
	Slovakia	461.052	85.610	106.455	4395.978	482.822	3.125	4.350	3.125	2.311
	Slovenia	252.507	126.353	50.471	4409.432	656.387	3.160	3.848	3.160	2.330
6^{th}	Bulgaria	410.719	52.146	88.378	4734.072	249.890	2.866		2.866	2.309
	Romania	2464.418	111.769	2290.297	4537.797	508.098	3.327	4.333	3.327	2.310

Y=Real GDP in Billion, PY=Per Capita Real GDP,RES=Foreign Reserves in Billion, K/L= Capital Labor ratio

Tarif1=Average tariff for 1988-2008, Tarif2=Average tariff for 1988-1994,Tarif3=Average tariff for 1995-2003, Tarif4=Average tariff for 2004-2008

Y, PY, DIST, RES Values are the averages for each country for 1998-2008

Table C.13: Summary Statistics

Variable	Obs	Mean	Std.	Min	Max
Y_j	480496	425054.5	2377581	0.018	37800000
Y_i	564322	12954.03	31730.91	28.2841	227918.2
R_j	472632	612000000	29400000000	0.0007	1.95E+12
R_i	564322	413.0327	1361.989	1.0921	43515.38
e_{ij}	294619	1020000000	1.42E+11	9.42E-10	2.41E+13
SIM	464623	-1.75128	1.318097	-15.85478	-0.6931472
RF	337910	1.932992	1.676233	0.0001331	11.80068
d_{ij}	557095	5555.734	3913.962	59.61723	19586.18

Values are the average of all the countries included in the sample

Values of Y_j, Y_i, R_j and R_i are in billions and others are in units

Table C.14: Trading Partners of the EU

Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Antarctica, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Bouvet Island, Brazil, Brunei Darussalam, Bulgaria, Bunkers, Burkina Faso, Burundi, Cambodia,Cameroon, Canada, Cape Verde, Cayman Island, Chad, Chile, China, Christmas Island, Cocos Island, Colombia, Comoros, Congo Democratic Republic, Congo Republic, Cook Island, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Czechoslovakia, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, Arab Republic, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Faeroe Islands, Falkland Island, Fiji, Finland, Fmr Arab Republic of Yemen, Fmr Democratic Republic of Germany, Fmr Democratic Yemen, Fmr Ethiopia, Fmr Fed. Republic of Germany, Fmr USSR, Fmr Yugoslavia, France, French Guiana, French Polynesia, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Greenland, Grenada, Guadeloupe, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Heard Island and McDonald Islands, Holy See (Vatican City State), Honduras, Hong Kong SAR China, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Korea Democratic Republic, Korea Republic, Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macao SAR China, Macedonia, FYR, Madagascar, Malawi,Malaysia, Maldives, Mali, Malta, Marshall Islands, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Niue, Norfolk Island, Northern Mariana Islands, Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Saint Helena, Saint Pierre and Miquelon, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovak Republic, Slovenia, Solomon Islands, Somalia, South Africa, South Georgia and the South Sandwich Island, Spain, Sri Lanka, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos Islands, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, RB, Vietnam, Virgin Islands (U.S.), Wallis and Futuna Island, West Bank and Gaza, Yemen, Republic, Zambia, Zimbabwe

Figure 21: Levels of Economic Integration

	Free Trade among Members	Common External Tariff	Free Factor Movements	Macro Policy Harmonization
Free Trade Area	×			
Custom Union	×	×		
Common Market	×	×	×	
Economic Union	×	×	×	×

A Free Trade Area is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade. However, each member of the group is free to adopt and maintain any tariff or regulations on the trade with non-member country.

A Custom Union is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade, plus a common external tariff on the trade with non-member countries.

A Common Market is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade, adopt of a common external tariff on the trade with non-member countries, plus a free movement of the factors of production among the member countries.

An Economic Union is an agreement in which two or more than two countries agree to remove all the tariff and non-tariff barriers and the quantitative restrictions on their mutual trade, adopt a common external tariff on the trade with non-member countries, a free movement of the factors of productions, and harmonization of the macro economic policies.

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