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INTRA-INDUSTRY TRADE BETWEEN CESEE COUNTRIES AND THE EU15

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Abstract

The rapid increase in intra-industry trade (IIT) between the EU15 and Central, Eastern and South-Eastern European (CESEE) countries after the collapse of the Soviet Union indicates a structural change in the nature of trade in CESEE and a new process of transition and real convergence to the EU. Using a product-level trade flows database and employing linear and non-linear panel data specifications, this paper assesses the determinants of intra-industry trade between the EU15 as the main trading block and CESEE, which are further divided into the 'new' EU member states (NMS) and the EU candidate countries and potential candidates (CCPC). The analysis highlights the importance of intra-industry trade in terms of achieving real convergence. The paper finds that there exist some common factors driving IIT across the sample, such as the corporate tax rate, the flexibility of exchange rate regimes and the quality of political institutions. However, the determinants of IIT between NMS and EU15 countries deviate considerably from those between CCPC and EU15 countries.

Keywords: intra-industry trade, real convergence, transition, emerging Europe, economic integration, Central and Eastern Europe, South-Eastern Europe, vertical IIT, horizontal IIT, Western Balkan, panel data, EU candidate countries, convergence criteria.

JEL Classification: F14 (empirical studies of trade), F15 (trade- Economic Integration), F10 (Trade-general)

Non-technical summary

Over the past quarter of a century Central, Eastern and South-Eastern European (CESEE) countries have witnessed a period of tremendous economic change, having transformed from relatively closed centrally planned economies into open markets that are increasingly connected to each other and to the rest of the world. Trade has been and continues to be an important aspect of this process, as these countries move towards integration into the European Union's common market. One interesting way to assess and compare the extent to which trade integration has developed is by looking at the level of two-way or intra-industry trade (IIT) between CESEE countries and the EU15, as IIT is tantamount of integrated trade structures and leads to more synchronised business cycles, a necessary condition for the stability of a monetary union.

Consisting in essence of the trade of similar products between countries, IIT has challenged traditional trade theories which were based on notions of comparative advantage and specialisation and which did not account for diversification of the same product. Yet, such trade can increasingly be observed between European countries, along with a steady relative decline in one-way trade or trade in different products. With the enlargement of the EU, first towards the South and later towards the East, the rise of vertical IIT, where countries trade similar products but of different quality levels, has been particularly notable. Horizontal IIT, i.e. two-way trade of goods of similar quality, has increased as well, but at a slower pace.

Having said this, IIT with the EU15 varies considerably across the CESEE countries, with the share of IIT in 2010 spanning from less than 2% in the case of Montenegro to almost 40% in the case of the Czech Republic. Most '*new*' EU member states (NMS) have higher IIT shares with the EU15 than EU candidate countries and potential candidates (CCPC), an indication of their higher degree of integration and convergence.

This paper describes and analyses different factors behind developments in IIT between CESEE countries and the EU15 from 1998 to 2010 using a panel data framework. In doing so, it uses the most disaggregated level of bilateral trade data available, namely a 6-digit level of disaggregation provided by the BACI database from CEPII.

Applying various statistical modelling techniques, this paper finds that, ceteris paribus, CESEE countries which have a better management of monetary policy, a lower average corporate tax rate, a more flexible exchange rate regime and better political institutions tend to be more engaged in IIT with the EU15. Furthermore, the paper highlights important differences between the forces driving vertical versus horizontal intra-industry trade. These results, while broadly in line with the literature, have potentially important policy implications for future European integration. This is relevant not only for new EU member states that plan to join the European Monetary Union as real convergence of trade structures is an important element of stability within a monetary union, but also for CCPC countries in the process of convergence and, eventually, accession to the EU.

1. Introduction

One of the most profound economic developments of the past quarter of a century in Europe has been the transformation of formerly centrally planned economies in Central, Eastern and South-Eastern Europe (CESEE) towards open market-based economies. Over this period, which has been characterised by tremendous political and economic reforms, progress has been considerable and has led to the successful accession to the EU of ten CESEE countries in 2004 and 2007 as well as Croatia in 2013.[1] Still, the process of real economic convergence continues throughout all CESEE countries as the region in its entirety still lags behind the EU15[2] in terms of economic development. Moreover, considerable differences exist between the CESEE countries in terms of the extent of convergence and integration with the EU15.

Arguably one of the most successful ways in which the EU has fostered economic convergence among its member states is through trade integration. With this respect, the CESEE countries are of special interest in the analysis of trade patterns because they had only limited trade relations with the EU15 at the beginning of the transition process. In fact, one of the EU's external economic policies has been to promote trade also among countries which are not yet EU member states. A deeper intra-industry integration into the EU15 would be a necessary pre-condition for real economic convergence, external balance sustainability and trade competitiveness, in particular for countries aspiring to become members of the European Monetary Union. Indeed, after having quickly eliminated most of the barriers to trade in a short period of time, the EU15 had become the destination of 51.1 % of the CESEE international exports in 2010.

In order to take stock of how far CESEE have come with regard to trade integration with the EU, this paper focuses on intra-industry trade (IIT) between these countries and the EU15, and assesses the factors which determine IIT across these countries. IIT in total trade with the EU15 varies enormously across the CESEE countries: in 2010, it spanned from less than 2% in the case of Montenegro to almost 40% in the case of the Czech Republic. Most "new" EU member states (NMS) have higher intra-industry trade shares than EU candidate countries and potential candidates (CCPC),[3] indicating a higher degree of trade integration and convergence vis-à-vis the EU15.

In order to determine some of the key factors that lie behind the variation of IIT with the EU15 across the CESEE countries, this paper applies a panel data analysis of eight CCPC and eleven NMS across a period from 1998 to 2010. We employ variants of ordinary least square (OLS) models, generalized method of moments (GMM) and fractional response models (FRM) in order to quantify the effects of various macroeconomic and institutional variables on an aggregated country-level IIT measure. One of the main findings of the analysis is that there are some common factors driving IIT across the sample, such as corporate tax rate, the flexibility of exchange rate regimes and the quality of political institutions. At the same time,

[1] The following CESEE countries that acceded to the EU on 1 May 2004 or 1 January 2007 respectively are covered by this paper and are jointly referred as "new" EU member states (NMS): Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Bulgaria and Romania. Cyprus that joined the EU on 1 May 2004 was also covered by this paper, although is not strictly referred to as the CESEE country. Malta, which also joined in the same period, was excluded due to data availability. Croatia, which joined the EU on 1 July 2013, is not included in NMS since it was an EU candidate country during the time span of the empirical analysis.

[2] The EU15 includes all countries which joined the EU before 1 May 2004, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

[3] The following CESEE countries are covered by this paper and referred jointly as EU candidate countries and potential candidates (CCPC): Croatia (now a member of the EU, but a candidate country during the time span of the empirical analysis), FYR Macedonia, Montenegro, Serbia and Turkey (all EU candidate countries) and Albania and Bosnia-Herzegovina (both EU potential candidates). Iceland, an EU candidate country, is also included, although it is not strictly referred to as CESEE country, Kosovo*, an EU potential candidate, was excluded from the sample due to data constraints.

many differences exist in what determines IIT between NMS and EU15 countries on the one hand and between CCPC and EU15 countries on the other hand. In particular, governance and institutional variables such as corruption and free trade agreements have a more robust negative effect for the EU candidate countries and potential candidates.

This paper seeks to contribute to the literature in the following ways. First, it is the first study aimed at analysing variables related to the quality of political institutions (such corruption and democracy) in combination with economic determinants of intra industry trade for CESEE countries. Second, the analysis sheds new light on efficient integration policies for CESEE countries, in view of the importance of intra-industry trade in terms of achieving *real* convergence and in reducing the costs of a monetary union. In fact, as emphasised by the optimal currency area literature, an increase in the share of IIT strengthens the synchronisation of business cycles within a monetary union and as such, reduces the costs of forsaking an autonomous monetary and exchange rate policy. Third, our results show that the flexibility of the exchange rate regime is revealed to be a significant factor that is conducive to higher IIT with the EU15. This has an important implication, because higher levels of IIT suggest that countries are better placed to have a fixed exchange rate with the euro compared to countries with low IIT, while on the convergence path toward a monetary integration a flexible exchange rate seems to help achieving trade integration more quickly.

From a more technical standpoint, the main contribution of the study is the adoption of IIT indicators based on highly disaggregated product-level bilateral trade data (at the 6-digit level) and the application of a comprehensive econometric modelling approach which takes account of the structure and truncation of the dependent variable (IIT). As such, this is the first study that tries to estimate the quantitative impact of CESEE economic policies on intra-industry trade with EU15, not only by controlling for the sector and aggregation biases arising from low levels of disaggregation, but also by taking the non-linear feature of our dependent variable appropriately into account.

The structure of the paper is as follows: Section 2 provides a brief summary of the related literature on IIT and Section 3 describes the data. Section 4 describes our explanatory variables and hypothesis, followed by the econometric analysis in section 5 which seeks to identify the determinants of IIT in the region. Section 6 concludes.

2. Related Literature and Motivation

Intra-industry trade (IIT) received scholarly attention in the 1960s, especially in terms of trade in products of similar quality.[4] Initially observed between countries of comparable development levels and thus with resembling relative factor endowments, IIT appeared to contradict prevailing theories of international trade, which were based on the concept of comparative advantage and specialisation of economies in particular types of goods.

The first vintages of IIT trade theory models predict that IIT would develop between countries which have a similar level of economic development and in which specialisation would continue on the firm level, whereas inter-industry trade (one-way trade) would prevail between partners with differences in relative factor endowments (see e.g. Helpman and Krugman 1985). The search for theoretical explanations for IIT has been a vibrant area of research over the last couple of decades. One of the most important contributions is the distinction between horizontally and vertically differentiated goods in intra-industry trade

[4] See Verdoorn (1960); Balassa (1966) or Grubel (1967).

(HIIT and VIIT, henceforth), where the division is based on the notion of product unit values (or 'quality').

Horizontal IIT is defined as a two-way trade in products of *homogeneous* quality, cost and technology employed, but with different characteristics or certain attributes. The theoretical basis for this type of trade was developed by Dixit and Stiglitz (1977), Lancaster (1980), Krugman (1979 and 1981) and Helpman (1981 and 1987). It is associated with imperfect competition or consumer preferences, but also with market structure (Brander and Krugman, 1983). It leads to efficiency via economies of scale in production and welfare gains thanks to a greater variety for consumers, including producers' gains in a variety of intermediate goods. The standard theoretical models suggest that the share of horizontal IIT increases with a higher level of country similarity in terms of capital endowments.

Vertical IIT involves simultaneous imports and exports of goods of *heterogeneous* quality, technology and costs. The theoretical basis for this type of trade was proposed by Falvey (1981), Shaked and Sutton (1984), Falvey and Kierzkowski (1987) and Flam and Helpman (1997). These models expect a positive relationship between the level of vertical IIT and differences in factor endowments, technology and in the pattern of income distribution. Countries specialise along the quality spectrum of a specific product, based on the assumption that development of human capital or physical capital intensity are associated with higher product qualities. The economic distance, i.e. the distance in the accumulation of physical or human capital, between the countries is thus a relevant determinant for VIIT and hence it is not exclusively associated with overall inter-industry trade.[5]

The link between regional integration and IIT has been under particular scrutiny since the beginning of the European integration process and the abundant literature on trade patterns among EU15 countries provided the base for the theoretical understanding of this phenomenon. There is a relatively ample literature on IIT in the context of EU enlargement, in particular in the period around the accession of Central and Eastern European countries in 2004;[6] a similar analysis for Western Balkan countries is almost non-existent.[7]

A few theoretical arguments are worth mentioning when discussing the importance of studying IIT in the European context, in particular with reference to the trade integration of CESEE countries. First, the evolution of trade patterns is an important indicator of real convergence across countries. The IIT literature argues that a higher degree of intra-industry trade over time corresponds to an advanced level of economic integration, diversification of the economy and industrial development. This indicates that the catching-up process, the convergence of CESEE countries towards income and development levels of the EU15, should also generate further growth of IIT.[8] Second, as authors of the optimal currency areas

[5] As pointed out by Fontagné and Freudenberg (1997), the story is even more complicated. Inter-industry trade can occur without comparative advantages (e.g. due to agglomeration effects or country size) and likewise intra-industry trade is not exclusively based on perfect competition and constant returns to scale and can occur without product differentiation, e.g. in highly concentrated market structures. See also Balassa 1986 or Flam and Helpman 1987.

[6] See Aturupane, Djankov and Hekman (1997); Hekman and Djankov (1996); Gabrisch and Segnana (2003); Caetano and Galego (2006) and (2007); Jensen and Lüthje (2009); Fidrmuc, Grozea-Helmenstein and Wörgötter (1999); Gabrisch (2006); Ito and Okubo (2011).

[7] There are a few exceptions, i.e. Botric (2012); Botric (2013), Mardas and Nikas (2008a), Mardas and Nikas (2008b), however they use a lower disaggregation of data, which makes it rather difficult to compare their findings with ours.

[8] See also theoretical argument referred to in the literature as "smooth adjustment hypothesis" (Jones 1971, Krugman 1979 and 1981 and Lancaster 1980). It argues that the economic integration is smoother and it implies lower transitional adjustment costs if it entails more IIT, as compared to specialisation in one-way trade. Under this hypothesis, the magnitude of the adjustment costs experienced by a country depends on the type of change in trade patters (e.g. if it is within a sector, it entails smooth resources reallocation). However, as pointed by Fontagné and Freudenberg (2002), this assumption might be challenged by vertical IIT and specialisation along the quality spectrum.

suggest,[9] a higher share of *intra*-industry trade leads to a synchronisation of business cycles and a lower frequency of asymmetric shocks between trading partners, the latter being a pivotal characteristic for the macroeconomic stability of a monetary union.

3. Data and measurement of intra-industry trade

In order to quantify intra-industry trade we use a bilateral trade database at a 6-digit HS product level of disaggregation. The data for this study were obtained from BACI,[10] a detailed international trade database constructed by CEPII[11] which provides an excellent source for IIT analysis for several reasons. First, it uses one of the finest product classifications available for international trade, namely the 6-digit Harmonized System second revision (HS1996), which distinguishes about 5,000 items. Second, it removes discrepancies between import and export values[12] and provides comparable harmonised quantities. Third, it provides the quantity of goods' trade enabling researchers to compute goods' unit product values.

Our initial product-level dataset spans the period 1998-2010, containing annual data for quantities, imports and exports trade values between each of the 15 EU members and a sample of 19 CESEE countries. The latter sample is divided in two groups using the EU membership as criterion: eleven NMS and eight CCPC countries. The product-level dataset provides an initial panel of approximately 18 million observations of bilateral trade flows. For the analysis, the data are aggregated at the country level, based on which the intra-industry trade shares for a cross-section of countries vis-à-vis EU15 countries are constructed.

The IIT share is based on the intensity (degree) of trade overlap for each individual product and partner. The dependent variable, intra-industry trade (IIT), is operationalized by computing the adjusted version of the Grubel-Lloyd Index (GLI).[13] The GLI for a CESEE country vis-à-vis a country in the EU15 is a weighted average of the product GLIs, with weights given by the share of a product in total trade with the EU15 trading partner country.[14]

For each traded product between two countries, a GLI is calculated based on the following formula:

$$GLI_{ii',k,t} = 100 * \left(1 - \frac{\left|X_{ii',k,t} - M_{ii',k,t}\right|}{X_{ii',k,t} + M_{ii',k,t}}\right) \quad (1)$$

where k represents a specific traded product, i the country in question and i' the partner country. X represents exports, M imports and t stands for the year. Calculated in this way, the GLI takes a value between 0 and 100, where 100 indicates that all trade is *intra*-industry trade (two-way trade) and 0 that all trade is *inter*-industry (one-way trade). As a result, higher values of the index correspond to a larger involvement of a country in intra-industry trade.

[9] See i.e. Kennen (1969), Frankel et al.(1998), Firdmuc (2004), or Shin et al.(2003) for more details on the correlation between IIT and business cycles synchronisation.
[10] BACI stands for "Base pour l'Analyse du Commerce International". For further details on the BACI database, see Gaulier and Zignago (2010).
[11] Centre d'Études Prospectives et d'Informations Internationales, Paris. http://www.cepii.fr/
[12] Import values are reported CIF (cost, insurance and freight) and export values are reported FOB (free on board). The BACI database subtracts transport costs from the reported imports.
[13] Similar other indices were proposed (see i.e. Balassa 1965, Grubel and Lloyd 1971, Aquino 1978, Greenaway and Milner 1983, Hamilton and Kniest 1991 and Brülhart 1994, Fontagné and Freudenberg 1997).
[14] A caveat in the calculation of the GLI is the geographic and the sector aggregation bias arising from a low level of data disaggregation. The BACI database helps us to deal with this bias by providing a detailed product-partner trade database. On the aggregation effect, see Grubel and Lloyd (1975), Greenaway and Milner (1986) or Fontagné and Freudenberg (1997).

The indices have been calculated according to equation (1) for each pair of trading partners and for each product class.

Subsequently, the bilateral product-level GLI is aggregated to a country-level GLI computing intra-industry trade between each country in the sample of 19 CESEE countries and each partner country in the EU15. The country level GLI vis-à-vis a partner country is a weighted average of the product GLIs, with weights given by the share of a specific product in total trade with respect to the partner country within the EU15:

$$GLI_{ii',t} = \sum_{k=1}^{5000} w_{k,t} * GLI_{ii',k,t} = 1 - \frac{\sum_{k=1}^{5000} \left| X_{ii',k,t} - M_{ii',k,t} \right|}{\sum_{k=1}^{5000} (X_{ii',k,t} + M_{ii',k,t})} \quad (2)$$

in which weights are given by:

$$w_{k,t} = \frac{X_{ii',k,t} + M_{ii',k,t}}{\sum_{k=1}^{5000} (X_{ii',k,t} + M_{ii',k,t})} \quad (3)$$

Following a similar weighting procedure, in which the weights correspond to the trade shares of each CESEE country with one partner in the EU15, the data are grouped across partner countries in order to obtain a country-level GLI defining IIT between every country in the CESEE region and the EU15 as one trading partner, thereby incorporating the EU15 as a trading block. The GLI index as such explains a percentage share of IIT in total trade with respect to the EU15.

In addition, the procedure suggested by Fontagné and Freudenberg (1997) is followed and define a trade overlap threshold of 10% below which the bilateral trade is considered to be one-way trade, while above this threshold trade flows are considered as (two-way) intra-industry trade. The authors point out that below this threshold - albeit somewhat arbitrary and hence not immune from criticism - the minority flow (e.g. import of one particular product *k* at time *t* from partner country *i'*) cannot be regarded as a "structural feature of trade". Formally:

$$\frac{Min(X_{ii',k,t} M_{ii',k,t})}{Max(X_{ii',k,t} M_{ii',k,t})} > 0.1 \quad (4)$$

Finally, all product classes have been further divided into horizontally and vertically differentiated products using the unit values, which are understood as proxies for quality. IIT is considered of a horizontal nature if unit values satisfy the following equation:

$$\frac{1}{1+d} \leq \frac{UV_k^x}{UV_k^m} \leq 1 + d \quad (5)$$

in which UVk^x and UVk^m represent unit values of exports and imports of product *k*, and *d* is a chosen dispersion factor. If this condition is not fulfilled, IIT is considered to be vertically differentiated. Following most of the studies, a dispersion factor of 15% is applied here.[15] Finally, lower and higher-quality vertical IIT are distinguished based on this dispersion factor, where lower quality VIIT is defined as the share of bilaterally traded product classes of which the unit export value of CESEE countries is at least 15% lower than that of the EU15, while the opposite holds for high-quality VIIT.

[15] For a discussion about the use of different dispersion factors, see e.g. Fontagné and Freudenberg (1997) and Aturupane, Djankov and Hoekman (1997). Qualitatively, our results do not change if we consider a threshold of 25%.

3.1 Recent trends and Stylised facts of patterns of trade between EU15 and CESEE

The empirical evidence suggests that IIT has played an important role in the dynamics of intra-EU trade, including new EU Member States. Empirical studies at the turn of the century[16] show that European integration induced not only an intra-European trade expansion - driven by trade liberalisation and increasing economic integration - but also that it was accompanied by structural changes in trade patterns in Europe. It was led by a relative decline in one-way trade and a relative increase in the volume of intra-industry trade. IIT remains a prominent feature of intra-European trade even today, with a higher share in total trade than in the rest of the world.[17] Furthermore, the European integration process has resulted in a quality layered market, with countries specialising along the quality ranges within product categories. Notwithstanding the convergence of trade patterns within enlarged EU, most of the trade flows between NMS and EU15 remains of an inter-industry nature.[18] This study tries to explore the causes of the lag in intra-industry integration between the Eastern and Western blocks in the EU, trying to assess the relative importance of political, monetary and fiscal determinants in the process of real convergence.

Figure 1a illustrates the evolution in IIT in EU15 and CESEE countries from 1998 to 2010 and Table 1 reports the average GLI index over this period. Figure 1a is a triangular chart depicting the "ideal" convergence path among trade partners in terms of the overall trade structure. At the beginning of the development trajectory every country starts from the bottom left angle of the triangle characterised by exclusively one-way trade. As the country in question begins to integrate in a trade area, it reaches convergence when it is located at the centroid of the isosceles triangle. This point consists of balanced proportions of one-way trade (25%) and horizontal IIT (25%) but a competitive edge in vertical IIT (50%). As indicated by an increase over time in the IIT share in total trade, the transition and integration process of many CESEE countries has been accompanied with profound changes in the composition of trade with the EU15.

It is worth emphasising how much IIT with the EU15 varies across the CESEE countries, with the GLI in 2010 spanning from less than 2% in the case of Montenegro to almost 40% in the case of the Czech Republic. Most NMS have higher GLI levels than CCPC, indicating their higher integration and convergence with trade patterns in EU15. As Figure 1a illustrates, many NMS have reached the IIT levels of EU15 countries by 2010. This is in particular true for the Czech Republic, Hungary, Poland and Slovenia.

The divergence between NMS and CCPC can also be observed with respect to development of IIT shares over the period of 12 years. Some CCPC have been losing their positions in IIT while increasing the share of one-way trade with EU15 (see Figure 1c). Most prominently, Albania and Croatia have lost IIT shares despite still enjoying relatively high GLI, but also Montenegro and FYR Macedonia where IIT levels in 2010 constituted less than 5% of total trade (see Figure 1b) have witnessed falling shares. The downward trend of intra-industry trade for these countries is persistent over the whole period, also when analysed

[16] For a previous analysis on the evolution of IIT in Europe see Fontagné et al. (2002) and Fidrmuc et al. (1999).

[17] First 9 bilateral IIT relations worldwide in terms of IIT shares in total trade are among EU Member states (Fontagné, Freudenberg and Gaulier 2006). Moreover, the share of two-way trade in total trade of every individual country is more significant in intra-EU15 trade than within non-EU markets (Fontagné and Freudenberg, 2002).

[18] The empirical literature suggests that the trade integration in Europe was implemented in a different fashion than expected by the EU Commission at the beginning of the 1990s.Two different scenario were expected – an optimistic scenario where integration would translate into horizontal IIT (European Commission 1990) and a pessimistic scenario that would lead to inter-industrial specialisation (Krugman 1993). From the standpoint of the location choices of companies, the IO literature often refers to economic dispersion vs. economic agglomeration (Cristobal et al.2009).

separately for the pre-crisis and crisis period. This is rather surprising, since the closer integration appears to have led to intra-industry trade divergence between them and EU15. Most of the other countries have recorded convergence of IIT patterns, which does not seem to be weakened even during 2008-2010 crisis period.

When looking at different components of IIT in Figure 1b, it shows that vertical IIT continues to dominate two-way trade, pointing to a specialisation along quality range between CESEE and EU15 countries. Most of CESEE have increased their share of higher-quality VIIT and HIIT in total IIT between 1998 and 2010, indicating a continued convergence toward the EU15 industrial structures. In other words, this could point to a relative improvement in the quality of goods produced by CESEE countries. NMS from Central Europe, but also Romania, Turkey and Serbia are worth highlighting in this respect as countries with the highest improvements in the quality of their products (in both relative and absolute terms).

3.2 Intra-Industry Trade with the EU15 and the Current Account in European Countries

Figure 2 illustrates a scatterplot of IIT flows and current account balances for sub-groups of CESEE countries. This correlation emphasises the importance of IIT for external competitiveness, which is important in particular in the light of the persistent current account deficits reported in many CESEE countries over the past decade. Intra-industry trade can be a significant determinant of the sustainability of current account balances. In particular, the top right chart of Figure 2 shows that the countries affected by refinancing problems during 2010-2012 crisis had a weaker correlation of current accounts and IIT with the EU15. The correlations suggest that a low intra-industry exchange can be a symptom of vulnerability and can lead to external imbalances. The bottom charts of Figure 2 show that NMS have a lower magnitude of the correlation than the EU15 countries among them. However, the correlations between intra-industry trade and current account balances are positive and stronger for the EU15 and the NMS than for CCPC. To statistically test for the importance of intra-industry trade on the current account sustainability, a set of dynamic panel models are estimated, regressing current account balances on intra-industry trade after controlling for time, country fixed effects and a selection of control variables. The results are reported in Table 9 and confirm the positive effect of IIT on the current account balance for CESEE countries at the 1% statistical significance level. In particular, the positive effect of IIT is highly significant for vertical IIT and for both NMS and CCPC.

These correlations and regressions show that the development of more integrated trade patterns, achieved by strengthening further intra-industry trade, can have significant positive effects on external competitiveness, and as a by-product can help to synchronise business cycles among the CESEE and the EU15. As such, intra-industry trade can be considered not only as a means to improve real convergence of CESEE economies towards the EU, but also as an important integration channel for achieving a more stable monetary union.

4. Explanatory variables and hypothesis

4.1. Unit Labour Cost

The cost of labour is one of the most frequently tested determinants for the external competitiveness of a country, as higher labour costs are expected to reduce a country's

competitiveness compared to its trade partners. This has become evident since the onset of the financial and economic crisis in Europe when rising unit labour costs in stressed euro area countries have been put at the centre stage of the policy debate.

Due to the strong correlation between current account balances and the intensity of intra-industry trade, Unit Labour Costs (ULC) should have a first order effect on the intra-industry trade between two countries. In line with the empirical literature, ULC differences (between trade partners) can boost IIT in at least two ways: first, by increasing competitiveness through lower wage dynamics; second, as suggested by Kaminski (2001), the gradual trade liberalisation in the CESEE region has reinforced the multinational companies to shift their production and logistic to Eastern Europe enhancing the productive capabilities of the CESEE countries.[19]

To our knowledge no other paper has included labour cost differences as a determinant for IIT development.[20] In order to capture this effect, ULC *differences* with the EU15 (i.e. average ULC in EU15 minus CESEE country ULC) are included in the analysis. In addition, following Felipe and Kumar (2011), ULC is disentangled into the wage share of labour in total production and a price deflator. From an estimation point of view, the split of ULC into two components allows relaxing the common parameter restriction, so as to assess the relative effects of wage and general price dynamics on IIT and understand whether wage dynamics or inflation dynamics prevail in explaining intra-industry trade.

In the recent debate on competitiveness within the euro area, adjustment is considered to pertain exclusively to the wage side of this relationship (ECB 2012). It entails that a country wishing to avoid severe and socially untenable internal devaluations should contain the wage dynamics of the export sector in order to cope with the loss of independent exchange rate policy. The data for ULC come from the IMF's International Financial Statistics and Eurostat, the ULC is specifically measured as follows:

$$ULC = \frac{w}{ALP} = \frac{w}{(GDP/P)/L} = \frac{wL}{GDP} * P = Labour\ Share\ * P \qquad (6)$$

Where w is the average money wage rate (i.e. labour compensations), GDP/P is the real Gross-Domestic-Product, L is the number of employed persons in a country.[21] This distinction is primarily aimed at disentangling the specific impact on IIT of wage share vis-à-vis general price inflation in the economy.

4.2 Capital Endowments

Factor endowment differences play an important role in international trade theory, both for the pattern and the volume of trade. The importance of capital endowment in explaining intra-industry trade has been studied extensively in the literature (e.g. Helpman et al. 1985, Falvey et al. 1987 and Falvey 1981). IIT is viewed as a consequence of vertical product differentiation based on quality difference and is seen to be mainly driven by initial differences in endowments, labour productivity and technological possibilities. Ceteris paribus, a larger stock of physical capital is assumed to increase productivity as well as the

[19] Examples of companies outsourcing their production from Western to Central and Eastern Europe citing lower wages are plentiful (see Marin 2006).

[20] The cost of labour has been considered in the IIT literature only implicitly, where differences in labour endowment were assumed to include different labour costs.

[21] The first equality shows the standard definition of ULC, namely is the ratio of the wage on labour productivity indicating the average cost of labour per unit of production, the latter can be decomposed in real GDP over number of workers in the country. Finally the third and fourth equalities show how this is merely the amount of worker compensation in total nominal production multiplied by the price deflator index. In this way it is easy to separate out the wage component from the price component in the ULC measure.

comparative advantage in endowments and, thereby, country competitiveness. Following the theoretical and empirical literature on IIT,[22] variables measuring economic distance and initial technological conditions are included in the analysis. Two measures of capital in the economy are included: the domestic stock of capital (stock of physical capital)[23] and foreign direct investment (investment capital).

For the analysis, the natural logarithm of the *difference* in capital stock between the EU15 average and the country in question is used. Effectively, we study the impact of the economic distance on IIT and expect a negative relationship between the domestic stock of capital and intra-industry trade.

Foreign direct investment (FDI) has been a major source of capital investment and technology transfer in CESEE countries. These long-term investments have accelerated productivity convergence as well as convergence of trade patterns towards the trade structures of advanced EU15 countries.[24] Due to their proximity to the EU15 and an initial low capital base, foreign companies have found it attractive to delocalise their production processes into CESEE countries as the return on capital has tended to be higher and labour costs lower than at home. A measure of *net* FDI inflows as a percentage of GDP is included in the analysis so as to account for the foreign long-term investment channel and its impact on IIT.

Since the 1970s, the relationship between FDI and trade has been a subject of debate in both the theoretical and the empirical literature. Following the standard new-trade theory argument of capacity building and product differentiation, one can expect a positive impact of FDI on IIT for CESEE countries.

Moreover, FDI is linked to the fragmentation of production processes in Europe, with parent companies specialising in capital-intensive activities, whereas labour-intensive activities have been entrusted to their foreign affiliates (efficiency-seeking FDI). The interaction of FDI and labour-intensive technologies can have positive effects on the share of wages in GDP and has promoted economies of scale, which in turn can increase IIT (Helpman 1984, Helpman and Krugman 1985). The decomposition of unit labour costs between the wage share and the deflator, allows for testing the interaction of FDI and the wage share.

At the same time, Markusen (1984, 2002) shows how the story can be exactly opposite as FDI can substitute for trade (domestic market-oriented FDI) on a global production scale, which has a negative impact on IIT. Similarly, Gaulier, Taglioni and Vicard (2012) explain how FDI inflows can have a direct demand effect on both tradable goods and non-tradable goods in the domestic economy. They increase price levels in the tradable sector, appreciating their real exchange rate and making the tradable goods less competitive. In our specifications we control for this interrelation, by including an interaction terms between FDI and the deflator component of unit labour costs.

[22] See for example Jensen and Lüthje (2009), Caetano and Galego (2007) and Botrić (2012) among others.
[23] The computation of the stock of capital is performed via the perpetual inventory method and the Herberger (1978) modification, assuming a depreciation rate of 15% annually and a growth rate of output of 3% annually. For details on the methodology the reader is invited to refer to the survey by Dhareshwar and Nehru (1993). Data come from the World Bank Development Index.
[24] See Bijsterbosch and Kolasa (2009).

4.3 Trade Agreements

The pioneering theories on intra-industry trade were developed in relation to the signing of the first regional trade agreements, in particular between countries of the European Economic Community. Most of the early empirical studies found some evidence that regional trade agreements stimulate intra-industry trade (i.e. Grubel and Lloyd 1975, Balassa and Bauwens 1987). However, there appears to be some disagreement in the literature when it comes to the effect of trade agreements on trade patterns between economically and geographically diverse countries. Some empirical studies suggest that the elimination of trade barriers contributes to an increase in IIT, linked to the re-export to a richer country of goods assembled in the lower-income country (e.g. Globeman 1992 and Foster et al. 2010). Other empirical studies (e.g. Rodas-Martini 1998) show that the impact of trade agreements on IIT is statistically not significant, suggesting that the removal of trade barriers increases competition among local and foreign firms and there is a risk that a relatively less developed country will not be capable of exploiting the benefits of the opening towards a new market. Similarly, the opening of markets will induce specialisation based on revealed comparative advantages and one-way trade. It follows that the overall impact can either be positive or negative, depending in particular on the quality of goods the two countries are able to supply to the intra-industry exchange.[25]

Since CESEE countries have been partners in different trade agreements with the EU15, these agreements are controlled for separately by means of including dummy variables for preferential trade agreements (PTA), free trade agreements (FTA) and EU membership.

4.4. Exchange Rate Regime

Most of the empirical literature in international economics investigates the effects of exchange rates volatility on the volume of bilateral trade, testing the underlying assumption that uncertainty about the final prices of traded goods reduces the value of bilateral trade flow.[26] This is in line with the notion that a monetary union will eliminate any exchange risk from transactions and thus promote trade. The effect of exchange rate regime on intra-industry trade has been studied in connection with the introduction of the euro in 1999 and creation of Monetary Union.[27] It has been argued that different trade types are not affected in the same way. Taking the perspective of demand elasticity, if the perceived elasticity of demand is very high, small variations in exchange rates may have a large impact on trade in similar products (IIT), with particular influence on horizontal IIT where the products are differentiated by some minor attributes. It follows that the elimination of exchange rate volatility would benefit IIT by reducing trade transaction costs and related financial uncertainties.

However, as pointed out by Cristobal et al. (2009), IIT in vertical differentiation is less sensitive to exchange rate variability. Moreover, a floating regime can serve as an absorber of external shocks and nominal depreciation vis-à-vis trading partners can make the tradable sector in the export country more competitive and thus increase export volumes and performance. This can provide a cost efficiency mechanism to firms in developing countries trying to enter and export their goods in more developed markets.

Therefore, for the group of CESEE countries the overall effect of the exchange rate regime on IIT is assessed. To estimate this effect the Reinhart and Rogoff (2004) index information

[25] See Herderschee and Qiao (2007) on discussions about the importance of sequencing in opening up domestic markets to foreign trade.
[26] See Baldwin et al.(2005).
[27] See Cristobal et al.(2009) and Fontagné et al.(1999)

on the exchange rate regime in each country in a particular year is included. The index varies from 1 to 14: value of 1 represents a country with no separate legal tender (i.e. euroisation as in the case of Montenegro) and 14 represents a country with a freely floating currency (i.e. hyper-float). The choice to select the exchange rate regime and not the exchange rate variability is motivated by an interest in monetary policy analysis: while the exchange rate regime is decided by monetary authorities, the exchange rate variability is determined predominantly by markets. This is the view also of the theoretical open macro literature, where most of the currency policy options are related with the effects of floating vs. fixed exchange *regimes* and not on the effects of exchange rate market evaluations on economic outcomes.[28]

4.5. Corruption, Democracy, and Corporate Taxation

In addition to these well-known economic factors, a number of institutional variables are included in the analysis. First, we account for the extent to which corruption is perceived in a country. The main rationale is that corruption serves as an invisible tax on business and has been shown to reduce investment and growth.[29] We use data from Transparency International's Corruption Perception Index: the index ranges from 1 (very corrupt) to 10 (free from corruption).[30] Also, a discrete variable measuring the level of democracy (ranging between -10 and 10, where the higher values correspond to a higher level of democracy) is included in order to control for the broad political environment.[31]

We also include a variable which measures corporate taxation rates and test whether differences in corporate tax rates can explain IIT.[32] On average, CESEE countries have a lower tax burden than the EU15 partners and hence exert lower fiscal pressure on prices of exported goods (see Table 2). The corporate tax policy can be used by governments to increase price competitiveness among domestic exporters which can facilitate trade integration of CESEE countries with the EU15. All three governance variables enter our estimations as *differences* from the EU15 average.

Table 2 illustrates the main descriptive statistical properties of our group of explanatory variables as well as of intra-industry trade. The stark differences in the means show the different levels of socio-economic development between the two blocks of countries (NMS and CCPC). Except for the inflow of FDI scaled by the gross domestic product, the means deviate substantially. These differences render it likely that the effects of explanatory variables are heterogeneous in these two groups. Therefore, two sets of specifications are presented in the following section. The motivation to do so is both theoretical and policy-driven. From a theoretical standpoint, NMS and CCPC have substantially different industrial structures and in particular in reference to the agglomerate group EU15. From a policy point of view, these two groups of countries are subject to different trade agreements with the EU15 and require different dummy variables for trade arrangement capturing the effect of trade agreements on IIT.

[28] We included in separate regressions the exchange rate variability with respect to the Euro without finding statistically significant effects on IIT shares. Results for this regression are available from authors.
[29] See e.g. Barro (1996) and Shleifer and Vishny (1993).
[30] This is publicly available at http://www.transparency.org/research/cpi/overview.
[31] The data are sourced from the Polity IV database, which is available at http://www.systemicpeace.org/inscr/inscr.htm.
[32] Data for corporate taxes are collected from KPMG Global Corporate Tax Data.

5. Identification Strategy and Estimation Results

As indicated above, the database contains an annual panel (cross-section time series) dataset covering the period from 1998 up to (and including) 2010 for 19 CESEE countries.[33] The time dimension is limited to this period due to data availability. The identification strategy is based on a set of dynamic panel regressions.[34] The dynamic specifications account for endogeneity by exploiting IV-GMM estimators and hence provide an identification strategy if the instruments satisfy the exogeneity criteria.[35] In order to account for unobserved heterogeneity, we use fixed-effect panel estimations and employ robust standard errors to account for heteroscedasticity and serial correlation in the pooled residuals.

A caveat is that the linear dynamic panel regression cannot provide meaningful quantitative effects for the covariates due to the truncated nature of the dependent variable: linear panel estimation would predict values outside of the specified boundaries, an outcome that would be hard to reconcile with a meaningful economic interpretation. Therefore, a non-linear model able to account for the continuous yet bounded nature of the dependent variable is needed. Two methodologies are applied so as to achieve this goal: a logistic transformation on the response variable and a fractional response model methodology developed for panel data in Papke and Wooldridge (2008). The estimation results and a brief explanation of the fractional response methodology are described in section 6.2.

As noted previously, the GLI index explains a percentage share of IIT in total trade with respect to the EU15, and is truncated at 0 and 100 percentage values by construction. Given the longitudinal structure of the data, a series of pooled ordinary least squares (OLS) models is estimated. The panel baseline regression specification therefore takes the following functional form:

$$\mathrm{LN}\left(\frac{\mathrm{IIT}_{it}}{1-\mathrm{IIT}_{it}}\right) = \alpha_i^g + \gamma_t^g + \beta_1 \mathrm{LN}\left(\frac{\mathrm{IIT}_{it-1}}{1-\mathrm{IIT}_{it-1}}\right) + \beta_2 Ec.DIST_{it}^g + \beta_3 ULC_{it}^g + \beta_4 FDI_{it}^g + \beta_5 TA_{it}^g + \beta_6 EXR_{it}^g + \beta_7 INST_{it}^g + \varepsilon_{it}^g \quad (7)$$

where i and t are the usual subscripts indicating respectively a country and a year. The superscript g is an index for group of countries which represents either the new member states or candidate countries and potential candidates, α_i and γ_t represent respectively the cross-section fixed effect by group of countries[36] and the time fixed effect aimed at capturing general effects of unobserved economic change on IIT during the period.

The other explanatory variables form the focus of the analysis and vary in time and across countries. *ULC* is the unit labour cost variable, which is further de-composed in two components - a share of country wage in total GDP and the price deflator index. *FDI* represents the share of foreign direct investments in the economy over the GDP. The row vector *Ec.Dist* defines a collection of control variables. It is proxied by the difference with respect to the EU15 average of the natural logarithm of the capital stock (K).[37] The variable

[33] The sample includes 11 new member states (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia) as well as eight CCPC countries (Albania, Bosnia-Herzegovina, Croatia, FYR Macedonia, Iceland, Montenegro, Serbia, and Turkey). For Montenegro and Serbia, the sample period is limited to 2006-2010.

[34] We perform a Hausman test to see if a random effect model is the more appropriate to use here. Yet, the test rejects this hypothesis. Nevertheless, we run several random effect specifications in order to allow for the effects of time invariant variables such as distance, contiguity etc. None of these models produce significant results for these variables in our specifications. The results of these models are available upon request.

[35] For a detailed treatment of the IV and GMM estimators used in this paper see Greene (2008).

[36] In the case of Candidate countries and Potential Candidates we have a cross-section of 8 countries whereas in the case of EU12 the cross-sectional dimension is given by 11 countries.

[37] The variable K is the proxy for the stock of capital factor endowments, computed through the perpetual inventory method and Hidelberg (1978) refinement. For details, see Dhareshwar and Neru (1993).

TA is a row vector of dummy indicators aimed at capturing the effect of trade agreements between the EU15 and the countries in question. The variable Exchange Rates Regime (*EXR*) is a discrete variable explaining the exchange rate arrangements for monetary policy taking values from 1 to 14 following the classification of Reinhart and Rogoff (2004). The indicator *INST* is a row vector capturing the effect of institutional variables on IIT, in particular three discrete variables, namely the Corruption Perception Index (CPI), an aggregate indicator of the level of democracy process in a country and the differences of the corporate tax rate from the EU15 average.

It is important to recall that for most explanatory variables, namely ULC, capital stock, wage share, corruption and democracy indexes, the difference with respect to the EU15 average is used so as to better capture the (economic) distance from this 'benchmark' region. In other terms, for NMS and CCPC the difference with respect to the EU15 represents the distance from the *desired level* of economic integration. As explained in section 4, the models for the CCPC and NMS are estimated separately.

5.2 Dynamic Panel Estimates

The results of the dynamic panel regressions are presented in Table 3. Standard diagnostic tests and regression statistics are shown at the bottom of the tables. Following the Monte-Carlo experiment by Judson and Owen (2001) on macro dynamic panels, the estimates are run with the one-step Arellano-Bond- Generalised Method of Moments (GMM) estimator in order to account for endogeneity. Judson and Owen (2001) show that the GMM estimator has similar efficiency and bias properties when compared to other estimators, e.g. the Anderson-Hsiao (1982) or Kiviet (1995) modified least-square dummy variable estimators. Four lags are implemented for all GMM-type instruments, i.e. the lagged dependent variable and all other our covariates except the time dummies and the unobserved cross-country heterogeneity.[38]

5.2.1 Candidate Countries and Potential Candidates (CCPC)

The first three columns of Table 3 illustrate the dynamic estimates for CCPC. All specifications have exogenous instruments, as confirmed by the Sargan test, and there is no sign of second or higher order correlation between the lagged dependent variable and the error term. Our preferred specification for CCPC is listed in column 3, which pools together the variables considered in the analysis. The results for CCPC show that the role of the dynamic lagged effect of IIT is important, confirming that IIT is an intrinsically dynamic concept.[39]

The marginal effect of the differential in the stock of fixed capital formation is significant only after controlling for the interaction with the inflow of foreign direct investment. The interaction between the FDI and the capital stock is statistically significant and positive, suggesting that foreign investment contributes to the accumulation of capital in CCPC and to the convergence in intra-industry trade with the EU15. Nevertheless, as standard theory predicts, the marginal effect of capital stock distance on IIT is negative. The result shows that there is still significant room for improvement to increase physical productive capabilities and accelerate the pace of convergence toward EU15 capital stock and IIT levels.

[38] The choice of four lags warrants an appropriate degree of balance between the bias-efficiency trade-off, see by Judson and Owen (2001). We adopt the one-step GMM estimator which performs better than the two-step GMM estimator as reported in Arellano-Bond (1991) and Kiviet (1995). We include time-variant fixed effects in all our reported specifications.
[39] See the dynamic marginal intra-industry trade contribution by Brülhart (1991).

At first inspection, no direct evidence of significant effects of ULC differentials on IIT is found. The lower unit labour costs in CCPC (which are on average 15 percentage points lower than in the EU15, see Table 2) do not present a significant impact on IIT. In order to further understand the effect of ULC differential on IIT, it is decomposed in two components in column two and three: the share of labour compensation in GDP and the general level of prices in the domestic economy, both measured as the distance from the average EU15 values. The increasing price level appears to be a stronger and more significant determinant than the wage share of GDP in deterring IIT with the EU15. The marginal effect of price levels is statistically significant (and negative) whereas the effect of labour compensation share is not statistically significant. We believe that the results point out that local monetary authorities can play a greater role in containing inflationary pressures in the development of domestic economy and promote intra-industry trade exchange.

The estimates show that the marginal effect of FDI is slightly positive. In column three, at mean deflator value (i.e. 1.1269) and mean wage share of GDP difference (i.e. 0.13) the impact of FDI on IIT is significant and positive.[40] FDI thus appears to contribute to the capacity building in the CCPC region and mitigates the lag in the convergence process. In the regression we include interaction terms of FDI and the deflator as well as the interaction of FDI and the wage share of GDP to control for the effect an inflow of foreign investments can have on domestic price levels.[41] The interaction terms are significant and have the expected sign. In particular, the interaction with the deflator is significant at the 1% confidence level and negative, hinting that the inflow of FDI into CCPC had generated an upward pressure on price levels. This negative effect reduces somewhat the direct positive effect of FDI on IIT because the higher levels of inflation promoted an appreciation of the real exchange rate and hence curbed trade competitiveness by crowding out the demand for domestic export sector.

In all specifications, the corporate tax difference with respect to the EU15 is statistically significant. Corporate tax differentials have a strong effect on trade patterns by making one country's exports relatively cheaper than the similar goods produced in the EU15. The transmission channel sees a lower corporate tax rate providing room for a more competitive pricing of goods and hence promotes IIT with the EU15 because it helps firms to optimize their costs. This result underlines how the tax structure can be an important policy lever to increase trade integration with the EU.[42]

In column three variables for free trade agreements and exchange rate arrangements are added. Among CCPC, free trade agreements have a significant and negative effect on IIT. Yet, this result should not be surprising due to the symmetric nature of such agreements coupled with the lower exporting capabilities of CCPC compared to the EU15.[43] The variable for the exchange regime arrangement has a positive and highly significant impact on IIT, suggesting that a less restricted exchange rate mechanism allows less competitive countries to enter EU15 markets via standard competitive devaluation argument. The result reconciles

[40] Using the coefficients of column 3 we perform the following computation: 0.294+0.053*0.13-0.252*1.1269=0.017.

[41] As already discussed by Gaulier, Taglioni and Vicard (2012), a positive shock of foreign capital helps to build economic capacity but the influx of long-term investment creates an internal demand shock, i.e. the demand (and thus price level) for tradable and non-tradable products in the domestic economy increases, making the export sector relatively less competitive.

[42] A caveat is due, corporate tax rates can also influence the impact of FDI on IIT (see OECD 2007). Most of CCPC have a sizeably lower corporate tax rate than EU15 countries (on average 11.3 percentage points, Table 2), acting as a catalyst in attracting FDI inflows. To control for this interaction, in other specifications we include interaction terms of FDI with corporate tax differences. However, the interaction is not significant in our specifications and do not alter quantitatively the impact of corporate tax differences on IIT. The estimates are available from the authors.

[43] Similar results for the Western Balkan region have been documented by other empirical studies; see e.g. Herderschee and Qiao (2007). In a different set of estimations we find some evidence that a more asymmetric trade agreement favouring the relatively weaker countries such as the Preferential Trade Agreement (PTA) has a positive effect on intra-industry trade. Nevertheless, the PTA effect is not robust across different specifications.

with the notion of devaluation as an adjustment tool to gain external competitiveness relative to trade partners. Nevertheless, the positive effect of flexible exchange rate regime on IIT is at odds with the theory of fixed exchange rate as a means to eliminate exchange rate risk, anchor inflation expectations and thus promote trade. It is important to point out that our results merely indicate that, ceteris paribus and within the group of CCPC, those that had a more flexible exchange regime with respect to the euro achieved a faster IIT convergence with respect the countries having a fixed exchange rate.[44]

One of the most interesting results for the candidate countries and potential candidates are the effects of corruption and corporate taxation. In particular, the corruption perception index (difference from the EU15 average) has a very strong and significant effect, indicating that higher relative levels of corruption reduce IIT. Similar results have been documented in the trade and corruption literature and underline the importance of institutional quality and, in particular, custom procedures.[45]

5.2.2 New Member States (NMS)

The second part of Table 3 illustrates the dynamic panel estimates for the new member states. As the standard tests show the estimates are robust to autocorrelation of second or higher order and have exogenous instruments. The variance-inflation factor test for multicollinearity is reported in Table 6: the dummy variables for free trade agreements (FTA) and the EU membership are highly collinear and hence the estimated coefficients can be biased. We address collinearity by splitting the NMS' regressions in two blocks where column 7 shows the regressions with the EU membership dummy.

As for CCPC, the estimates confirm the significance of the intra-industry trade dynamic effects. The standard variables for economic distance, and in particular physical capital stock, are not significant for NMS.[46] The reader is invited to note that average capital stock in both NMS and CCPC is lagging behind the EU15 average (see Table 2); nevertheless, the average distance from the EU15 in terms of capital stock accumulation is four times lower in NMS than CCPC. We conclude that the distance of physical capital stock accumulation does not explain *inter* industry trade with the EU15 for NMS. Nevertheless, it is worth emphasising that there is still significant room for improvement in the NMS infrastructural and overall physical capital endowment to grasp the full advantage of the Single Market and improve *total* trade with the EU.

Policy rather than structural variables seem to have a higher weight in determining IIT for the NMS. With this respect, the impact of FDI on IIT does not show the same patterns as for CCPC. The inflow of FDI into NMS does not have a strong significant effect on intra-industry trade even after interacting FDI with the stock of physical capital. Intuitively, given a lower gap of the physical stock of capital with the EU15, the inflow of FDI does not have a significant marginal contribution to the increase of IIT.

Mirroring the results for CCPC, unit labour costs are not significant. However, when splitting the components of unit labour cost, the impact of the general rise in prices has a

[44] The choice of exchange rate regime is still an argument of debate in the literature and depends on the period of investigation, the sample of countries and the empirical methodology, see Ozturk (2006)

[45] For example, de Jong and Bogmans (2011) show how bribes paid at the border can have a positive effect on imports and negative on exports. It implies that a relatively less competitive country (as the candidate countries are with respect to the EU15 block) will have a decrease in IIT because the relatively less competitive exports are further penalised by corruption at border.

[46] We run separate regressions where we include also GDP per capita distance from the EU15 average as a measure of economic distance: the estimates are insignificant. The results are available from the authors.

significant negative effect on IIT. It is important to note that the interaction between FDI and the deflator is not significant. We can infer that price inflation pressures, induced by the inflow of foreign capital on domestic goods, did not contribute to the appreciation of the real exchange rate.

In column 6 the free trade agreements and the degree of flexibility in the exchange rate regime are added to the analysis. The symmetric Free Trade Agreements that were in place prior the EU accession in most of the New Member States have a markedly negative and statistically significant coefficient.[47] The results mirror the negative and significant effect of the FTA for CCPC and are robust across different specifications.[48] In our view, they point to a still unfinished transition process, coupled with lower exporting capabilities of NMS compared to the EU15.[49] When splitting the regressions including the EU Member binary variable instead of the FTA dummy, a positive and significant effect for the EU membership is found.[50] The effect is significant at the 10% confidence level. Intuitively, the estimate for the EU membership indicates that only after a period of convergence and transitions from socialist industrial structures, CESEE countries benefited from the EU partnership in terms of IIT convergence.

The relevance of policy variables is further corroborated by the statistical significance of the exchange rate regime and the corporate tax differentials. As seen in the case of CCPC a floating exchange rate mechanism is an important channel for improved external competitiveness and this result is confirmed for the NMS. In addition, as for CCPC, corporate tax differences between NMS and EU15 countries have a positive, highly statistically significant and robust effect on IIT between these countries.

Unlike for CCPC, the impact of corruption and democracy variables does not have any significant effect on IIT between NMS and EU15 countries. This is an important result with respect to the institutional convergence of CESEE to the EU. In fact, the NMS have undergone recently a comprehensive legislative confluence path toward the EU's *acquis communautaire*, which, by reforming and stabilising their political institutions, reduced overall investment risk and increased the trust of trading partners. The overall impact of this institutional convergence process, despite still incomplete given relatively higher levels of corruption in some of NMS than in the EU15, has been successful or at least did not harm the intra-industry trade flows with the EU15.

5.3 Fractional response Models

In this section we address the bounded nature of our dependent variable and adopt the non-linear fractional response model to estimate the magnitude of the impact of our covariates on the intra-industry trade. Our pooled fractional probit[51] model has the form:

[47] Except Malta and Cyprus, all the NMS had a free trade agreement with the EU15 in place already in the 1998.
[48] Similar results for the new member states have been found by Herderschee and Qiao (2007).
49 In fact, most of the industrial life in the East European countries during the 1990s consisted of nascent private enterprises after the fall of socialism. Furthermore, recent firm level empirical trade literature shows how the majority of trade volumes are driven by few big and more productive firms and that export and survival in foreign markets is for the few firms at the top. In pioneering theoretical works the comparative (dis)advantage with respect to more established competitors is explained either through lower economies of scale (Helpman and Krugman, 1985) or higher fixed cost (Haked and Sutton, 1984) encountered in reaching the new markets where bigger and more productive firms already exist. See the review by Mayer and Ottaviano (2007) for an empirical application for Europe, and Melitz (2003).
[50] From a trade integration the fundamental differences between the EU Membership with respect to the FTA is that the former encompasses also fee movement of factors of production and a common external trade policy whereas the latter is a mere removal of trade tariffs and quotas with no common trade policy.
[51] We use the probit model because shown to be superior to the conditional logit estimation, the latter is not consistent when the response variable is not binary and serial dependence is an issue. For more details see Wooldridge (2002), section 15.8.3.

$$\mathbb{E}(IIT_{it}\,|\boldsymbol{x_{i1}},\boldsymbol{x_{i2}},\ldots\boldsymbol{x_{iT}}) = \Phi(\gamma_{at}^{g} + \boldsymbol{x}_{it}^{g}\beta_a + \bar{\boldsymbol{x}}_i^{g}\vartheta_a)$$

This model is estimated using the one-step pooled Bernoulli quasi-MLE (QMLE) derived by maximising the pooled probit log-likelihood. To correct for arbitrary serial dependence and misspecified conditional variance[52] robust standard errors are used. We then compute the partial effects averaged across the population, i.e. the average partial effects (APE), to have an estimate of the relative importance of the determinants.

The variable γ_{at}^{g} represents the intercept and the subscript *t* indicates that the average IIT is allowed to differ across years. As before g represents either CCPC or NMS. The subscript *a* is the scaling factor, all of the QMLE estimated coefficients depend on the scaling factor *a,* in fact without the scaling factor the QMLE coefficients would not be identifiable.[53] The explanatory variables are represented by the matrix $\boldsymbol{x}_{it}^{g}$. Importantly, the inclusion of the time averages of the covariates ($\bar{\boldsymbol{x}}_i^{g}$) controls for correlation between country unobserved fixed effects and the covariates and helps in estimating, with relative ease, the coefficients of interest up to a scaling factor.[54]

Table 4 illustrates the results of the pooled Bernoulli quasi-MLE estimator for the two groups of countries. Although the coefficients of the pooled fractional response model can be used to evaluate qualitative effects, they do not have meaningful *quantitative* economic interpretation. To gauge the quantitative effect of the covariates we refer to the average partial effects columns where we use the scaling factor to obtain the APE coefficients and bootstrapped standard errors.

5.3.1 Candidate Countries and Potential Candidates (CCPC)

The non-linear estimates show that the APEs for CCPC have the same qualitative signs as the dynamic panel regressions although there are some fundamental differences in terms of quantitative effects and statistical significance of some variables.

First, it is safe to confirm that the dynamic effect of the lagged response variable is an important feature of intra-industry trade: the coefficients on the lagged dependent variable are close to 0.5, suggesting that about half of the intra-industry share in one year is carried over to the next.

The average partial effect of the difference in the stock of capital is negative: a ten percentage point reduction of the gap from the average EU15 capital stock could have contributed to an increase of 0.8 percentage points in the fraction of intra-industry trade.[55]

The overall evidence for the effect of unit labour costs differential on IIT suggests that relative unit labour costs decrease the proportion of intra-industry trade unconditional on the capital stock distance. The APE of the wage share in GDP has a negative effect on intra-industry trade. The fact that in the non-linear model the wage share is significant illustrates that wage share has negative effects on IIT in particular at extreme distributional values of wage share, namely for countries with very high levels of wages. In average, a 1% decrease in the wage share increases intra-industry trade with the EU15 by 16 basis points, in other

[52] In an alternative estimation method we allow for misspecifications in the conditional variance and adopt the generalised estimating equation approach (GEE) with an exchangeable working correlation matrix. The results, available from the authors, are very similar to the Bernoulli QMLE.
[53] See Papke and Wooldridge (1998) for further details on QMLE.
[54] See Chamberlain (1980).
[55] The estimated coefficient is considerably lower with respect to the linear model estimate. This implies that the linear model prediction is not performing well due to the non-linear nature of the response variable.

words if wage growth is 1% lower than GDP growth the positive competitive effect translated in higher IIT is 16 basis points. Furthermore, the direct effect of the general level of prices is not significantly different from zero. However, the interaction with FDI and deflator has a negative sign, making the overall partial average effect of the increase in prices negative: a 1% increase in inflation, evaluated at average 1998-2010 FDI ratio in CCPC, decreases intra-industry trade by 16 basis points.

Certainly one of the most interesting results of this group of estimates is the negative APE of foreign direct investment after taking into account the partial effects of the interactions with capital (not significant), wage share (not significant) and the deflator (significant).[56] The result is crucial to understand the policy implications of FDI impact on intra-industry trade and the convergence process with the EU15.[57] As shown in Table 4, the result is exclusively driven by the negative effect of the FDI interaction with the deflator. We interpret this outcome as a crowding out effect of FDI on IIT due to the occurrence of inflationary pressures in the tradable sector after a surge in FDI and we think that domestic monetary authorities can try to cushion this rise in prices when witnessing a surge in FDI inflow into their country. If the objective of monetary authorities is to integrate faster into the EU15 and accelerate the accession to the EMU by maintaining external competitiveness of domestic firms they have to internalise in their objective function the inflationary effect on prices induced by an inflow of FDI.

The last coefficient of the first specification confirms that the corporate tax differences have a positive impact on intra-industry trade: a decrease in the corporate tax rates with respect to the EU15 average, and assuming the EU15 average remains at this level, by 1 percentage point could increase the intra-industry trade between CCPC and EU15 by 0.2%.[58] In terms of policy, the effect of corporate tax is one of the strongest quantitative effects across these estimates: a small percentage change can give rise to a considerable gain in terms of IIT. To control for possible interplay between FDI inflow and corporate taxes, in additional estimates (not shown) we include the interaction of FDI share and corporate tax differences without finding a statistically significant impact.[59]

In the second set of fractional probit estimates for CCPC, column 3 and 4 in Table 4, the same qualitative effects as in the linear regressions are found. Free trade agreements have a negative effect on trade integration, although this effect is quantitatively marginal. Similarly, the degree of flexibility of the exchange rate can have a positive effect on IIT, for instance a drastic paradigm shift in the exchange rate policy from the value of 1 (euroisation) in the Reinhart-Rogoff (2004) scale to the value of 14 (fully floating exchange rate), ceteris paribus, could increase intra-industry trade with the EU15 by 14.3 basis points. The effect of the

[56] Looking at column 4 and evaluating at the average deflator level of CCPC we calculate the following: 0.025-0.027*1.1269=-0.005: a 10 percentage point rise of the FDI/GDP ratio decreased intra-industry exchange between CCPC countries and the EU15 block by 5 basis points. For the sake of illustration and extrapolating further, we note that in the period 1998-2010 the average growth rate of the share of FDI in the candidate and potential candidate countries was 27 percent per year. This translates into an average dampening effect on intra-industry trade of approximately 13.5 basis points per year.

[57] As a caveat recall that the linear model may have a good approximation of the effect at the average of the FDI distribution, however at extreme values of FDI inflow the linear model performs poorly because unsuited to take into account the non-linear behaviour of the response variable. Given that FDI inflow has been remarkably high in the past decade in candidate countries, with unprecedented inflow just before the 2007 financial crisis, the result of the non-linear specification should not be understated.

[58] In order to give a more intuitive representation note that the average tax rate on corporate profit in EU15 in 2010 was 26.7% and the average distance from this EU average for the CCPC was 11.28%. It follows that if, for instance, Turkey reduces the tax rate applied to corporate profits from the actual 20% to the 19% it could increase the intra-industry trade with the EU15 block by 20 basis points, i.e. from the 18.4% of intra-industry trade in total trade with EU15 of 2010 to the 18.6% share.

[59] The results are available from the authors.

difference in corruption perception for the CCPC is also highly statistically significant. The estimate shows how a reduction of the index by one unit with respect to the EU15 average leads to a 2.7 basis points rise in IIT.[60]

5.3.2 New Member States (NMS)

In the second half of Table 4 the APEs for the New Member States are listed. Dynamic effects are still very significant and for CCPC they explain almost half of the IIT from year to year. Mirroring the linear models, most of the explanatory variables are not significant except for the floating exchange rate, and less evidently, the corporate tax rate and the free trade agreement.

Nevertheless, a few observations are worth mentioning. The intensity of FDI inflow was practically identical in proportion to GDP levels for CCPC and NMS between 1998 and 2010, but contrary to CCPC, we do not find any negative effect of the inflow of foreign direct investments on intra-industry trade. It follows that NMS had more success in controlling inflationary pressures into the domestic market after the inflow of FDI and keeping all else constant. Similarly, unit labour cost differences with respect to the EU15 are not a significant determinant of intra-industry trade for the NMS, in fact the average difference from the EU15 was only 0.04 units in the period under investigation, whereas the average difference for the candidate countries was 0.13 (see Table 2).

The impact of the exchange rate regime is significant at 1% confidence level but with a lower magnitude than in the case of CCPC, an increase of the flexibility of the exchange rate regime by one notch brought in average 0.4 basis points increase of intra-industry trade with the EU15 block. In practice and ceteris paribus, a shift of the exchange rate policy from a currency board to a managed float would mean an increase of 6 steps in the Reinhart-Rogoff (2004) scale, implying an increase of intra-industry trade by 2.4 basis points, which admittedly is a rather weak effect.

5.4 Vertical and Horizontal Intra-Industry Trade

To conclude the empirical analysis, we present evidence for the determinants of vertical and horizontal intra-industry trade. The main interest of this study lies in the determinants of vertical intra-industry trade because of the direct effect the higher quality goods can have on the current account balances.[61] Table 5 illustrates the determinants of horizontal intra industry trade the vertically differentiated goods and low and high quality vertically differentiated goods. The distinction of effects between low and high qualities of intra industry trade helps to shed new lights on these results.

5.4.1 Candidate Countries and Potential Candidates (CCPC)

The negative effect of the ULC differences with respect to the EU is mostly driven by their effect on the high quality intra-industry trade. In fact, for the high range of the quality spectrum the wage share of GDP has a remarkable effect, over the period under study and

[60] The corruption perception index ranges from 0 to 10 (the 10 meaning no corruption perception). As an example, in 2010 the average EU15 value was 7.25, the Croatian was 4.1 (3.14 points distant from the EU15 average): ceteris paribus, if Croatia had reduced this distance completely over the past decade, its intra-industry trade with the EU15 block could have benefited by approximately 9 basis points.

[61] Refer to Table 7 in Appendix. The vertical IIT is shown to be significant in determining current account in a fixed effect dynamic panel regression after controlling for serial correlation and heteroscedasticity.

evaluating at average FDI inflow a 1% increase in wage share decreased the IIT in high quality goods by 4%. Similarly, an increase in the general level of prices has also a considerable negative effect on high quality IIT driven exclusively by the interaction with FDI inflow. For the lower quality end of IIT, only the deflator has a negative impact when interacted with the inflow of FDI. The horizontal IIT is not affected by the ULC components.

Second, one of the most important aspects of the quality-partitioned estimates is that the negative effect of FDI on intra-industry trade is driven principally by the effect FDI has on the similar quality range of exports. At the same time, FDI has a strong negative effect also on the high quality goods after accounting for the partial effects and a slightly weaker effect on the low quality goods.[62]

Third, the negative coefficients on the interaction between FDI and the deflator provide further evidence for the role that monetary policy can have in taming the crowding out effect whereby FDI increases the internal demand and drives up the prices of the tradable sector, thereby helping the appreciation of the real exchange rate and making domestic goods less competitive.

Fourth, we find evidence that free trade agreements penalise goods of similar quality rather than the vertically differentiated goods, while corruption has a negative impact on the intra-industry trade in vertically differentiated goods.

5.4.2 New Member States (NMS)

For the new member states the dynamic effect are particularly important for vertically differentiated goods, suggesting a learning (and cumulative) effect of intra-industry trade. In contrast to the CCPC region, the dynamic nature of intra-industry trade is a stronger feature for the New Member States. We interpret this as a sign that inertial effects of established intra-industry relationships and trade patterns persist over time when industrial structures are similar.

There is some evidence that lower quality range products and horizontal intra-industry trade are at a disadvantage when unit labour costs increase. In particular, horizontal intra-industry trade is penalised by increasing general price dynamics, whereas the low quality range of intra industry trade is reduced by increasing wage dynamics. The highest quality goods are, however, not affected by the subcomponents of unit labour costs. Similarly to the CCPC case, the free trade agreement variable has a negative effect on trade for homogenous quality goods. These findings suggest a strong dual effect of trade agreements on intra-industry trade: a first positive impact for the industries that are capable of producing high quality goods and that have the economies of scale and managerial capabilities to exploit the opening of the borders, and a second less beneficial effect on the weaker low quality producers.

The floating exchange rate regime has some competitive benefits for the lower end of the quality spectrum as well as for intra industry trade in similar goods. This indicates that high quality goods are not affected by the competitive devaluation argument. An interpretation can be that they are able to compete in the foreign market solely through their intrinsic quality.

Interestingly, corruption perception distance has a negative and statistically significant coefficient at a 1% confidence level on the lowest quality range of products and a statistically significant and positive coefficient on the highest quality range. With regards to the positive

[62] For the high quality range we perform the following calculation: 0.867-0.088*0.13-1.030*1.1269+0.369*0.29 = -0.198
For the low quality range: 0.432-0.4*1.1269 = -0.019

impact of corruption on the high quality range, the literature shows[63] that it is likely that the highest quality range of producers correspond to companies having a greater disposal of financial resources whereby invest in lobbying activities in order to improve their market access into the EU. This is a channel that can explain also the negative effect of corruption in candidate and potential candidate countries

6 Conclusions

Over the past quarter of a century, CESEE countries have opened up to trade as part of a process of economic transformation and integration into the European Union. This paper has looked into the extent to which trade integration has developed in terms of intra-industry trade (IIT) between these countries and the EU15. The focus on intra-industry trade is of first order importance for the EU integration process for multiple reasons. First, it is a tool for achieving more synchronised business cycles and as a consequence reduces the effects of asymmetric shocks. Second, IIT is a crucial determinant of competitiveness and positive current account balances. Third, the focus on IIT is important as a real convergence mechanism toward the EU, as it can be a good indicator of the path to real convergence of the EU candidate countries and potential candidates.

By describing and analysing the factors behind these developments in a panel data set up using the most disaggregated level of bilateral trade data available while applying various statistical modelling techniques, this paper finds that the candidate countries and potential candidates are lagging behind in terms of intra-industry integration with respect to the new EU member states.

Moreover, the paper identifies common factors behind IIT between CESEE and EU15 countries, such as fiscal incentives (corporate tax rate) and the exchange rate regimes that the former countries apply. In other words, the significance of the corporate tax differential for intra-industry trade indicates that fiscal policy considerations could play a role in promoting a faster convergence process toward the EU trade structure. Furthermore, for both groups of countries unit labour costs and their interplay with the influx of foreign direct investments are negative drivers of IIT. These findings in the baseline specifications are echoed by results from a fractional response model, which underlines the considerable quantitative effects of the variables.

Still, there is considerable variation between the EU candidate countries and potential candidates on the one hand and the new EU Member States on the other hand. Namely, whereas the trade competitiveness of the former group of countries with the EU15 is affected by FDI and institutional quality as well as the distance in stock of physical capital, none of these factors appear to play a salient role in explaining IIT between NMS and EU15 countries. Our analysis shows that corruption perception plays a critical role in hampering trade integration of CCPC into the EU. The disaggregated analysis of vertical versus horizontal IIT reveals more important distinctions between the explanatory variables and in particular the importance of highly innovative and qualitative goods for intra-industry trade competitiveness.

The results offer interesting and potentially important insights for policy-makers in CESEE countries. The notion that macroeconomic imbalances are detrimental to long-term economic performance of countries is reinforced in terms of their effects on trade diversification. The increasing role of institutional quality on IIT also warrants further attention from both policy-makers and researchers alike.

[63] See Meunier and Nicolaidis (2006).

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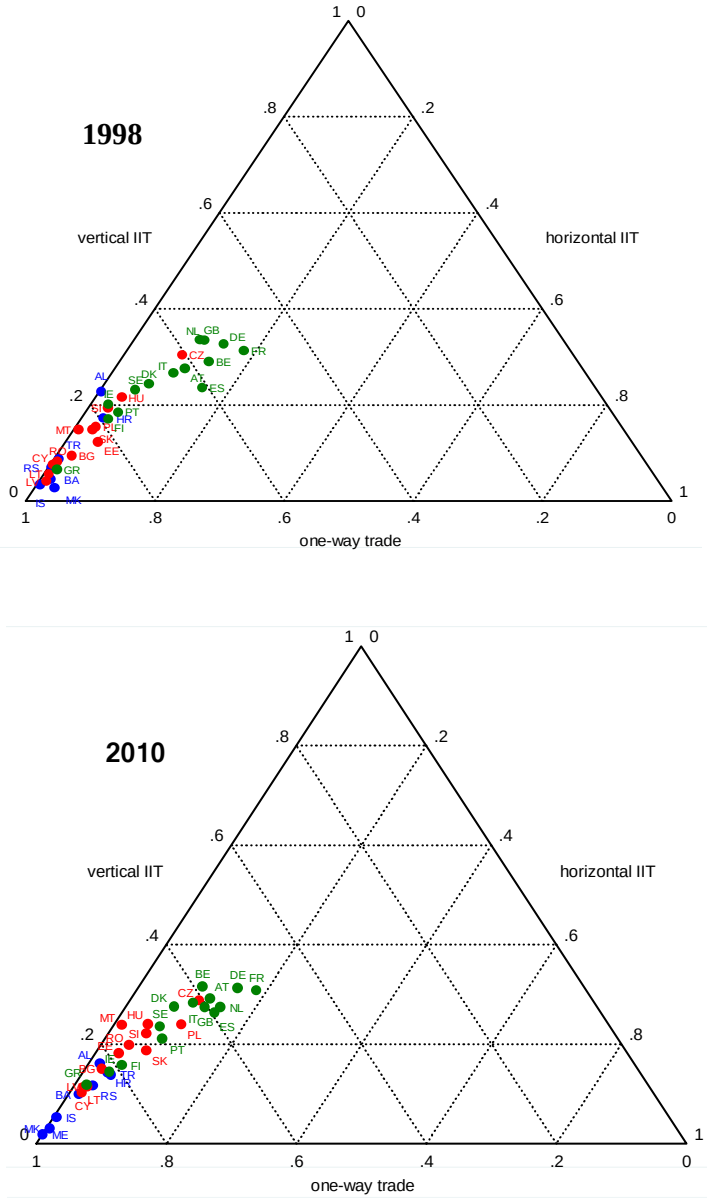
Figure 1a – Developments in bilateral trade modes between individual European countries and the EU15



Note: Blue dots indicate candidate countries and potential candidates (CCPC), red dots are the new member states (NMS) and the green dots represent the EU15 block countries. The horizontal lines intersecting the triangles indicate the level of vertical IIT, for example France (FR) in 1998 had around one-third of its trade in vertical IIT with the EU15. The one-way trade is revealed drawing a negatively sloping parallel line from the base of the triangles, hence France in 1998 had half of its trade with the EU15 of inter-industry one-way nature. Similarly for the horizontal IIT parallel lines have to be drawn from the right hand side to the dot representing a country, hence France in 1998 had almost 20% of trade in horizontal, similar quality, IIT.

Figure 1b. Horizontal and Vertical IIT levels in CESEE countries in 2010

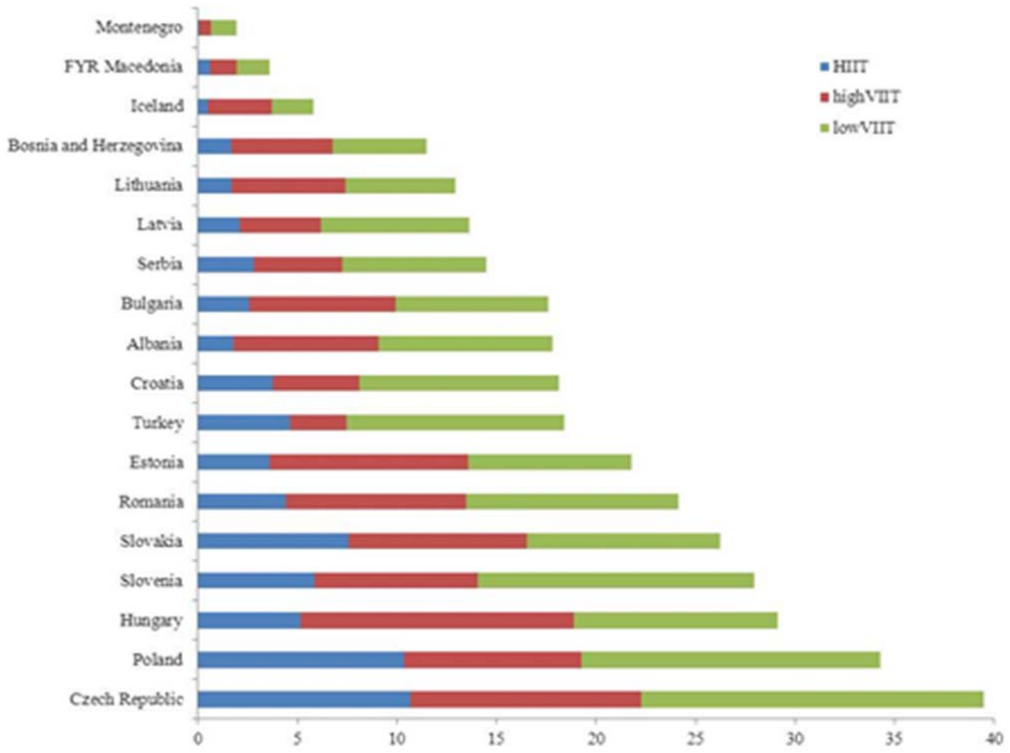
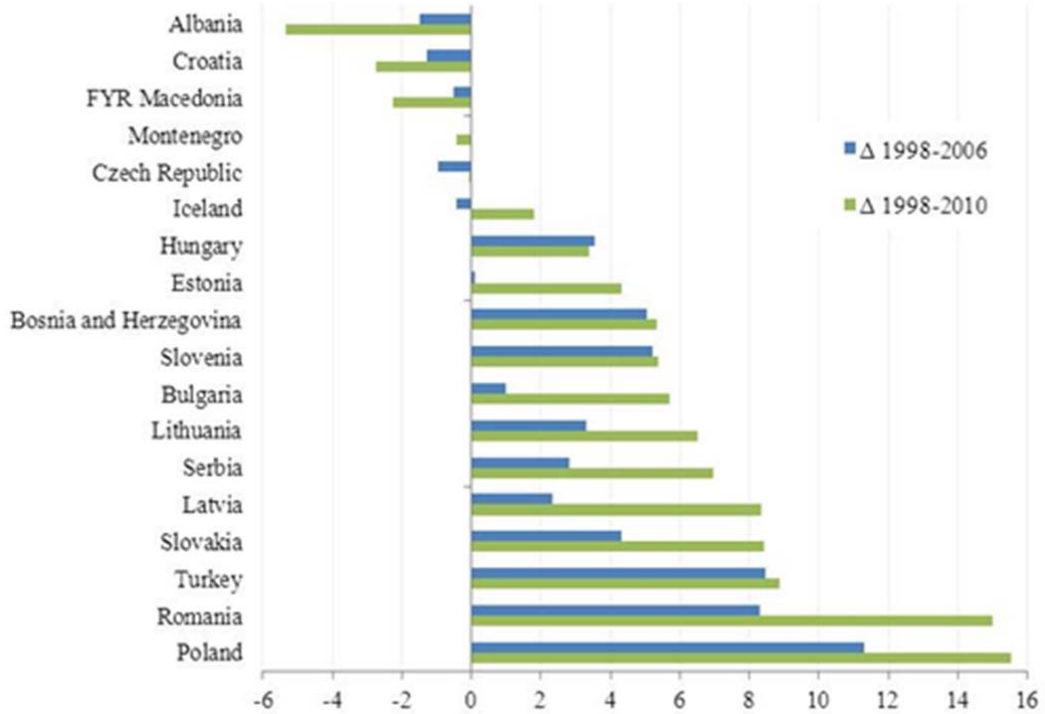
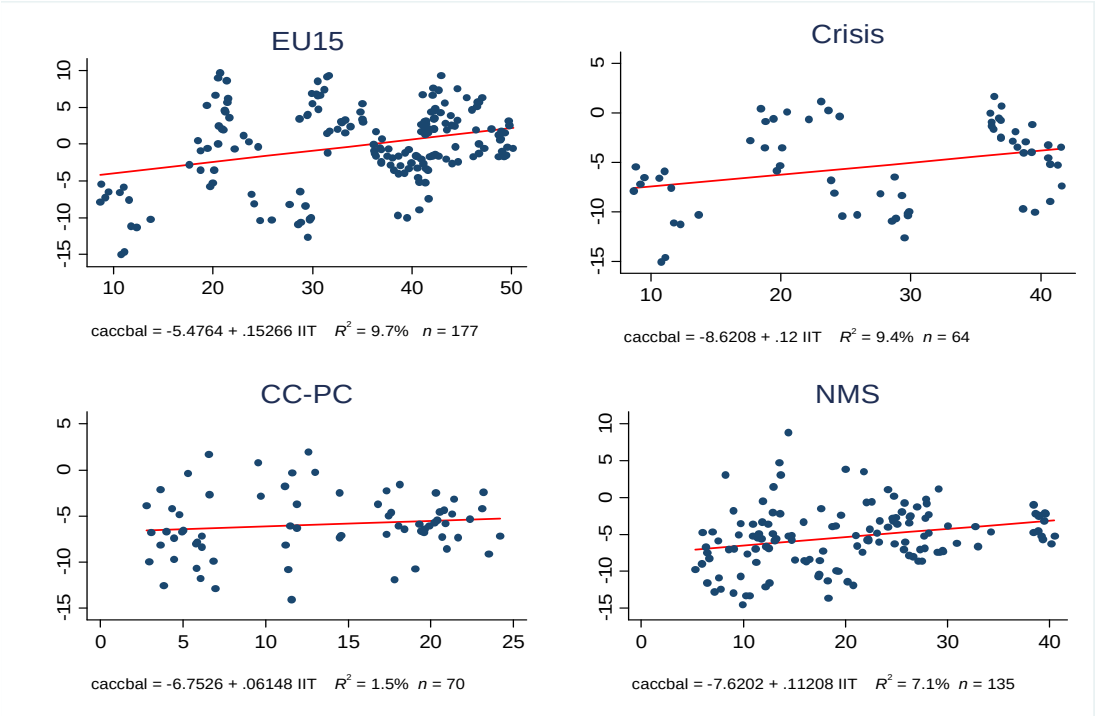


Figure 1c. Overall changes in IIT levels in CESEE countries



Note: Simple differences between first and last year of the two periods are showed. The difference between these two periods could be used as a proxy for the change since the crisis.

Figure 2 – Current Account Balance and Intra-Industry Trade with EU15, 1998-2010



Note: On the horizontal axis we show bilateral IIT figures between each country in the group and the respective partner in the EU15 block. The vertical axis is the current account balance. The group of Crisis countries is composed by Greece, Ireland, Italy, Portugal and Spain.

Table 1. Emerging Europe's IIT with the EU15 (Grubel-Lloyd Index 1998-2010)

		Mean	S.E.	Minimum	Maximum
EU12	Bulgaria	13.5%	1.9	11.4%	17.6%
	Cyprus	11.8%	2.6	8.3%	16.5%
	Czech Republic	39.2%	0.6	38.4%	40.5%
	Estonia	18.4%	2.2	14.4%	21.8%
	Hungary	27.8%	1.4	25.7%	29.6%
	Latvia	8.2%	2.9	5.3%	14.4%
	Lithuania	9.7%	2.3	6.4%	13.5%
	Malta	19.3%	5.3	11.2%	26.8%
	Poland	27.3%	4.8	18.7%	34.2%
	Romania	15.7%	4.7	9.1%	24.1%
	Slovakia	22.0%	2.4	17.8%	26.2%
	Slovenia	26.0%	1.7	22.6%	28.2%
CCPC	Albania	20.9%	2.4	16.2%	24.2%
	Bosnia-Herzegovina	9.8%	2.9	5.9%	13.6%
	Croatia	19.8%	1.4	17.3%	21.4%
	FYR Macedonia	5.2%	2.6	2.8%	11.1%
	Montenegro	1.8%	0.4	1.3%	2.4%
	Serbia	10.4%	2.4	7.4%	14.6%
	Turkey	15.5%	3.4	9.6%	20.2%

Table 2. Descriptive statistics for CCPC and NMS countries.

Candidates & Potential Candidates	Obs.	Mean	*Std. Dev.*	Min	Max
IIT with EU15 (%)	96	11.84	*6.73*	1.30	24.17
ULC (diff with EU15)	104	0.15	*0.12*	-0.27	0.33
Wage Share (diff EU15)	104	0.13	*0.45*	-3.73	0.33
Inflation (%)	104	12.69	*22.46*	-1.58	137.96
Net FDI inflow (% GDP)	88	6.21	*7.28*	0.31	36.88
Ln(Capital stock/ GDP) (diff EU15)	102	0.29	*0.32*	-0.41	1.53
Corporate taxation (diff EU15)	104	11.28	*6.55*	-6.05	21.41
PTA	104	0.63	*0.48*	0	1
FTA	104	0.42	*0.50*	0	1
FX regime	104	8.07	*4.29*	1	14
Corruption perception (diff EU15)	104	3.70	*2.16*	-2	6.30
Democracy (diff EU15)	83	3.15	*2.93*	0.92	15.92

New Member States	Obs.	Mean	*Std. Dev.*	Min	Max
IIT with EU15 (%)	156	19.91	*9.18*	5.28	40.47
ULC (diff with EU15)	143	0.04	*0.06*	-0.12	0.13
Wage Share (diff EU15)	143	0.05	*0.05*	-0.09	0.15
Inflation (%)	156	5.96	*8.11*	-3.71	55.22
Net FDI inflow (% GDP)	142	6.20	*7.65*	-32.88	52.05
Ln(Capital stock /GDP) (diff EU15)	156	0.07	*0.16*	-0.55	0.48
Corporate taxation (diff EU15)	156	7.79	*6.06*	-8.46	19.70
EU Member	156	0.5	*0.50*	0	1
FTA	156	0.42	*0.50*	0	1
FX regime	156	6.83	*3.55*	1	14
Corruption perception (diff EU15)	143	2.85	*1.09*	0.69	4.93
Democracy (diff EU15)	143	0.63	*0.84*	-0.08	3.92

Table 3. Determinants of IIT for CESEE

	CCPC			*New Member States*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GMM	GMM	GMM	GMM	GMM	GMM	GMM
LT(IIT) Lag(-1)	0.461***	0.516***	0.435***	0.411**	0.411**	0.414**	0.494**
	(0.125)	(0.133)	(0.056)	(0.203)	(0.206)	(0.202)	(0.202)
ULC, diff EU15	0.951			-0.114			
	(0.641)			(0.698)			
FDI/GDP	-0.013**	0.226***	0.294***	0.002	-0.099*	-0.072	-0.084
	(0.005)	(0.085)	(0.076)	(0.006)	(0.058)	(0.060)	(0.056)
FDI*ULC, diff EU15	-0.005			-0.007			
	(0.119)			(0.047)			
Ln(K.Stk/GDP)diffEU15	-0.373*	-0.569***		0.007	0.169		
	(0.222)	(0.158)		(0.273)	(0.265)		
FDI*Ln(K.Stk/GDP)	0.018*	0.053**		-0.005	-0.024		
	(0.010)	(0.025)		(0.034)	(0.033)		
Corp.Tax, diff EU15	0.013**	0.013**	0.023**	0.004	0.005*	0.008**	0.009**
	(0.007)	(0.007)	(0.011)	(0.003)	(0.003)	(0.004)	(0.004)
W/GDP, diff EU15		1.467	0.708		-0.339	-0.843	-0.896
		(1.173)	(0.566)		(0.930)	(0.807)	(0.835)
Deflator		-0.327***	0.947***		-1.021**	-1.155*	-1.22**
		(0.119)	(0.308)		(0.513)	(0.622)	(0.591)
FDI*W/GDP,diff EU15		0.046	0.053*		0.017	0.003	0.009
		(0.060)	(0.032)		(0.025)	(0.015)	(0.018)
FDI*Deflator		-0.196**	-0.252***		0.109	0.071	0.087
		(0.077)	(0.061)		(0.068)	(0.061)	(0.058)
FTA (EU member)			-0.199***			-0.128**	0.060*
			(0.073)			(0.062)	(0.033)
XR Regime			0.115***			0.015***	0.015***
			(0.034)			(0.004)	(0.004)
Corruption, diff EU15			-0.208***			-0.006	-0.009
			(0.038)			(0.027)	(0.022)
Democracy, diff EU15			0.014			-0.024	-0.024
			(0.019)			(0.039)	(0.039)
Intercept	-1.244***	-0.792***	-2.523***	-0.812**	0.122	0.352	0.375
	(0.339)	(0.301)	(0.714)	(0.320)	(0.482)	(0.611)	(0.588)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test	.000***	.000***	.002***	.000***	.000***	.000***	0.000***
SW -Test	.000***	.000***	.000***	.000***	.000***	.000***	0.000***
Sargan Test	0.206	0.336	0.183	0.623	0.679	0.594	0.587
BIC	203.82	210.39	148.97	235.00	242.32	207.70	210.26
AB Test - 1st order	0.029**	0.024**	0.024**	0.117	0.120	0.105	0.104
AB Test - 2nd order	0.089*	0.835	0.855	0.323	0.300	0.352	0.334
AB Test - 3rd order	0.370	0.837	0.367	0.264	0.246	0.235	0.237
Observations	73	73	62	110	110	106	118
N. of countries	8	8	7	11	11	11	11

Note: p<0.1*, p<0.05**, p<0.01***.Coefficients: Std. Errors in parentheses robust with respect to serial correlation and heteroscedasticity. F-Test, p-values for joint significance of time fixed effects under Ho: no joint effect of time fixed effects. SW (Shapiro-Wilk) test for normality of residuals, p-values reported under Ho: residuals are normally distributed. Sargan Test for over-identifying restrictions, p-values reported under Ho: the instruments as a group are exogenous. AB (Arellano-Bond) test for autoregressive residuals of 1st, 2nd or 3rd order, reported p-values for Ho: no serial correlation.

Table 4. Pooled Fractional Response Model and the APEs for CCPC and NMS

	Candidates and Potential Candidates				*New Member States*			
Dep. Var.:	*Pooled*	*APE*	*Pooled*	*APE*	*Pooled*	*APE*	*Pooled*	*APE*
IIT with EU15	*QMLE*		*QMLE*		*QMLE*		*QMLE*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IIT Lag(-1)	2.694***	0.741***	1.898***	0.555***	1.601**	0.475**	1.600**	0.481**
	(0.609)	(0.065)	(0.625)	(0.079)	(0.688)	(0.211)	(0.622)	(0.189)
FDI /GDP	0.092**	0.025***	0.088***	0.025***	-0.054	-0.016	-0.031	-0.009
	(0.045)	(0.007)	(0.033)	(0.005)	(0.040)	(0.014)	(0.038)	(0.012)
Ln (K.Stk/GDP)	-0.319***	-0.088***			-0.042	-0.012		
	(0.089)	(0.025)			(0.175)	(0.046)		
FDI*Ln (K.Stk/GDP)	0.023**	0.006			0.005	0.001		
	(0.011)	(0.004)			(0.021)	(0.006)		
Corp. Tax, diff EU15	0.006*	0.002**			0.002*	0.001		
	(0.004)	(0.001)			(0.001)	(0.001)		
W/GDP, diff EU15	0.467	0.129	-0.566***	-0.166***	-0.216	-0.064	-0.341	-0.102
	(0.527)	(0.091)	(0.195)	(0.031)	(0.548)	(0.155)	(0.487)	(0.138)
Deflator	-0.218**	-0.060	0.007	0.002	-0.282	-0.084	-0.356	-0.107
	(0.102)	(0.056)	(0.097)	(0.038)	(0.298)	(0.087)	(0.331)	(0.114)
FDI* W/GDP	0.007	-0.002	0.002	0.000	-0.008	-0.002	-0.016*	-0.005
	(0.022)	(0.003)	(0.010)	(0.002)	(0.016)	(0.006)	(0.009)	(0.003)
FDI*Deflator	-0.089**	-0.025**	-0.093***	-0.027***	0.046	0.014	0.179	0.005
	(0.044)	(0.009)	(0.029)	(0.004)	(0.040)	(0.013)	(0.035)	(0.012)
FTA			-0.119***	-0.035***			-0.060**	-0.018
			(0.032)	(0.005)			(0.030)	(0.013)
Float XR Regime			0.038***	0.011***			0.012***	0.004**
			(0.012)	(0.002)			(0.003)	(0.002)
Corruption, diff EU15			-0.091**	-0.027***			0.006	0.002
			(0.037)	(0.008)			(0.017)	(0.006)
Log pseudolikel.	-20.12	-	-20.11		-40.42	-	-39.39	-
AIC	0.670	-	0.669		0.826	-	0.837	-
BIC	-324.99	-	-325.01		-537.76	-	-514.98	-
Observations	81	81	81	81	118	118	118	118
N. of clusters	8	8	8	8	11	11	11	11

Note: ***p<0.01, **p<0.05, *p<0.10, Standard errors in parentheses, robust to general second moment misspecification, conditional variance and serial correlation. All models have time dummies from 1999 to 2010. All models are estimated with pooled Bernoulli QMLE and have time averages of the explanatory variables except the interaction terms and the dummies for trades agreements and EU membership. The standard errors for the APE are obtained with 500 bootstrap replications.

Table 5. Determinants of Vertical and Horizontal IIT for CCPC and NMS

	Candidates and Potential Candidates				*New Member States*			
	Horizontal	*Vertical*	*V-Low*	*V-High*	*Horizontal*	*Vertical*	*V-Low*	*V-High*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag HIIT	-0.028				-0.134			
	(0.035)				(0.164)			
Lag VIIT		0.247***				0.519***		
		(0.061)				(0.145)		
Lag VIIT L			0.166				0.441**	
			(0.139)				(0.186)	
Lag VIIT H				-0.133				0.329***
				(0.129)				(0.052)
FDI/GDP	-0.488**	0.588***	0.432**	0.867***	-0.117	-0.065	0.019	-0.118
	(0.193)	(0.115)	(0.177)	(0.262)	(0.157)	(0.067)	(0.068)	(0.171)
Ln (K.Stock)	0.559	-1.415***	-0.844	-1.183	-0.299	-0.062	-0.179	-0.167
	(0.926)	(0.533)	(0.956)	(0.799)	(0.531)	(0.250)	(0.402)	(0.337)
FDI*lnKStk	-0.058	0.131***	0.012	0.369***	-0.035	0.004	0.034	-0.007
	(0.120)	(0.045)	(0.093)	(0.095)	(0.067)	(0.027)	(0.052)	(0.046)
Corp. Tax	0.015	0.028**	0.023	0.021	0.046***	0.001	0.006	-0.001
	(0.014)	(0.012)	(0.015)	(0.021)	(0.015)	(0.003)	(0.006)	(0.006)
W/GDP	-1.630	0.539	1.385	-3.452***	0.916	-1.061	-2.189***	0.455
	(1.581)	(0.735)	(1.221)	(1.212)	(1.530)	(0.647)	(0.828)	(0.819)
Deflator	0.276	0.936**	1.811	-0.596	-3.451*	-0.456	-0.165	-0.359
	(0.564)	(0.408)	(1.144)	(1.567)	(1.886)	(0.507)	(0.874)	(1.869)
FDI*W/GDP	-0.152	0.037*	0.032	-0.088**	0.062	-0.014	-0.053**	0.040
	(0.093)	(0.022)	(0.025)	(0.041)	(0.050)	(0.018)	(0.027)	(0.037)
FDI*Deflator	0.362	-0.592***	-0.400**	-1.030***	0.158	0.051	-0.057	0.141
	(0.238)	(0.123)	(0.199)	(0.295)	(0.180)	(0.070)	(0.075)	(0.190)
FTA	-0.584***	-0.083	-0.168	0.222	-0.339*	-0.131	-0.231	0.048
	(0.113)	(0.099)	(0.210)	(0.253)	(0.178)	(0.092)	(0.231)	(0.220)
Float XR	0.019	0.104***	0.100*	0.058	0.035***	0.014***	0.020**	0.008
	(0.044)	(0.035)	(0.057)	(0.067)	(0.011)	(0.005)	(0.009)	(0.007)
Corruption	0.144	-0.372***	-0.145	-0.313*	0.058	-0.030	-0.114**	0.096*
	(0.164)	(0.100)	(0.176)	(0.181)	(0.092)	(0.023)	(0.049)	(0.050)
Democracy	-0.041	0.110***	0.139	0.084	-0.004	-0.004	-0.057	0.049
	(0.073)	(0.035)	(0.089)	(0.096)	(0.043)	(0.043)	(0.046)	(0.050)
Intercept	-4.508**	-1.710***	-4.670**	-1.729	-1.011	-0.152	-0.549	-1.979
	(1.995)	(0.560)	(1.824)	(1.849)	(1.913)	(0.652)	(1.232)	(1.861)
Time Fix Eff	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test	.000***	.000***	.001***	.000***	.000***	.000***	.000***	.000***
SW -Test	.000***	.086*	.168	.000***	.000***	.000***	.001***	.000***
Sargan Test	0.540	0.010**	0.650	0.218	0.427	0.219	0.130	0.156
BIC	264.52	151.50	254.94	279.76	381.95	187.31	267.34	283.23
AB Test - 1st	0.034**	0.191	0.032**	0.043**	0.024**	0.013**	0.011**	0.040**
AB Test - 2nd	0.293	0.567	0.036**	0.104	0.188	0.913	0.396	0.024**
AB Test - 3rd	0.185	0.394	0.078*	0.264	0.134	0.474	0.350	0.090**
Observations	62	62	62	62	106	106	106	106
N. countries	7	7	7	7	11	11	11	11

Note: p<0.1*, p<0.05**, p<0.01***Std. Errors in parentheses robust with respect to serial correlation and heteroscedasticity. F-Test, p-values for joint significance of time fixed effects under Ho: no joint effect of time fixed effects. SW (Shapiro-Wilk) test for normality of residuals, p-values reported under Ho: residuals are normally distributed. Sargan Test for over-identifying restrictions, p-values reported under Ho: the instruments as a group are exogenous. AB (Arellano-Bond) test for autoregressive residuals of 1st, 2nd or 3rd order, reported p-values for Ho: no serial correlation.

Table 6. Multicollinearity: variance inflation factors

Candidate countries and Potential Candidates		
Variable	*VIF*	*1/VIF*
Float XR	3.40	0.294
FTA	2.61	0.384
Corp. Tax	2.32	0.430
W/GDP, diff EU15	1.91	0.526
FDI/ GDP	1.71	0.585
Democracy	1.69	0.593
ln(K.Stk/GDP), diff EU15	1.53	0.655
Corruption	1.30	0.771
Deflator	1.23	0.813
Mean VIF	3.11	

New Member States		
Variable	*VIF*	*1/VIF*
FTA	33.39	0.030
EU Member	32.30	0.031
Corruption	2.27	0.440
Float XR	1.79	0.557
ln(K.Stk/GDP), diff EU15	1.78	0.561
W/GDP, diff EU15	1.51	0.661
Corp. Tax	1.43	0.698
Democracy	1.24	0.803
Deflator	1.13	0.882
FDI/ GDP	1.12	0.893
Mean VIF	7.35	

Table 7. Dynamic Estimates of Current Account Balance on IIT with EU15

Dependent Variable:	*Total IIT*		*Horizontal IIT*		*Vertical IIT*	
Current Acc.Balance	*(CCPC)*	*(NMS)*	*(CCPC)*	*(NMS)*	*(CCPC)*	*(NMS)*
Lag Current Acc. Balance	0.430**	0.469***	0.484***	0.475***	0.410**	0.465***
	(0.174)	(0.106)	(0.168)	(0.113)	(0.182)	(0.112)
IIT EU15	67.782***	61.261***				
	(11.159)	(20.337)				
Horizontal IIT EU15			13.368	19.114		
			(31.862)	(29.671)		
Vertical IIT EU15					64.789***	66.940***
					(15.701)	(25.222)
W/GDP, diff EU15	9.832	-32.613**	12.571	-28.719	12.511	-23.471*
	(15.147)	(14.029)	(13.625)	(21.054)	(11.993)	(13.153)
Deflator	18.553***	-37.038***	18.728***	-45.384***	18.710***	-45.097***
	(5.199)	(10.661)	(5.773)	(11.501)	(4.969)	(11.893)
FDI/GDP	4.884	2.533	7.345***	2.085	4.830	2.799
	(3.143)	(2.147)	(2.466)	(2.385)	(3.003)	(2.017)
Ln(K.Stk/GDP), diff EU15	-8.036	-3.743	-14.520*	-3.519	-6.309	-2.902
	(8.886)	(8.878)	(7.806)	(9.699)	(8.806)	(8.265)
FDI*W/GDP	1.398	1.217**	1.348*	1.312**	1.531**	1.430***
	(0.915)	(0.584)	(0.788)	(0.654)	(0.755)	(0.482)
FDI*Deflator	-3.463	-1.671	-6.158***	-1.155	-3.196	-1.759
	(3.225)	(2.355)	(2.250)	(2.510)	(3.058)	(2.199)
FDI*Ln(K.Stk/GDP)	0.595	0.437	1.470	0.247	0.348	0.243
	(1.286)	(0.935)	(0.996)	(1.055)	(1.276)	(0.892)
Corp. Tax	-0.183	-0.027	-0.025	0.024	-0.151	0.039
	(0.135)	(0.121)	(0.120)	(0.108)	(0.118)	(0.101)
FTA	-1.792	0.532	-2.530*	-0.660	-2.822**	-0.125
	(1.319)	(2.162)	(1.397)	(2.235)	(1.190)	(2.254)
Float XR Regime	0.227	0.343**	0.775	0.424**	0.383	0.366*
	(0.340)	(0.164)	(0.499)	(0.186)	(0.286)	(0.192)
Corruption, diff EU15	1.610	0.360	-0.128	0.333	1.723	0.604
	(2.566)	(0.701)	(2.645)	(0.772)	(2.654)	(0.728)
Democracy, diff EU15	-0.296	0.808	0.279	0.311	-0.435	1.013*
	(0.653)	(0.567)	(0.631)	(0.701)	(0.756)	(0.572)
Intercept	-40.488***	19.377	-31.778*	39.831***	-41.808***	28.477**
	(13.271)	(12.254)	(17.737)	(12.141)	(13.111)	(14.060)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
F-Test	.000***	.000***	.002***	.000***	.000***	.000***
SW -Test	.428	.000***	.028**	.000***	.068*	0.000***
Sargan Test	0.538	0.154	0.571	0.048**	0.574	0.182
BIC	499.69	838.65	508.56	841.85	501.91	840.94
AB Test - 1st order	0.016**	0.046**	0.016**	0.048**	0.015**	0.045**
AB Test - 2nd order	0.105	0.814	0.145	0.741	0.150	0.919
AB Test - 3rd order	0.071*	0.116	0.134	0.105	0.098*	0.154
Observations	60	105	60	105	60	105
Number of ccodecow	7	11	7	11	7	11

Note: p<0.1*, p<0.05**, p<0.01***.Coefficients: Std. Errors in parentheses robust with respect to serial correlation and heteroskedasticity. F-Test, p-values for joint significance of time fixed effects under Ho: no joint effect of time fixed effects. SW (Shapiro-Wilk) test for normality of residuals, p-values reported under Ho: residuals are normally distributed. Sargan Test for over-identifying restrictions, p-values reported under Ho: the instruments as a group are exogenous. AB (Arellano-Bond) test for autoregressive residuals of 1st, 2nd or 3rd order, reported p-values for Ho: no serial correlation.