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# European Integration, Labour Market Dynamics and Migration Flows

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## Abstract

The paper has two objectives. Firstly, we wish to evaluate whether a greater economic integration has effects, and of what type, on migration flows from Central and Eastern Europe (New Member States of the EU, NMS) towards the fifteen countries of the European Union (EU-15). Secondly, we wish to understand what effect the migration flows from the NMS have on the labour market of the receiving countries in the EU-15. The most suitable theoretical context that seems to summarise European labour market characteristics is that of the insider/outsider model by Layard, Nickell and Jackman (Layard *et al.*, 1991). We have modified the above mentioned model by introducing two innovations. Firstly, we constructed three measures that act as a proxy for economic integration: the Intra Regional Trade Index (IRTI), Global Trade Index (GTI) and Financial Market Integration (FMI). Then we placed the three indicators into the insider/outsider model to arrive at a modified version of Layard, Nickell and Jackman (Layard *et al.*, 1991). The second innovative contribution was the introduction of an equation modelling migration flows. The creation of this equation is inspired by the neo-classical approach to migration theory (Harris-Todaro, 1970). The theoretical model, based on rational expectations, has been solved to find the equilibrium solution and the impact multipliers. We then carried out an empirical analysis, which involved estimating a Structural Vector Autoregression Model (SVAR). The aim of this estimation was to evaluate, on the one hand, the effect that greater European integration (a positive shock to the integration indicators) has on migration flows, and, on the other, to measure the type of effect that migration flows could have on the labour market of the EU-15 countries, considered as a single entity. The results of our empirical evidence show that economic integration does generate significant effects on migration flows from the enlargement countries towards the EU-15 countries. It also emerges that migration flows do generate an effect on the European labour market.

JEL Classification: B22, F15, J61

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## 1. Introduction

During the last few decades, trends in the Western European labour market have been characterised by two factors. The first is the high level of unemployment persistence, while the second is the sluggish disinflation process that accompanies rising unemployment. On the contrary, the US and UK have experienced a more cyclical evolution of unemployment and a lower price stickiness. These facts have stimulated an intense debate amongst economists on the causes of unemployment, its persistence and on its cross-country differentials. The problem of persistence can be interpreted, together with inflation stickiness, as signalling a shift in the NAIRU. Consistent with this view, many studies have interpreted unemployment as being structural, underlining the relevance of labour market rigidities and the intrusive role of institutions. A natural evolution of this phenomenon (defined as Eurosclerosis) emphasizes the relevance of long run unemployment and considers institutional rigidities and trade union activities as a cause of the hysteresis mechanisms that can prolong indefinitely the effects, that

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would otherwise be temporary, of aggregate demand shocks<sup>2</sup>. This work lays inside this extensive literature. The objective is to analyse the type of effect that a greater economic integration of the EU-15 countries generates on migration flows from the enlargement countries. The question we want to address is whether greater economic integration renders the countries of the EU-15 more attractive for the populations of the NMS. Furthermore, we want to evaluate what effect migration has on the labour market of the EU-15 countries, considering them, however, as a single, combined entity.

Economic literature dealing with the potential consequences of global and regional economic integration has displayed a consistent development beginning in the second half of the twentieth-century. Economic integration is perceived as an important factor for growth, and, as a result, in literature we find different theoretical and empirical research regarding the impact of economic integration on growth (Balassa, 1961; Baldwin, 1993 and 1995; Henrekson *et al.*, 1997; Landau, 1995; Walz, 1998; Badinger, 2001 and 2005; Yanikkaya, 2002; Gao, 2005; Bussière *et al.* (2008)). The contribution of this literature is to emphasise the different channels through which the process of economic integration generates an impact on economic growth. The most important channels can be summarised as: internal and external economies of scale, faster technological progress, increased competitiveness, reduced uncertainty, lower costs of capital and a more favourable environment for economic activity. One of the most controversial areas of this literature is the distinction between permanent and temporary growth effects. In the neo-classical theory of growth, economic integration does not affect the growth rate at a steady state. Economic integration, therefore, has only temporary effects. Under certain conditions the effects of permanent growth are possible in the endogenous growth theory, although they depend on the ability to disclose knowledge at an international level. If this condition is maintained economic integration leads to a scale effect in research and development that can then lead to permanent growth effects enabling a reallocation of intersectoral and international effects.

From the literature review of economic integration it emerges that there are no similar studies to those related to the impact of integration on economic growth for the labour market, except for some contributions dealing with the relationship between economic integration and regional labour market dynamics (Blanchard and Katz, 1992; Decressin and Fatás, 1995; Fatás, 1998, Alecke *et al.*, 2009). Among the most relevant aspects emerging from the studies on the link between economic integration and the labour market we find labour mobility and competition in the product market. These phenomena are often perceived as necessary factors to make the labour market flexible. Since labour is less mobile in Europe (Fertig and Schmidt, 2002; Puhani, 1999 and 2001; Nahuis and Parikh, 2004; Ederveen, Nahuis and Parikh, 2005 and 2007), the effects of integration on the labour market are seen through the integration of the product market. The issues of economic integration and labour mobility are also analysed from another

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<sup>2</sup> The traditional structure for the analysis of hysteresis is the insider/outsider model, whose basic assumptions are: imperfect competition in both the product and the labour market, existence of a trade union and wage negotiation, possibility of partial/total hysteresis and natural level unemployment in the long run. In literature there have been many other attempts to analyse the role of interactions between shocks and institutions, without considering the insider/outsider structure.

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point of view, taking into consideration expected migration flows from Eastern and Central European countries, in the enlargement phase, and their impact on the labour markets of the member states (Fertig, 2001; Fertig and Schimdt, 2002; Boeri and Brücker, 2001 and 2005; Dustmann *et al.*, 2005 and 2007; Drinkwater *et al.*, 2006; Manacorda *et al.*, 2006; Lemos and Portes, 2008). For example, Fertig (2001), Fertig and Schimdt (2002) and Lemos and Portes (2008) analyse migration flows inside Germany after the enlargement using different models and estimation approaches. These papers conclude that expected migration flows from the enlargement countries towards Germany are moderate. Boeri and Brücker (2001 and 2005), instead, study the impact of the European Union (EU) enlargement on the labour markets of the member states focusing on trade, foreign direct investments and migration. The principal conclusion of the paper is that it is improbable that capital movements are unlikely to lead to a levelling-off of prices, especially of wages. Another aspect that emerges from the literature considers the relationship between European integration and unemployment. Blanchard and Wolfers (2000) verify that high European unemployment can be attributed to the interaction between unfavourable macroeconomic policies and real labour market rigidities. The authors analyse the interdependence of shocks like a reduction in growth of total factor productivity, higher real interest rates and adverse shifts in demand together with institutional rigidities, such as the generous insurance system covering European unemployment. Other authors analyse empirically the process of wage formation among the EU member states (Blanchflower and Oswald, 1994, 2005; Wagner, 1994; Baltagi and Blien, 1998 and Baltagi *et al.*, 2007). Their results show that economic integration changes labour market structures, leading to wage convergence and to a stronger wage interdependency (Andersen *et al.*, 2000 a and b). A theoretical contribution by Gruener and Hefeker (1999) analyses how the European Monetary Union will change the behaviour of trade unions in wage determination. Each of these contributions evaluates different aspects of the link between economic integration and labour market. However, a rigorous quantitative analysis of the impact of greater labour market integration has been omitted. An innovative paper in this sense is by Fertig (2003) that analyses the relationship between economic integration and employment in Europe, by constructing an economic integration measure to observe the macroeconomic developments of the labour market. The most important evidence that emerges from the study by Fertig (2003) can be summarised in three main points. First, he finds that the integration impact on the long term employment level does not seem statistically significant in all member states, whereas it results in being positive in the Southern enlargement countries (Greece, Spain and Portugal). Second, he observes that short run fluctuations in the integration measure do not have a substantial role in the explanation of relative employment levels. Finally, a greater integration tends to increase unemployment levels in the long run in the existing EU member states except for Southern enlargement countries.

The literature concerning European economic integration offers several contributions that evaluate different aspects of the relationship between economic integration, the labour market and labour mobility, whereas a quantitative analysis of the impact of higher integration on the labour market in European countries has not provided significant results yet. This paper has two objectives. First, we want to evaluate the effect that the greater economic integration has on migration flows moving from the

Eastern European enlargement countries towards the countries of the EU-15<sup>3</sup>, (considered as a single entity or bloc, rather than individually); second, we want to understand if the migration flows have any type of effect on employment, real wages and the labour force in the labour markets of the receiving countries (again, considered as an entire entity rather than individual countries). To conduct this analysis we consider the three fundamental aspects of economic integration, labour markets and migration flows from the enlargement<sup>4</sup> countries towards the EU-15 countries. Economic integration can be observed in different phenomena such as real, monetary and financial integration. These phenomena include business cycle synchronization, inflation rate convergence, exchange rate variability, interest rate convergence, trade openness, trade integration and convergence of income. This paper focuses on three of these phenomena in order to have two measures of real integration and one of monetary integration. We adopt a two step approach considering firstly three integration indicators that are included in a model which explains labour market trends. The basic hypothesis of our theoretical model is that of a labour market characterised by insider/outsider mechanisms with the presence a monopolistic trade union. The major innovations are the introduction of three economic integration measures and of migration flows that are modelled coherently with the neo-classical approach of the migration theory. The second step considers the estimation of a Structural Vector Autoregression Model (SVAR) used to evaluate the impact that shocks to integration indicators can have on migration flows towards EU-15 countries, and what effect migration has on certain labour market variables. From the empirical analysis it emerges that greater economic integration generates positive effects on the migration flows towards the EU-15. It is plausible to think that this is tied to the fact that economic integration renders the countries of the EU-15 more attractive. Furthermore, we observe that migration has a positive effect on the labour market of the receiving countries, in particular on employment and the labour force.

The structure of this paper is as follows: Section 2 describes migration trends among the EU-27 countries. Section 3 presents the integration indicators, the theoretical model which we refer to and the relative equilibrium solution. Section 4 is dedicated to a detailed report on the empirical evidence. Section 5 concludes.

## **2. Economic Integration and Migration to European Union: Some Facts**

Migration is a complex phenomenon on which a wide literature has developed, beginning in the second half of the eighteenth century (Ravenstein, 1885). For this reason it is helpful to classify the research conducted on this subject. There are three relevant aspects that emerge. The first is in relation to the spatial context of migration flows and on this basis we can distinguish between international migration and internal

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<sup>3</sup> The EU-15 countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy Luxembourg, the Netherlands, Portugal, United Kingdom, Spain and Sweden.

<sup>4</sup> As Enlargement countries we mean those 10 that entered in the EU in 2004, including Bulgaria and Romania (entered in 2007), such as: Bulgaria, Cyprus, Czech Republic, Hungary, Malta, Poland, Romania, Slovakia, Estonia, Latvia, Lithuania and Slovenia

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migration. Studies on international migration focus on the movement of people between different countries, while studies on internal migration consider the reallocation of people within national borders. The second aspect is based on the distinction between a microeconomic and macroeconomic approach. The former analyses the decision making process of a single individual, while the latter concentrates on the role played by the principal macroeconomic variables. The third aspect regards the objective of the research, which can be to identify the determinants of migrations or to explore the consequences of migration. (Greenwood, 1985 and 1997; Levine *et al.*, 2003; Chusing and Poot, 2004; Heikkilä *et al.*, 2006).

This paper, following a macroeconomic approach, wants to identify the consequences that migration flows have on the labour markets of the EU-15. The hypothesis is that the EU-15 is integrated and therefore we can consider it as a single entity. In fact, from the literature concerning European integration it emerges that the Treaty of Rome sanctioned the formation of a common market in which the free movement of people, goods, services, and capital would be permitted. With the passage of time the integration project has created a single market for goods and capital, but the free movement of people remains a problem in the integration process, which is demonstrated by a very low level of migration. In Europe the debate regarding migration policy is more passionate than in the US. Radical positions in Europe<sup>5</sup> are in general more widespread than in the US. These positions are rarely based on empirical evidence but instead on an ideological basis. The majority of Europeans seem not to favour an increase to the stock of immigrants, meaning they are in favour of a zero immigration scenario (Zimmerman, 1995 and 2004). These opinions explain why immigration policy in the EU shows such rigidity. Initially Europe experienced a mass migration towards the Americas, Africa and Asia. Later the economic scenario changed and Europe (EU-6) became one of the main destinations for immigrants from other non EU-6 European countries. With the further enlargement to EU-15 the scenario of migration flows changed. The Southern enlargement countries (Greece, Spain and Portugal) have become destination countries. The net annual immigration rate towards Europe has, in fact, increased from 0.3% in the 1950s, to 11.3% in the 1990s. The rate of the EU reached a higher level than the European average (2.2% in the 1990s). Net immigration rates vary considerably among nations and regions. In Western Europe which is the principal destination, the net migration rate dropped following the first oil crisis, from 2.6% in the 1970s to 1.7% in the 1970s – 1980s, reaching its peak in the early 1990s (4.7%). In the same years, Southern Europe changed its role, moving from the position of an originator of net migration flows to instead being a destination area. Immigration growth rates in Southern European countries, which are members of the EU-15, are underestimated by official statistics due to a high number of illegal immigrants. Total immigration in the EU increased over the last five years. In 2006 the number of immigrants was nearly a quarter higher than in 2002. The annual average increase was more than 100.000 during this period. However, in the last three years this increase has slowed, even registering a decline in 2005. The biggest rise in immigration was in Ireland and Spain. In Ireland immigration doubled in 2006 compared with 2002, while Spain received three quarters more immigrants in 2006 than 2002 in absolute

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<sup>5</sup> With the expression radical positions it is meant on one side multiethnic societies and the complete liberalisation of migrant flows, on the other side policies that oppose to any form of migration.

numbers. By contrast, several countries including Germany, Austria and the Netherlands witnessed a decline in immigration over the whole or part of the period. In 2006, total immigration to these three countries was 14%, 17% and 11% respectively lower than in 2002. The largest numbers of immigrants to the EU in 2006 were recorded in Spain, Germany and UK. These three countries together received more than 2 million immigrants (including returning nationals<sup>6</sup>). However, among these countries only Spain also had high immigration relative to its population size. The highest rate of immigration was recorded in Luxembourg, followed by Ireland, Cyprus and Spain. These four countries had significantly higher rates compared with other member states, while for Germany and the UK, immigration per 1000 inhabitants was close to the EU-27 average (Eurostat, 2008 and 2009).

Europe is a continent where workers are less willing to move for working reasons. Less than 1 in 200 workers changes their region of residency annually, against 5 in 200 workers in the US. Immobility of Europeans is even clearer when thinking about the imbalances present amongst European regions. Within any single European country regions lacking workers can coexist with regions that have a scarce labour supply. Often this imbalance becomes chronic. This makes immigrants a necessary requirement but at the same time source of social unrest. Different institutions are responsible for the scarce mobility of the European labour force and some of them play a fundamental role within the different countries of the EU. Mobility is weakened by the wage compression created by centralised agreements on remuneration; regimes of job protectionism make it more difficult for workers from poor regions to find a job in other parts of the country; and unemployment benefits (transfer payments offered to working age individuals who do not have a job) can discourage workers from accepting a slightly lower wage. Meanwhile, shifting jobs to exploit new opportunities created in different geographical regions is more expensive due to fiscal deductions that favour the ownership of houses, as well as regulated rental fees. Moreover, other institutions discourage mobility between countries in the EU. Language differences certainly constitute a sizeable obstacle to the flow of labour force among each country and the lack of co-ordination among national institutions of the different EU member states represents a real tax over the flow of labour force. Variations in national legislation regarding pensions and a lack of harmonisation in taxation procedures relating to social welfare, lead to a significant reduction in pension rights of those workers moving through various countries. For whatever reason, it is without doubt that labour is a largely immobile factor in Europe. However, the growing number of non-EU residents in the EU is, more mobile than the rest of the labour force. Therefore, retaining a higher number of immigrants can help Europe become a continent with a more mobile labour force. Due to the fact that Europeans are less mobile than Americans, there is no arbitrage among the great differences in the levels of productivity of the different European regions. Immigrants are almost always unwinding this task, moving in order to balance different markets. Immigrants settle themselves in exactly those areas that have the widest labour opportunities. Initially, they tend to settle close to borders, and if the labour opportunities in those areas turn out to be less favourable than anywhere

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<sup>6</sup> National immigrant means a person who returns to his or her country of citizenship, having previously lived abroad. Returning nationals include national citizens born abroad who have not previously been resident in their country of citizenship.

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else, they will probably move. Immigrants choose where to settle also by considering the generosity of the social system. The differences in the nature and generosity of the social system between the EU member states alters the composition of immigrants, allocating those that reach different countries in ways that are often undesirable for both economic efficiency and equality. Considering all these circumstances, migration can be perceived as a tax on European labour force immobility. Migration flows towards the EU took place simultaneously with a decrease in the population growth rate and with an increase in average age in the Union countries. Since the early 1970s despite a growth in population of the EU-15 member states from 49 to 375 million, working age population (20-64) has started to shrink: a reduction from 225 million in 1995 to 223 million in 2025 is forecast. Although it seems moderate, this decline is relevant due to the forecast of a substantial increase in the number of elderly people. The proportion of the population over 65 years old has increased from 13% in 1975 to 15.4% in 1995; currently it is forecast to reach 22.2% in 2025. Consequently, net immigration has become the main factor of growth in the European population. Age composition varied between member states. Denmark had the youngest total immigration, with half of immigrants younger than 25 and 80% younger than 35. The Netherlands and Sweden also received a greater number of younger immigrants than others: 70% were younger than 35. However, the proportion of younger immigrants in these countries was not as high as in Denmark: the median age was nearly three years higher than Denmark (27.8 years in both). In these three countries migrants of all citizenship were relatively young. By contrast, in some countries like the Czech Republic and Slovenia more than half of immigrants were older than 30. According to data from Slovakia, half of the people entering the country were older than 32. In Slovenia, this was mainly because of relatively older non national EU immigrants<sup>7</sup>, while in the Czech Republic, returning nationals were older. Thus, immigrants' age composition varied markedly across the EU member states, particularly in relation to their citizenship. Therefore, it is rather difficult to find any common features among member states. The median age of non-EU citizenship immigrating to EU member states was distributed over nearly eight years: from the lowest in Denmark (24.1 years) to the highest in Lithuania (31.9 years). The groups of countries with younger or older non-EU immigrants were rather selective: in the EU-15 member states, non-EU immigrants were generally younger than in member states that joined the EU more recently (Eurostat, 2008 and 2009). Moreover, it must be noted that those European countries that traditionally have been sources of emigration are experiencing similar ageing trends of their population: birth-rates in Southern European countries are equal or even lower than those in Northern European countries, and Central and Eastern European countries waiting to be integrated in the Union enlargement process, show population growth rates that are even slower. The lack of labour force of the 1950s and 1960s provides the basis for relatively favourable international immigration policies towards EU member states. Subsequently, persistence in unemployment has gradually led to policies that inhibit immigration from non-member states. However, measures undertaken to facilitate mobility inside the Union have not reached the aim of exceeding 1.5% - this being the percentage of EU citizens that live in another member state. In fact, the majority of foreign citizens living in the Union are of extra-European origin. The overall macroeconomic scenario of the EU is

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<sup>7</sup> Non-EU immigrant means an immigrant who has no citizenship of any EU Member States.

currently favourable, but unemployment remains at about 8%, and this makes the decision to accept further non-EU immigration a complicated one. Moreover, the generous levels of welfare in the EU member states raise concerns regarding the financial impact of further immigration. Therefore the European attitude towards immigration from extra-EU countries remains cautious.

### 3. The Theoretical Framework

#### 3.1 The Economic Integration Measures

Economic integration can be observed in different phenomena such as real, monetary and financial integration. These phenomena include business cycle synchronization, inflation rate convergence, exchange rate variability, interest rate convergence, trade openness, trade integration and convergence of income (Dorrucci *et al.*, 2002). We focus on three of these integration phenomena in order to obtain two measures of integration: real and financial integration. To describe these phenomena we decided to construct three indicators to act as a proxy for real and financial integration. In this subsection we will explain how these measures were constructed, their economic significance and the trends demonstrated during the time periods.

For real integration we chose to construct two indicators: the first is a measure of economic integration within the EU-15, the second captures the effects of globalisation. The purpose of using two measures of trade integration is to show whether the immigration flows in the EU-15 countries are encouraged or incentivised by the greater internal integration or if they are tied to the effects of globalisation.

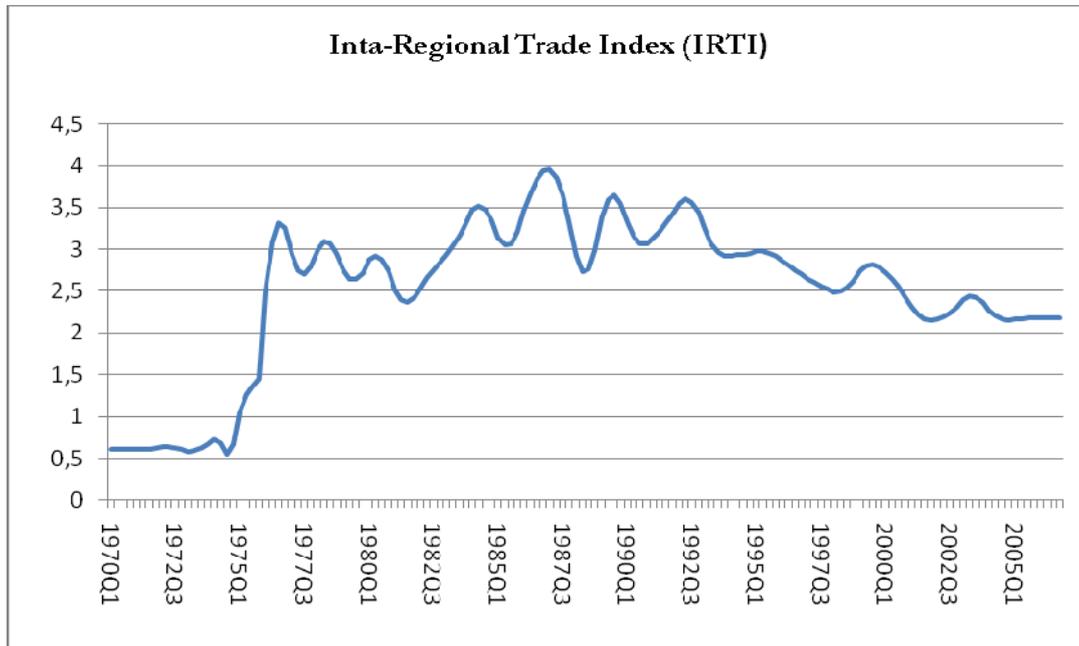
The indicator of intra EU-15 trade integration, the Intra-Regional Trade Index (IRTI), is given by the ratio between the Intra EU Trade (internal trade of the 15 countries of the EU, considered as a single, entire entity) and Total Trade<sup>8</sup>. According to the literature on economic integration and trade, a number of countries can gain more benefit from the decrease or the elimination of exchange rate variability if they demonstrate a higher degree of trade integration. The evolution of this ratio is shown in figure 1, where it is possible to identify two different stages.

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<sup>8</sup> Total Trade and Intra EU trade in Mrd EURO.

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Figure 1: Intra-regional trade index (IRTI)



Data Source: for intra-countries trade and total trade is Ameco.

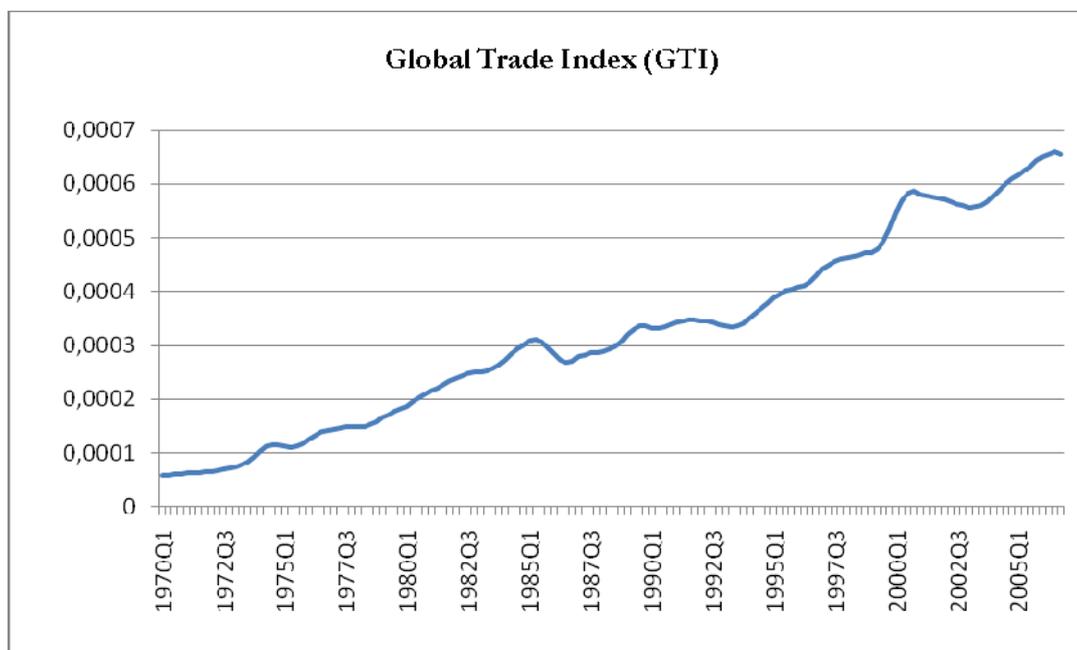
In the first phase in the early Seventies we can observe a very slow, almost stable rise, which is probably due to the fact that even before the 1980s there was a tendency to reach economic integration by the removal of tariffs. The second stage starts in the second half of the Seventies, where we notice a turning point that should be linked to the birth of SME. This change could derive from the stabilising function of exchange rates that has generated a reduction in uncertainty and has consequently favoured trade. Moreover, following the great economic crisis of the Seventies and the constitution of a Customs Union, the Single European Act was promulgated, proposing a re-birth of the European Community, enhancing the necessary instruments for the implementation of common policies. This act defined the concept of the Internal European Market, proposing to integrate national markets in order to convert them into a wider and sufficiently flexible booming market.

The second measure that has been created, the Global Trade Index (GTI), is the ratio between Total Trade and the GDP (Gross Domestic Product)<sup>9</sup> of the fifteen European Union countries. This ratio measures the degree of participation of a country, in our case the EU-15 considered as a single bloc, from a trade perspective in the world market. The objective is to observe how the globalisation influences the European economic growth. For this reason no distinction between intra and extra EU trade is

<sup>9</sup> The source of trade data is Ameco, while the GDP data has been taken from the European Central Bank and Ameco. The period of time considered is 1970Q1-2007Q4. In order to calculate total trade we added up the annual data relating to the import/export totals of the EU-15. To maintain homogeneity with the other data, which are quarterly, the trade data has been computed into quarters, enabling us to then calculate the ratio between the two measures. Total trade and GDP in Mrd EURO

made for constructing this indicator. The trend of this indicator is represented in figure 2.

Figure 2: Global Trade Index (GTI)

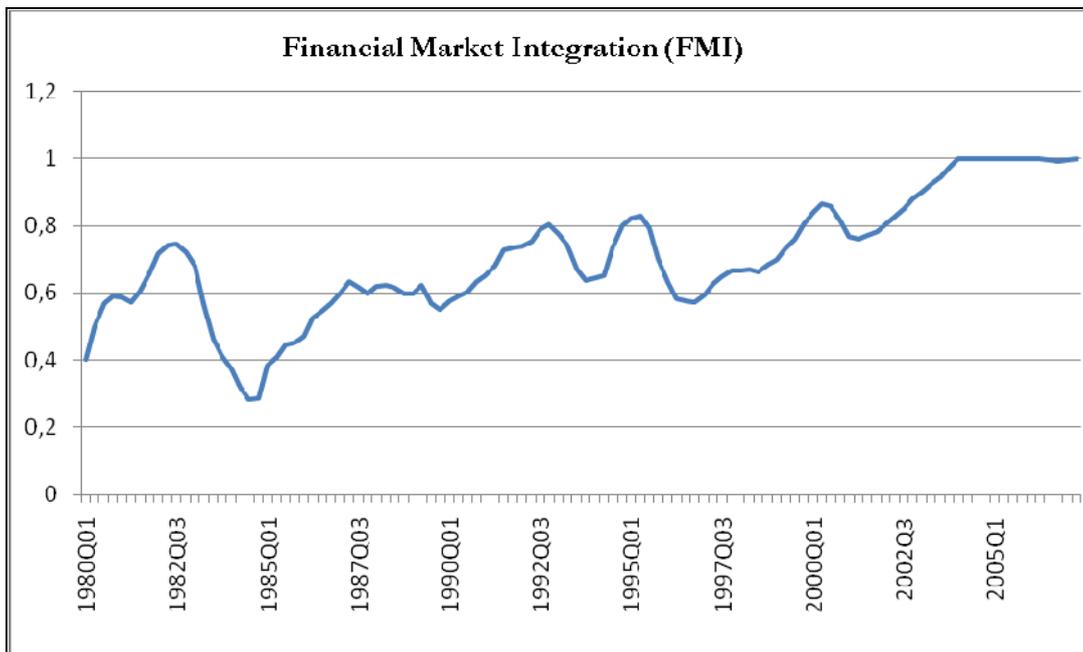


Data Source: for Total Trade is Ameco, for GDP are European Central Bank and Ameco.

From the chart it is possible to see that the indicator demonstrates a relatively steady trend with minimal volatility, which is probably due to the fact that even before the 1980s the idea of reaching trade integration was supported by the free flow of goods, people, services and capital. In contrast to the Intra-Regional Trade Index (IRTI) where the increase in internal trade displays a cyclical behaviour, in this measure we can observe that the overall volume of trade rises in a more linear way.

The third measure that has been constructed is an indicator of financial market integration (FMI)<sup>10</sup>. In order to measure financial market integration we used the correlation between short term interest rates in fifteen countries of the European Union. Countries can benefit from financial market integration by allocating resources more efficiently and by reducing transaction costs. Thus, a higher level of integration allows modest variations of interest rates to cause stable movements of capital among countries. The trend of this indicator is represented in figure 3.

<sup>10</sup> To calculate these correlations we used monthly interest rate data relative to three months that have been computed into quarters in order to make data homogeneous with the other indicators. The data source for the interest rates is DataStream and the period of time considered goes from 1980Q1 to 2007Q4.

Figure 3: *Financial Market Integration (FMI)*

*Data Source: DataStream*

The figure shows how financial market integration records an overall growing trend in the long run although its behaviour is clearly oscillatory. This indicator can also be analysed in comparison to the evolution of the European Union. The first aspect to be considered is the fact that the 1980s were characterised by severe economic crises which created a degree of fragmentation in financial markets. Countries searched for a compromise in order to restore a certain balance, that was implemented with the signature of the Single European Act. This act proved to be a signal of the rebirth of the EU. Starting from 1990, with the launch of the first phase of economic and monetary union, there was a progressive increase in integration; in fact the aims of this phase were the liberalisation of capital and an increased co-ordination of economic policies. The second phase, which began in 1994, gave a further support to financial integration with the creation of the European Monetary Institute that strengthened the process of convergence. Another increase in integration can be noticed since the Single Currency became effective.

### 3.2 The Theoretical Model

To analyse the role undertaken by migration in the integration process and to explain the type of effect that it generates in the labour market, we have chosen to use as a reference a theoretical model inspired by the insider/outsider model (Blanchard and Summers, 1986; Layard, Nickell and Jackman, 1991; Lindbeck and Snower, 1988 and Amisano and Serati, 2003). The model suggested in this paper respects all the characteristics described by the Layard, Nickell and Jackman (1991) model (see Appendix 1) and in the same way is a microfounded structural model. Also in this case, we assume a theoretical context that is characterised by imperfect competition in the product market, the existence of an insider/outsider mechanism with the phenomena of

partial/total hysteresis and the presence of a monopolistic trade union. The first innovation comes from the introduction of an equation that models migration flows. From the neo-classical approach, migration is a function of expected earnings, expressed by the prevailing wage level in the destination country, and from the probability of finding a job. The second innovation considers the introduction of three exogenous variables that measure economic integration, these being the intra-regional trade index (IRTI), global trade index (GTI) and financial market integration (FMI). These three variables could be considered as endogenous variables since they are influenced by the market, however we have decided to model them in an exogenous way given that the indicators representing them are built in a statistical way and therefore would cause difficulties modelling them with the economic theory.

This theoretical model is characterised by five endogenous variables expressed in a logarithmic form: output ( $y$ ), prices ( $p$ ), wages ( $w$ ), employment ( $n$ ), and migration ( $mn$ ). The exogenous variables (logarithms) are capital stock ( $k$ ), money stock ( $m$ ), intra-regional trade index (IRTI), global trade index (GTI) and financial market integration (FMI). The equations describing this economy are the following:

$$y_t = \alpha n_t - (1 - \alpha)k_t + \varepsilon_t \quad \eta_t^\varepsilon \approx w.n.(0, \sigma_\varepsilon) \quad (1)$$

$$y_t = \sigma IRTI_t + \rho GTI_t + \psi(m_t - p_t) + \theta_t \quad \eta_t^\theta \approx w.n.(0, \sigma_\theta) \quad (2)$$

$$p_t = w_t + \beta(y_t - k_t) - \delta_1 FMI + \nu_t \quad \eta_t^\nu \approx w.n.(0, \sigma_\nu) \quad (3)$$

$$w_t = p_t^e + \alpha \beta k_t - \alpha \beta \lambda n_{t-1} - (1 - \lambda) \alpha \beta l^e + \delta_2 FMI + \eta_t^\omega \quad \eta_t^\omega \approx w.n.(0, \sigma_\omega) \quad (4)$$

$$l_t = \mathcal{M}_{t-1} - \mathcal{N}_{t-1} + \xi(w - p)_t^e + \gamma mn_{t-1} + \eta_t^l \quad \eta_t^l \approx w.n.(0, \sigma_l) \quad (5)$$

$$mn_t = A_t - \alpha_1 l_{t-1} + \alpha_1 n_{t-1} + \alpha_2 w_t^e + \eta_t^{mn} \quad \eta_t^{mn} \approx w.n.(0, \sigma_{mn}) \quad (6)$$

$$u_t = l_t - n_t \quad (7)$$

where  $\beta$  is given from  $\beta = \frac{1 - \alpha}{\alpha}$  and where  $\alpha$  and  $\lambda$  are non-negative parameters less than 1, whereas  $\gamma$ ,  $\psi$ ,  $\xi$ ,  $\sigma$ ,  $\varrho$  and  $\delta$  are expected not to be negative and the subscript  $e$  represents conditional expectations of information of one period before.

All of the equations are in a log linear format. Equation (1) describes a production function having technology and constant returns, equation (2) is the aggregate demand function obtainable as the solution of an IS-LM model and (3) is the price-setting equation. The wage-setting equation (4) is characterised by the fact that real expected wage is defined as a weighted sum of two components, an insider one ( $n_t^e = n_{t-1}$ ) and an outsider one ( $n_t^e = l_t^e$ ):

$$w_t - p_t^e = \lambda(w_t - p_t^e : n_t^e = n_{t-1}) + (1 - \lambda)(w_t - p_t^e : n_t^e = l_t^e)$$

Equation (5) represents the labour force depending positively on real expected wages and migration flows, and negatively on the past level of unemployment. Finally, equation (6) describes migration, whereas (7) is a simple identity defining unemployment.

The choice to represent migration in this way is consistent with the indications coming from migration theories, especially the approach proposed by Harris-Todaro (1970)<sup>11</sup>. In this model the decision to migrate is based on the expected gains of employment; due to this, people will move if the expected wage (that depends both on the probability to finding job and the average wage in a given region) in the destination region is higher than that of the region of origin. Therefore, in accordance with this theory, if a country presents a high level of unemployment and low wages it will have limited migration flows. Considering the Harris-Todaro structure, migration is determined by the prevailing wage level and the possibility of finding a job in a given region. The migration equation will be given from:

$$MN_{it} = A_{it}(u_{it}^{\alpha_1} w_{it}^{\alpha_2}) \tag{8}$$

where  $MN_{it}$  indicates migration flows,  $u_{it}$  indicates the unemployment rate and  $w_{it}$  indicates the wage level in the region at time  $t$ . To maintain homogeneity with the other equations of the model it is possible to write the migration equation in a logarithmic form ( $mn_{it}$ ), in the following way:

$$mn_{it} = A_{it} - \alpha_1 \ln u_{it} + \alpha_2 w_{it} \tag{9}$$

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<sup>11</sup> In their model Harris and Todaro (1970) analyse migration from rural areas towards urban areas in developing economies. This approach can also be applied more generally on regional migration.

<sup>12</sup> Where the unemployment rate is defined in the following way:  $u_t = l_t - n_t$ .

In addition to these migration determinants, there could be other influential factors that can depend on differences in labour market institutions and we have not included in our model. For example, higher levels of employment protection as well as higher substitution rates can impact labour supply. Moreover, even regional differences can be important. For example, if acquiring a house in a certain region is difficult and expensive, migration towards that region will be relatively low. Another possible source of factors that can influence the migration decision are cultural differences in skills and preferences.

### 3.3 The Linear Representation

Endogenous variables can be collected in a vector (6x1) called  $Y_t$ , whereas exogenous variables are represented by a vector (5x1) denominated  $X_t$ . Thus, the system (1)-(7) has the following matrix representation:

$$A_0 Y_t + A_1 Y_{t-1} + \Gamma Y_t^e + B_0 X_t + B_1 X_{t-1} = \Xi_t \quad (10)$$

Taking expectations of (10), we find that:

$$Y_t^e = [A_1^* Y_{t-1} + B_0^* X_t^e + B_1^* X_{t-1}] \quad (11)$$

Where we have:

$$\begin{aligned} A_1^* &= -(A_0 + \Gamma)^{-1} A_1 \\ B_0^* &= -(A_0 + \Gamma)^{-1} B_0 \\ B_1^* &= -(A_0 + \Gamma)^{-1} B_1 \end{aligned} \quad (12)$$

If the expectations of vector  $X_t^e$  are defined in the following way:

$$X_t^e = [k_t \ m_{t-1} \ IRTI_{t-1} \ GTI_{t-1} \ FMI_{t-1}] \quad (13)$$

by replacing (13) in (11) we can solve the model in terms of expectations:

$$A_0 Y_t + A_1^{**} Y_{t-1} + B_0^{**} X_t + B_1^{**} X_{t-1} = \Xi_t \quad (14)$$

where we have:

$$\begin{aligned} A_1^{**} &= \Gamma A_1^* + A_1, \\ B_0^{**} &= \Gamma B_0^* D_1 + B_0, \\ B_1^{**} &= \Gamma B_0^* D_2 + [\Gamma B_1^* + B_1] \end{aligned} \tag{15}$$

### 3.4 The Long Run Effects

Starting from (14), the static equilibrium solution of the model is obtained by setting:  $Y_t = Y_{t-1} = Y^*$ ,  $X_t = X_{t-1} = X^*$  so that:

$$Y_t = -(A_0 + A_1^{**})^{-1} (B_0^{**} + B_1^{**}) X = QX \tag{16}$$

Observing the long term equilibrium levels of unemployment and real wages described in matrix Q (for a detailed description of the equilibrium solution see Appendix 2.1) we can draw some conclusions. The first one is that the monetary policy does not impact either the labour demand equilibrium or the labour supply equilibrium, in fact  $\partial u^* / \partial m = 0$ . Real wages on the other hand do result in being influenced by monetary policy  $\partial(w-p)^* / \partial m \neq 0$ . Secondly, the intra-regional trade index (IRTI) and global trade index (GTI) do not have any effect on long term unemployment  $\partial u^* / \partial IRTI = \partial u^* / \partial GTI = 0$ , whereas from long term multipliers we observe some effects different to zero on real wages: in fact  $\partial(w-p)^* / \partial IRTI = \partial(w-p)^* / \partial GTI \neq 0$ . This could be due to the fact that the trade integration (expressed by two indicators of a real nature) are not structural factors, they only act on the demand, which does not influence long term unemployment, all this is consistent with the NAIRU model. The last integration measure regarding financial markets (FMI) instead influences both employment and real wages in equilibrium. In particular, considering the impact of this indicator both on long term unemployment and on real wages of equilibrium it is not possible to define a priori the sign  $\partial u^* / \partial FMI \neq 0$ ;  $\partial(w-p)^* / \partial FMI \neq 0$ . As in the case of the Layard *et al.* model, variations in capital stock produce positive effects only on the real wage of equilibrium  $\partial(w-p)^* / \partial k = \alpha \beta / \alpha \beta \xi + 1 \geq 0$ , whereas the long term unemployment value is not influenced  $\partial u^* / \partial k = 0$ . Regarding the impact that shocks to

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exogenous variables have on equilibrium migration, we derive that all shocks have impacts different to zero.

### 3.5 The Impact Multipliers

Looking at the multipliers matrix  $B_0^*$  (see the Appendix 2.2) it emerges that: shocks to trade integration indicators have an impact that reduces unemployment (multipliers have a negative sign). This effect is due to the positive reaction of employment that depends positively from  $\sigma$ ,  $\varrho$  and  $\psi$  and negatively from  $\alpha$  and  $\beta$ . These three shocks have an impact that reduces real wages as well, consistent with unemployment trends. The sign of unemployment responses to financial market integration (FMI) shocks cannot be defined a priori on both unemployment and real wages. A growth in capital stock generates an increase of employment and labour force both during the shock and in the long run. The instant variation is due to the fact that higher levels of capital stock influence the level of industrial production, therefore, a growth in labour force is caused from an increase in real wages, acting through the expected wage setting mechanism described by the labour force equation. Impact multipliers, referred to as net migration, show that any shock on exogenous variables, except in the case of a shock to capital stock, does not influence net migration flows in the short run.

## 4. Empirical Evidence

### 4.1 Data Description

This section describes the data used in the empirical evidence and their relative sources. The data is relative to the EU-15 member states considered as a single entity, except for migration flows in which we consider flows from the enlargement countries to the EU-15. For all data the sample period is from 1985Q1 to 2007Q4. Naturally, with the objective of the descriptive analysis of economic integration indicators, contained in paragraph 3.1, and to have an idea of the trend of the indicators, it was decided to analyse the period between 1970Q1 and 2007Q4 (except for the Financial Markets Integration, for which data about the period 1980Q1- 2007Q4 has been considered). The period after 2007 is excluded because it is characterized by too many turbulences and the number of available observations is not high enough to give these turbulences a meaningful interpretation.

The output ( $y$ ) is represented by data of gross domestic product with constant prices; for prices ( $p$ ) we used the harmonised consumer price index, whereas for wages we decided to use a data of compensation per employee. For employment ( $n$ ) we used total employment, whereas the labour force is obtained by adding employed and unemployed. All data is seasonally adjusted and the sources are the European Central Bank, Ameco and Datastream. Capital stock ( $k$ ) is obtained by combining Gross Fixed Capital Formation (GFCF) at constant prices, adjusting them seasonally taking account of the constraints given by annual data. This is linked to the fact that capital stock is a variable that should be purified from depreciation, the problem arising is the fact that no depreciation measure is available. Data sources are the European Central Bank and

DataStream, while the annual capital stock data is taken from the OECD. As an indicator of monetary policy (m) it was possible to use either a measure of short term interest rate or the M3 monetary aggregate. Considering the limited availability of the data regarding the aggregate of the European Union for such a long period of time (1980-2007), we decided to use the seasonally adjusted M3. The data source is the European Central Bank and Datastream. The intra-regional trade index (IRTI) is calculated using the ratio between the intra-EU trade and the total EU-15 trade. The data used relate to the amount of imports and exports both inside and outside the EU-15. The data sources are the European Central Bank and Ameco. The same sources are used in order to obtain the data required to show the global trade index (GTI), which is the ratio between total trade and the GDP of EU-15. Finally, in order to analyse the financial market integration (FMI), we decided to use the correlation of short-term interest rates between the EU-15 countries. The source of the interest rates is DataStream. For the migration flows from the Eastern enlargement countries towards the EU-15 member states, we used data on migration flows divided by citizenship and by previous country of residency produced by Eurostat.

#### 4.2 The Estimated Model

The estimated model is a structural VAR with four equations derived from the six equations theoretical model [1 – 7]. Four equations are related to four endogenous variables: real wages (wr), employment level (n), labour force participation level (l) and migration flows (mn). The set of exogenous variables include five components of the theoretical model, except for money stock which is indicated in real terms (mr). The aim is to evaluate the different impact that shocks to exogenous variables, in particular to the three integration indicators, have on endogenous variables: employment, real wages, level of labour force participation and migration considering a time horizon of 10 quarters. Summarising, the estimate of the model is obtained by considering the following variables:

$$Y_t = \begin{bmatrix} n_t \\ w_t - p_t \\ l_t \\ mn_t \end{bmatrix} = \begin{bmatrix} n_t \\ wr_t \\ l_t \\ mn_t \end{bmatrix} \\
 X_t = \begin{bmatrix} k_t \\ m_t - p_t \\ IRTI_t \\ GTI_t \\ FMI_t \end{bmatrix} = \begin{bmatrix} k_t \\ mr_t \\ IRTI_t \\ GTI_t \\ FMI_t \end{bmatrix}$$

The estimated model is an unrestricted structural VAR with deterministic and exogenous lagging variables:

$$\Pi^y(L)Y_t = \Psi d_t + \Pi^x(L)X_t + \varepsilon_t, \varepsilon_t \approx VWN(0, H^{-1})$$

$$\Pi^y(L) = I_n - \sum_{i=1}^{h_1} \Pi_i^y L^i, \Pi^x(L) = \sum_{i=0}^{h_2} \Pi_i^x L^i$$

This SVAR can be thought of as a reduced form solution of the theoretical structural model presented in the previous section. The interesting aspect is that of estimating the coefficients described by dynamic responses of the endogenous variables to an exogenous shock. These coefficients are obtained as the solution of the following:

$$Y_t = d_t^* + C(L)X_t + \varepsilon_t$$

$$C(L) = \sum_{i=0}^{\infty} C_i L^i$$

$$\Pi^x \equiv \Pi^y(L)C(L)$$

### 4.3 The Impulse Response Functions

This section will present the impulse response functions of employment, real wages, labour force and migration flows to shocks to exogenous variables. The confidence bounds are equal to 90%.

Referring to the results obtained, it is possible to make some general observations. Firstly, we can see that the system displays a degree of inertia, in fact impulse responses often tend to stabilise in the mid - long run on significant values. This appears to indicate that shocks to an integration indicator, even if temporary, produce effects with a high level of persistence. Secondly, it emerges that migration responses vary depending on the type of shock. A shock to intra-regional trade (IRTI) generates overall insignificant effects both in the short and long run. However, in contrast to this, shocks to global trade index (GTI) and to financial market integration (FMI) generate significant effects on immigration flows. Finally, we can observe how shocks to migration flows cause a positive and significant impact on the labour market.

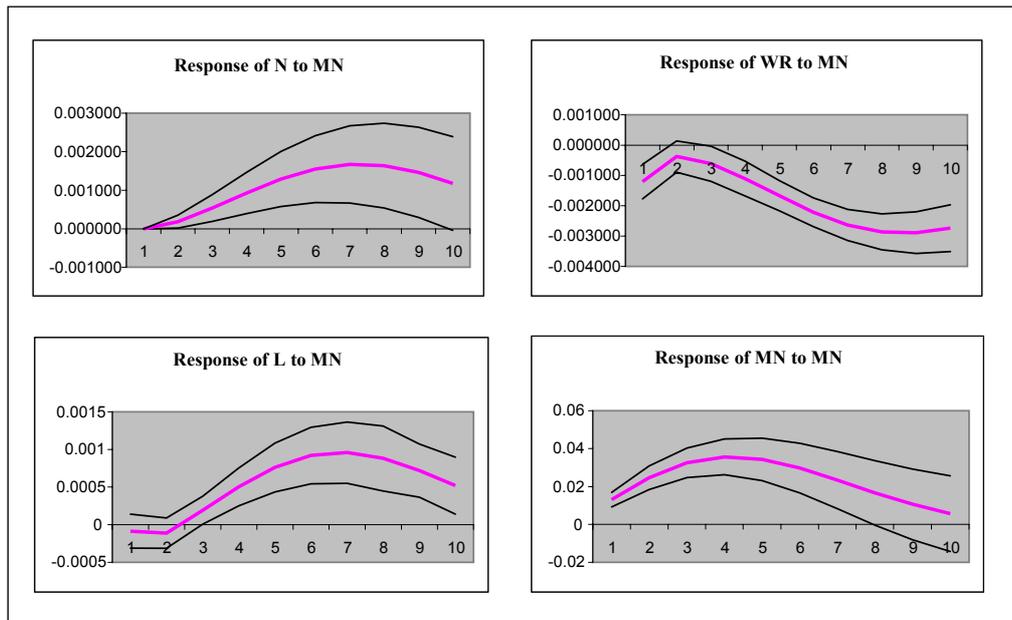
The impulse responses generated from a shock to migration flows and related to the endogenous variables of the SVAR are the following (figure 4).

From the impulse responses we can observe:

- a positive effect in the short and medium-term on employment; no effect in the long run;
- a negative effect on real wages in the short and long run;
- a non significant effect on labour force participation in the short run; a positive effect in the mid - long run.

From the empirical results we observe that an increase in the migration flows has an effect on the labour market. This innovation generates an increase of both employment and labour force, but given that employment seems to increase more than participation, there should be a reduction in unemployment. Moreover, we observe a negative effect on real wages.

Figure 4: impulse responses a shock to migration flows



The picture just described can be interpreted only partially on the basis of the theoretical model presented in this chapter. Moreover, to produce a complete interpretation of the results it is useful to consider some key concepts suggested by the theoretical model proposed by Bauer and Zimmermann (1995 and 2004) and Brücker (2002). Migration flows appear to generate an increase in labour force and move the equilibrium to a point characterised by a lower wage level than that of the previous period. This could point to the fact that the monopolistic power of the trade union results being partially reduced. Then wage seems to follow a similar adjustment to that of perfect competition. In other words this suggests that immigrants could unhinge the insider/outsider mechanism; inasmuch as it is reasonable that immigrant workers are less unionised, competitive and therefore attractive for firms and endowed in terms of human capital. Wage reduction should lead to an increase in the labour demand of firms<sup>13</sup>. In this situation there should be an overall increase in the level of employment and, due to their characteristics and competitiveness, immigrant workers should find employment easily. While analysing this situation, the potential indirect effects<sup>14</sup> that

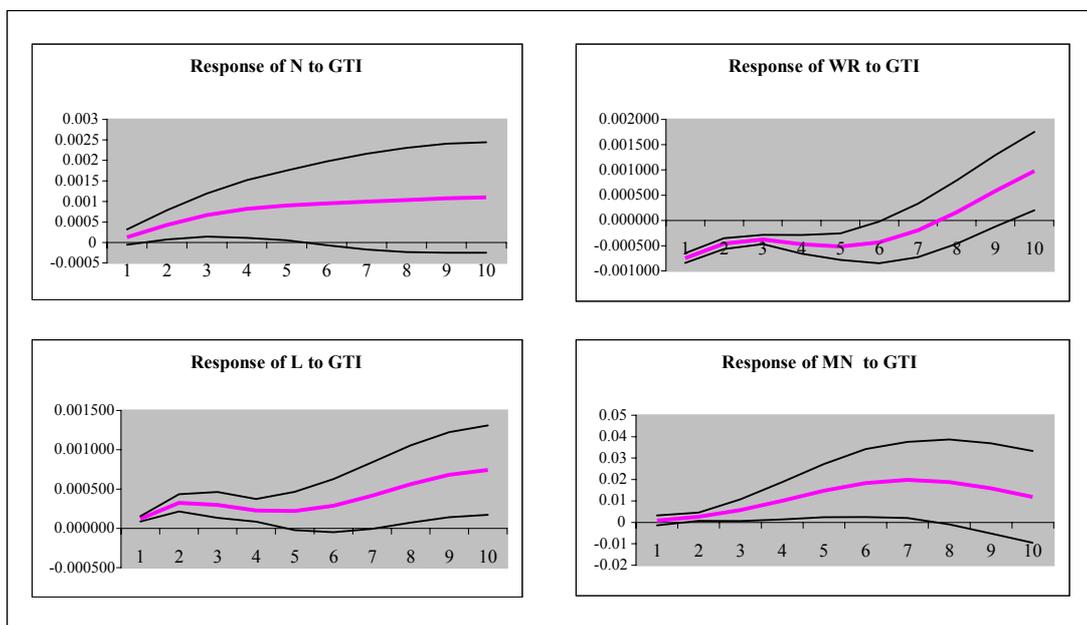
<sup>13</sup> Due to this result it is reasonable to assume migration from the enlargement countries is skilled

<sup>14</sup> A relevant aspect is linked to the presence of indirect effects that immigration flows cause on the labour market. Thus, besides evaluating the direct effects, it is necessary to consider also the indirect effects shown on the side of the product market.

such a type of shock could cause on labour demand should not be forgotten. In this way, the effect of an increase in migration could be mitigated from indirect effects derived from the fact that immigrants are consumers of goods, and so, following an increase in inflows, product demand could increase and consequently there could also be a rise of labour demand. Therefore, given the labour supply, such an increase could have a positive effect on wage levels.

Impulse responses with respect to a shock to global trade index (GTI) are the following:

Figure 5: impulse responses a shock to global trade index (GTI)



We can observe that a positive shock to the global trade index (GTI) generates:

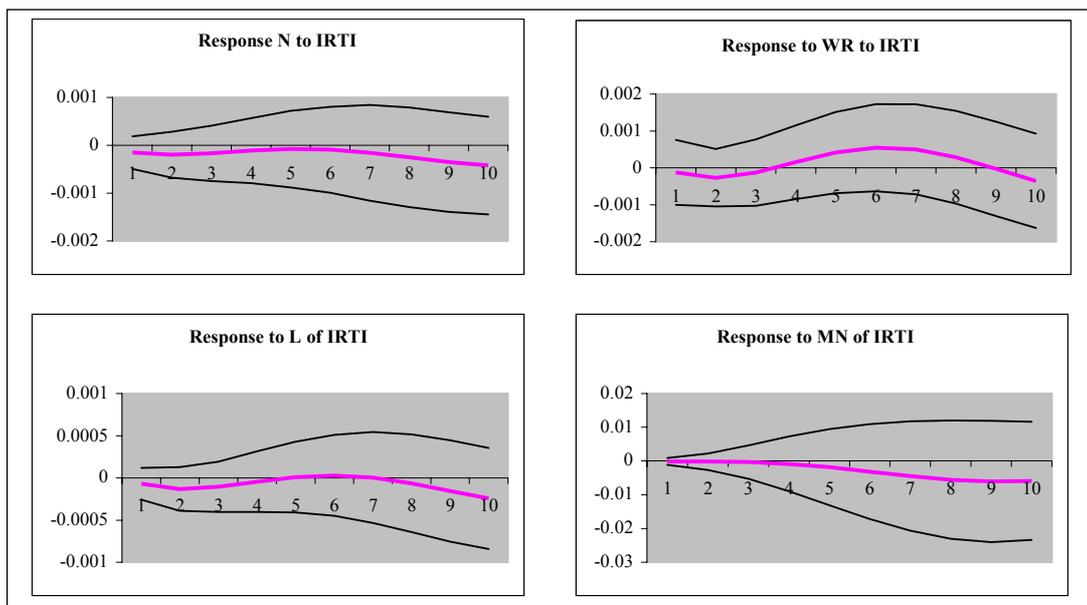
- a positive and significant effect on the employment in the short and mid-term
- a positive effect on real wages in the short and mid-term, whereas in the long term the impulse response becomes non significant, and therefore it is not possible to define the type of effect, whereas in the long run we observe a further significant and positive effect;
- a positive and significant effects on labour force participation that tend to be persistent in the long run;

- a positive effects on migration in the short and mid-term; in the long run it is not possible to make any conclusion due to the fact that the impulse response results are not significant.

In summary, from the analysis of the impulse responses of shocks to the global trade index, we can observe an increase in employment which is higher than the increase in labour force participation, and from which therefore follows a decrease of unemployment. The results are consistent with the theoretical model presented in section 3. Greater trade integration should generate more competition in the product market, and consequently lead to price convergence. The mechanism described should lead to a reduction in price level differences and to a reduction of real prices, thus stimulating consumption. These factors could lead firms to ask for a higher amount of labour, therefore increasing employment. On the other hand, greater trade integration should also increase the total amount of trade, and therefore could lead to a trade creation effect higher than that of trade diversion, generating a final positive effect on aggregated demand. This should generate an increase in labour demand from firms. At this point it is reasonable to assume that workers, seeing a decrease in unemployment and an increase in wages, will then decide to increase the labour supply. Greater trade integration also generates an increase in migration flows in the short run. This effect can be explained considering the theoretical model, in fact, migration flows are a function of unemployment and real expected wages in the destination country. In this case workers, seeing a decrease in unemployment in the destination country and an increase in real wages, have an incentive to migrate.

Impulse responses with respect to a shock to intra-regional trade index are the following:

Figure 6: impulse responses a shock to intra-regional trade index



The charts shows that a positive shock to the intra-regional trade index (IRTI) does not cause significant effects both in the short and long run on any endogenous variable. In this case it is not possible to make any consideration of the consequences that this type of unrest will have on labour market variables and on migration flows.

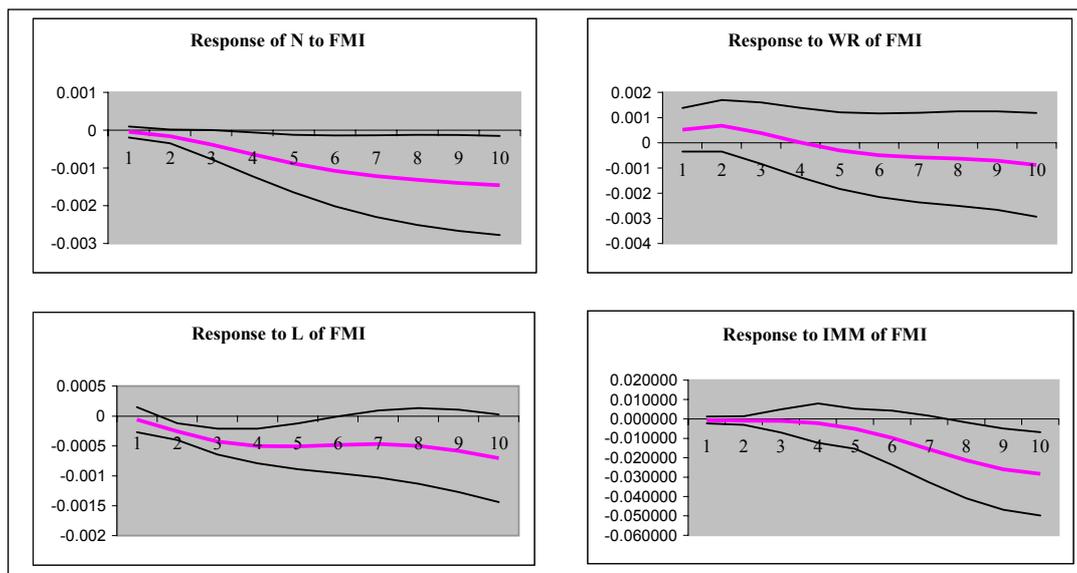
A positive shock to financial market integration (FMI) generates the following impulse responses (figure 7).

We observe:

- a negative effect on the level of employment in both the short and long run
- an effect on real wages that cannot be defined, due to the fact that the impulse response results are not significant both in the short and the long run
- a negative effect on labour force participation in the short and mid-term, whereas in the long run the response becomes non significant
- a non significant effect in the short and mid-term on migration flows, then in the long run the shock tends to reduce migration flows.

The analysis shows a reduction in both employment and on labour force participation. By comparing the trends of these two responses we can notice a reduction of unemployment in the short run that tends to increase again in the mid-long run. This effect could be due to the fact that greater financial market integration, generating a more efficient allocation of resources, leads to a reduction in transaction costs and therefore a reduction in marginal costs for a firm. Marginal costs for firms are represented by borrowing costs, and therefore this could generate an effect by which firms substitute labour with capital, resulting in an increase in unemployment.

Figure 7: impulse responses a shock to financial market integration



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The issues developed in this paper can be distinguished from the theoretical literature considered in section 1, for a number of different reasons. First, the analysis of the effects that economic integration have on migration flows, from the point of view of attraction, is based on the theoretical model of reference that will then affect the estimated model. Second, the evaluation of integration impacts is made by considering in three different ways the concept of integration, enabling us to understand what type of effects are generated by different shocks to endogenous variables. For example, we can observe how the global trade index and financial market integration are the indicators having a more significant impact on both labour market variables and migration flows.

## 5. Conclusions

During the last few decades, trends in the Western European labour market have been characterised by two factors. The first is the high level of unemployment persistence, while the second is the sluggish disinflation process that accompanies rising unemployment. On the contrary, the US and UK have experienced a more cyclical evolution of unemployment and a lower price stickiness. These facts have stimulated an intense debate amongst economists on the causes of unemployment, its persistence and on its cross-country differentials. The problem of persistence can be interpreted, together with inflation stickiness, as signalling a shift in the NAIRU. Consistent with this view, many studies have interpreted unemployment as being structural, underlining the relevance of labour market rigidities and the intrusive role of institutions, examples of which would include unemployment benefit schemes and worker protection systems. A natural evolution of this phenomenon (defined as Eurosclerosis) emphasizes the relevance of long run unemployment and considers institutional rigidities and trade union activities as a cause of the hysteresis mechanisms that can prolong indefinitely the effects, that would otherwise be temporary, of aggregate demand shocks<sup>16</sup>. This paper sits within this wide literature and focuses on one particular aspect, that is, the analysis of the issue of economic integration and migration in Europe and their repercussions on the labour market. Before entering into the detail of the analysis, we tried to identify, starting from the definition of economic integration, the main fields of research of the theoretical and empirical literature related to the issue of integration. In Europe economic integration is characterized by a series of efforts made to reduce or remove territorial barriers, perceived also as economic frontiers, with neighbouring countries. What emerges is that this a necessary but not sufficient condition for integration, that can have two dimensions. On one side, it can be linked to the degree of convergence of formal and institutional structures of the single countries, while, on the other, to the degree of convergence in prices, interest rates, unemployment rates and living standards. In the case of the EU we observe that with the passage of time, the integration project has created a single market for goods and capital, whereas the free mobility of people remains a problem in the integration process, as the very low level of intra EU migration

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<sup>16</sup> The traditional structure for the analysis of hysteresis is the insider/outsider model, whose basic assumptions are: imperfect competition in both the product and the labour market, existence of a trade union and wage negotiation, possibility of partial/total hysteresis and natural level unemployment in the long run. In literature there have been many other attempts to analyse the role of interactions between shocks and institutions, without considering the insider/outsider structure.

confirms. The aim, which was to evaluate the impact of the progressive process of integration on the European labour market and to understand the role of migration (if and how migration is a relevant factor acting on the labour market and how it interacts with its integration), has been pursued through the constitution of theoretical models that were then transferred to reality with empirical evidence. The context that seemed the most suitable with which to summarise European labour market characteristics is based on the following assumptions: imperfect competition in both the product and the labour market, the existence of an insider/outsider mechanism with partial/total hysteresis and the existence of a monopolistic trade union. Due to the fact that economic integration can be observed in different real, monetary and financial phenomena, we decided to use three of these to measure integration, thus having two measures describing real phenomena (intra-regional trade index and global trade index) and one describing monetary-financial phenomena. These indicators have been inserted in the theoretical models that try to explain labour market dynamics. Based on the characteristics highlighted previously, the theoretical context that seemed the most suitable one with which to summarise European labour market characteristics is a modified version of the insider/outsider model proposed by Layard *et al.* (1991). This model combines the hypothesis of rational expectations and the concept of a natural unemployment rate with rigidities and imperfection in markets, thus results in being the most suitable for the study of modern economic systems. From the comparison of the theoretical model with the results obtained from the empirical test some signs of novelty seem to emerge in the European labour market, which are partially due to trade integration and partially from labour mobility encouraged during the integration process. What seems to emerge is that migration flows from Central and Eastern European countries impact the labour market cracking the insider/outsider mechanism. In fact, we observe an increase of employment contextual to a wage reduction, showing that the insider force is deceived and partially substituted by a normal labour supply and demand mechanism. Migrating workers enter the labour force but by being outsiders they are characterised by a low level of unionism; moreover Eastern European migrants are well endowed in terms of human capital and, as a result of this, they are competitive and therefore attractive for firms.

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## Appendix

### A1 Theoretical Model of Layard, Nickell and Jackman

The theoretical model of reference for the analysis of the European labour market developed in section 3 is the Layard, Nickell, Jackman model (1991). The model is based on microfoundations, in fact, the macro relations are derived from functions that describe the behaviour of single agents, firms and trade union. At an aggregate level, it represents the traditional structure of IS-LM model, modified to take into account the market power that workers and firms enjoy. The model describes an economy in which a large number of firms fix prices and output with the aim of maximising their profits. On top of this, the fixing of wages does not reflect perfect competition in the labour market, since wages depend on insider and outsider factors. Enterprises take decisions in the following way: prices are fixed at the beginning of the period on the basis of expected future demand and costs, output and employment are fixed during the period. The output is determined by the firm supplying what is demanded at the price determined, while the employment is fixed on the basis of the output produced. Firms fix the output and the prices at a level that maximises profit.

The equations that compose the model are the following:

$$y - k = \alpha(n - k) + \varepsilon \quad (3.1)$$

$$\bar{y} - k = \alpha(l - k) \quad (3.2)$$

$$y = y_d \quad (3.3)$$

$$y^p = -\eta(p - p^e) + y_d^e \quad (3.4)$$

$$y_d = \sigma_1 x + \sigma_2(m - p) \quad (3.5)$$

$$y_d^e = \sigma_1 x^e + \sigma_2(m^e - p^e) \quad (3.6)$$

$$p - w^e = b_0 - b_1(y_d^e - \bar{y}) + b_2(y^p - k) \quad (3.7)$$


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$$w = \lambda[p - b_{01} + b_2 \alpha(k - n_{-1})] + (1 - \lambda)[w^e + c_0 - c_1 \Delta u + c_3 \hat{z}_w] + \hat{z}_{1w} \quad (3.8)$$

$$u = l - n \quad (3.9)$$

Equation (3.1) describes the log-linear version of the production function, in which it is assumed that technology has constant returns. Equation (3.2) expresses the production function of full employment. Equation (3.3) expresses the equilibrium condition therefore demand and supply must be equal. Equation (3.4) describes the function with regards to output planning. Equation (3.5) supposes that aggregate demand is obtained like a solution of an IS-LM system (equation (3.6) is the expected function of demand) and is a function of fiscal and monetary policy. The price setting equation (3.7) is obtained by short run profit maximization. The price equation, like that of wages, is obtained by the microeconomic relations that describe, respectively, the behaviour of the single firm and that of the trade union. It is useful to reorganize the model in three equations which refer to unemployment, prices and wages. These three equations with the addition of the demand equation (3.5) are sufficient for a full analysis of the economy, both in terms of long run equilibrium and of the short run dynamics.

Important features of this stationary situation are:

- the equilibrium unemployment level depends only on the exogenous variables of wage pressure ( $z_w$ ), the parameters of the equations of price, wage and on the function of production;
- the equilibrium unemployment level does not depend on the ratio capital/labour, which affects only the real wages;
- from the equilibrium characteristics of this system of equations, we can classify the model like a NAIRU, in fact, only the supply side factors can influence employment in the long run and the output level, while the demand factors and political measures can play a significant role only in the short run.

## A2. Equilibrium Solution and impact multipliers

### A2.1 The Long Run Effects

From the equilibrium solution we find that:

$$\frac{\partial u}{\partial k} = \frac{\partial u}{\partial m} = \frac{\partial u}{\partial IRTI} = \frac{\partial u}{\partial GTI} = 0$$

$$\frac{\partial u}{\partial FMI} = \frac{\delta_1 - \delta_2}{\alpha\beta(\lambda - 1)} \neq 0$$

$$\begin{aligned} \frac{\partial(w-p)^*}{\partial k} &= \frac{\alpha\beta(\psi + \gamma\alpha_2)}{\psi + \alpha\beta\xi\psi + \alpha\gamma\alpha_2 + \alpha\beta\gamma\psi\alpha_2} \neq 0 \\ \frac{\partial(w-p)^*}{\partial m} &= -\psi \frac{\alpha\beta\gamma\alpha_2}{\psi + \alpha\beta\xi\psi + \alpha\gamma\alpha_2 + \alpha\beta\gamma\psi\alpha_2} \neq 0 \\ \frac{\partial(w-p)^*}{\partial IRTI} &= -\sigma \frac{\alpha\beta\gamma\alpha_2}{\psi + \alpha\beta\xi\psi + \alpha\gamma\alpha_2 + \alpha\beta\gamma\psi\alpha_2} \neq 0 \\ \frac{\partial(w-p)^*}{\partial GTI} &= -\rho \frac{\alpha\beta\gamma\alpha_2}{\psi + \alpha\beta\xi\psi + \alpha\gamma\alpha_2 + \alpha\beta\gamma\psi\alpha_2} \neq 0 \\ \frac{\partial(w-p)^*}{\partial FMI} &= \frac{2\lambda\psi\delta_1 - \psi\delta_2 - \gamma\psi\delta_2 - \alpha\gamma\alpha_2\delta_1 + \gamma\psi\alpha_1\delta_1 - \gamma\psi\alpha_1\delta_2 + \alpha\lambda\gamma\alpha_2\delta_1}{\lambda\psi - \psi - \alpha\beta\xi\psi - \alpha\gamma\alpha_2 + \alpha\beta\lambda\xi\psi + \alpha\lambda\gamma\alpha_2 - \alpha\beta\gamma\psi\alpha_2 + \alpha\beta\lambda\gamma\psi\alpha_2} \neq 0 \\ \\ \frac{\partial mn^*}{\partial k} &= \frac{\partial mn^*}{\partial m} = \frac{\partial mn^*}{\partial IRTI} = \frac{\partial mn^*}{\partial GTI} = \frac{\partial mn^*}{\partial FMI} \neq 0 \end{aligned}$$

## A2.2 The Impact Multipliers

Looking at the multipliers matrix  $B_0^*$  emerges that:

$$\begin{aligned} \frac{\partial u}{\partial k} &= -\alpha\beta\lambda \frac{\xi}{\alpha\beta\lambda\xi - \alpha\beta\xi - 1} \geq 0 \\ \frac{\partial u}{\partial m} &= -\frac{\psi}{\alpha(1 + \beta\psi)} \leq 0 \\ \frac{\partial u}{\partial IRTI} &= -\frac{\sigma}{\alpha(1 + \beta\psi)} \leq 0 \\ \frac{\partial u}{\partial GTI} &= -\frac{\rho}{\alpha(1 + \beta\psi)} \leq 0 \\ \frac{\partial u}{\partial FMI} &= -\frac{\psi(\delta_1 - \delta_2)}{\alpha(1 + \beta\psi)} \end{aligned}$$

Moreover the response of wages and migration to shocks on the exogenous variables:

$$\frac{\partial(w-p)}{\partial k} = -\alpha \frac{\beta}{-\xi\alpha\beta + \beta\alpha\xi\lambda - 1} \geq 0$$

$$\frac{\partial(w-p)}{\partial m} = -\frac{\beta\psi}{1+\psi\beta} \leq 0$$

$$\frac{\partial(w-p)}{\partial IRTI} = -\frac{\sigma\psi}{1+\psi\beta} \leq 0$$

$$\frac{\partial(w-p)}{\partial GTI} = -\frac{\rho\beta}{1+\psi\beta} \leq 0$$

$$\frac{\partial(w-p)}{\partial FMI} = -\frac{(-\delta_1 + \delta_2)}{1+\psi\beta}$$

$$\frac{\partial mn}{\partial k} = \frac{\alpha_2(1 - \alpha + \alpha\beta\xi - \alpha\beta\psi - \alpha\beta\lambda\xi)}{\psi(\alpha\beta\lambda\xi - \alpha\beta\xi - 1)}$$

$$\frac{\partial mn}{\partial m} = \frac{\partial mn}{\partial IRTI} = \frac{\partial mn}{\partial GTI} = \frac{\partial mn}{\partial FMI} = 0$$

### A2.3 The Model Specification

This section reports model specification having as endogenous variables employment level ( $n$ ), real wages ( $w$ ), labour force participation ( $l$ ) and migration flows ( $m$ ). The set of exogenous variables include five components of the theoretical model, except for money stock which is indicated in real terms ( $m$ ).

Considering the model specifics we opted for the use of two lags for the endogenous variables. The supporting evidence derives principally from the Wald test, by which we can see how only the first two lags are significant. The information criteria related to the choice of the order of the lags (FPE, AIC, SC and HQ) show that for the Schwarz and Hannan – Quinn criteria the relevant lags are two, whereas for Final Prediction Error and for Akaike Information Criterion the relevant lags are three. A further indication on the choice of the number of lags is provided from the results of the residuals of the autocorrelation tests, from which emerges that it is necessary to consider up to four lags.

For the exogenous variables we used a procedure that moved from the overall picture to specific details, starting with a model from one to four lags for all exogenous variables, eliminating the non significant lags. Due to this reason it has been decided to maintain just one single lag for both real money and trade openness. For capital stock, trade integration and financial market integration we opted for two lags.