European integration, labour market dynamics and migration flows

Michela Martinoia
This paper has a double goal. On one side we want to evaluate the effect of economic integration on migration flows moving from the enlargement countries towards the EU-15; on the other, we want to analyse whether the migration flows had any impact over employment, real wages and labour force in the receiving countries of the European labour market. Due to the fact that economic integration can be observed in different real, monetary and financial phenomena, we refer to three of these to measure integration: trade openness, trade integration and financial market integration. These indicators have been inserted in a theoretical model that tries to explain labour market dynamics. The theoretical context that seemed the most suitable one to summarise European labour market characteristics is a modified version of the insider/outsider model proposed by Layard, Nickell and Jackman (LNJ, 1991). Another innovative contribution is the introduction of an equation modelling migration flows, whose creation is inspired to the neo-classic approach to the migration theory (Harris-Todaro, 1970). The model based on rational expectations is solved to find the equilibrium solution and the impact multipliers. Subsequently we estimated a structural VAR with the aim of both evaluating the impact that different shocks on integration measures have on migration flows, and measuring the type of effects that an increase in migration flows causes on the labour market. The estimates show that economic integration generate relevant effects on migration flows from the enlargement countries towards the EU-15 countries. Moreover, from the results emerge that migration flows generate an effect on the labour market.

* michela.martinoia@unimib.it
1. Introduction

The analysis of continental European labour market trends reveals two stylized factors characterizing many European countries in the last decades. The first one is the high level of unemployment persistence, while the second one is the slowness of the disinflation process that accompanies unemployment growth. On the contrary, the US and UK have experienced a more cyclic evolution of unemployment and lower price viscosity. These facts have triggered an intense debate among economists on the causes of unemployment, on persistence and on its differentials among countries. The problem of persistence can be interpreted, together with inflation viscosity, as a signal of a NAIRU shift. Coherently with this vision, many studies have interpreted the unemployment phenomena as being structural, underlining the relevance of labour market rigidities and the intrusive role of institutions. A natural evolution of this phenomena (defined eurosclerosis) emphasizes the relevance of long term unemployment and combines the role of institutional rigidities with trade union activities as a cause of the hysteresis mechanisms that can extend in an undefined way the effects of aggregate demand shocks, otherwise temporary. This paper lays inside this wide literature and it focuses on one particular aspect, that is, on the analysis of the issue of economic integration and of migration in Europe and on their repercussions over the labour market.

Economic literature dealing with the potential consequences of the process of global and regional economic integration had a consistent development starting from the second half of the twenty-first century. Economic integration is perceived as an important factor for growth, and due to this in literature we find different theoretical and empirical researches regarding the impact of economic integration on growth (Balassa (1961), Baldwin (1993, 1995), Henrekson et Alii (1997), Landau (1995), Walz (1998), Badinger (2001, 2005) and Gao (2005)). The contributions of this literature emphasise the different channels through which the process of economic integration generates impacts on economic growth. The most important channels are: internal and external economies of scale, faster technological progress, increase in competitiveness, reduced uncertainty, lower costs of capital and a more favourable environment for the economic activity. One of the most controversial points of this literature is the distinction between permanent and temporary growth effects. In the neo-classical theory of growth, economic integration does not affect growth rate at steady state. Economic integration, therefore, has only temporary effects. Under certain conditions

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1 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.
the effects of permanent growth are possible in the endogenous growth theory, although it depends on the possibility of disclosing knowledge at international level. If this condition is maintained economic integration leads to a scale effect in research and development that can lead to permanent growth effects enabling a reallocation of intersectoral and international effects.

From the review of the literature on economic integration 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 relation between economic integration and regional labour market dynamics (Blanchard and Katz, 1992; Decressin and Fatás, 1995; Fatás, 1998, Alecke et Alii, 2009). Among the most relevant aspects emerged from the studies on the link between economic integration and 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 not so mobile in Europe (Fertig, 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 work through the integration of the product market. The issues of economic integration and of labour mobility are also analysed from another 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 Alii, 2005 and 2007; Drinkwater et Alii, 2006; Manacorda et Alii, 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, 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 on migration. The main conclusion of the paper is that it is improbable that capital movements will lead to a levelling-off of prices, especially of wages.

Another aspect that emerges from this literature considers the relationship between European integration and unemployment. Blanchard and Wolters (2000) prove that a 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 as reduction in growth of total factor productivity, higher real interest rates and adverse shifts in demand together with institutional rigidities, as the generous insurance system for 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 alii, 2007). Their results show that economic integration changes labour market structures, leading to wage convergence and to a stronger wage interdependency (Andersen et alii, 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 this contribution evaluates different aspects of the link between economic integration and labour market. However, a rigorous quantitative analysis of the impact of a greater labour market integration has been omitted. An innovative paper in this sense is by Fertig (2003) that analyses the relation between economic integration and employment in Europe, estimating the contribution of dedicated integration measure to observe the macroeconomic developments of the labour market. The most important evidence that emerge 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 term 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 original EU member states except for Southern enlargement countries.

According to the literature on European economic integration we can find several contributions that evaluate different aspects of the relationship among economic integration, labour market and labour mobility, whereas a qualitative analysis of the impact of higher integration on the labour market in the European countries has not provided significant results yet. This paper has a double goal. On one side we want to evaluate the effect of economic integration on migration flows moving from the enlargement countries towards the EU-15\(^2\), on the other, we want to analyse the migration flows had significant consequences over employment, real wages and labour force in the receiving countries of the European labour market. To conduct this analysis we consider three fundamental aspects such as; economic integration, labour markets and migration flows from the enlargement\(^3\) countries towards the EU-15 countries. Economic integration can be observed in different phenomena such as real, currency and financial integration. These phenomena include the business cycle synchronisation, inflation rates convergence, exchange rates variability, interest rates convergence, trade openness, trade integration and convergence of

\(^2\) The EU-15 countries are: Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy Luxembourg, the Netherlands, Portugal, United Kingdom, Spain and Sweden.

\(^3\) As Enlargement countries we mean those 10 that entered in the EU in 2004, including Bulgaria (entered in 2007), such as: Bulgaria, Cyprus, Czech Republic, Hungary, Malta, Poland, Romania, and Slovakia.
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 at the first step three integration indicators that are included in a model which explains labour market trends. The hypothesis on which our theoretical model is based on are those of an insider/outsider mechanism characterising labour market trends, in presence a monopolistic trade union. The major innovations refer to the introduction of three economic integration measures and of migration flows that are modelled coherently with the neo-classic approach of the migration theory. The second step considers the estimation of a structural VAR (Vector Autoregression Model) used to evaluate the impact shocks to integration indicators have on migration flows towards EU-15 countries, and what effect migration has on some labour market variables. From the results emerge a positive impact on economic integration, in particular over trade integration, and on migration flows that consequently have positive effects on both employment and labour force.

The structure of this paper is as follow: section 2 describes migration trends among EU-27 countries. Section 3 presents the integration indicators, the theoretical model we refer to and the relative equilibrium solution. Section 4 is dedicated to estimation issue used and the comments made to the results, whereas section 5 contains the conclusions.

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

From to the literature concerning European integration emerges that the Treaty of Rome sanctioned the formation of a common market allowing the free mobility workers, goods, services, and capital. As the years pass, the integration project has created a single market for goods and capital, whereas the free mobility workers is still a problem in the integration process, which is shown by a very low level of migration. Conflicts over immigration policies in Europe are more rough and people are less aware of it than in the US. Radical positions (those that propose multiethnic societies and the complete liberalisation of migration flows, or those that contrast any type of migration) are generally more spread in Europe rather than in the US. These types of attitudes generally develop on ideological basis, in fact movements supporting or contrasting migration in Europe are rarely based on empirical evidence and statistics. In the US, on the other hand, the debate is more self-aware, supplying lots of data to support arguments. Thus, the debate leads to a wider knowledge of the issue among politicians and activists, as well as the general public opinion. The majority of Europeans seems not to be in favour of an increase to the stock of immigrants, meaning they are in favour of a zero immigration scenario. Surveys made in the US show that the American
citizens rather maintain migration flows at the current level, instead of turning it down to zero, and accept that foreign population resident in the US increases, provided that annual flows will not increase (Zimmerman, 1995 and 2004). These opinions explain why the immigration policy in the EU shows so much rigidity. The US show difficulties in the implementation of immigration policies as well, but restrictions are applied in a better way than in Europe, since they are not as protective.

Only a few decades ago, Europe has experienced a mass migration towards the Americas, Africa and Asia. Meanwhile, the economic scenario has changed and since the second post-war period Europe has become one of the main region of destination for immigrants all over the world. The net annual immigration rate towards Europe has, in fact, increased from 0.3% in the ‘50s, to 11.3% in the ‘90s. The rate of the EU reached a higher level than the European average (2.2% in the ‘90s). The net immigration rates vary considerably among nations and regions. In Western Europe, being the main destination area, the net migration rate has dropped following the first oil crisis, from 2.6% in the ‘70s to about 1.7% in the ‘70s – ‘80s, reaching in the early ‘90s its maximum level (4.7%). In these same years, Southern Europe has changed its role, moving from being the origin to being the destination of net migration flows. The levels of immigration growth rates in Southern European countries, members of the EU, are underestimated from official statistics due to a high number of immigrants working in sunk economy. Total immigration in the EU increased over the last five years. In 2006 the number of immigrants was nearly a quarter higher than 2002. The annual average increase was more than 100,000 during this period. However, in the last three years this increase has slowed, even turning into a decline in 2005. The biggest rise in immigration was 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 numbers. By contrast, several countries including Germany, Austria and the Netherlands saw 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 4). 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 Ireland, Cyprus and Spain. These four countries had significantly higher rates compared with

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4 National immigrant means a person who returns to his or her country of citizenship, having previously live abroad. Retuning nationals includes national citizens born abroad who have not previously been resident in their country citizenship.
other member states, while for Germany and the UK, immigration per 1000 inhabitants was closed to the EU-27 average (Eurostat, 2008 and 2009).

Europe is the continent where workers are less willing to move for working purposes. Less than 1 over 200 workers changes region of residency annually, against 5 over 200 workers in the US. Immobility of Europeans is even more clear thinking of the lack of balance present among European regions. In the same European country can coexist regions lacking of workers with regions with scarce labour supply. Often this unbalance becomes chronic. This makes immigrants necessary and at the same time source of social unrest. Different institutions are responsible for the scarce mobility of European labour force and some of them play a fundamental role inside the different countries of the EU. Mobility is weakened by wage compression created by centralised agreements on remuneration, regimes of job protectionism make it more difficult for workers of poor regions to find a job in another part of the country and unemployment benefits (transfer payment offered to working age individuals that do not have a job) discourage workers from accepting an even slightly lower wage. Meanwhile, shifting job to exploit new opportunities created in different geographical regions is more expensive due to strong fiscal deductions favouring ownership of houses and regulated renting fees. Moreover, other institutions discourage mobility through countries of the EU. Language differences certainly constitute a huge obstacle to the flow of labour force among each country and the lack of co-ordination among institutions of the different EU member states represents a real tax over the flow of labour force. Differences in national legislation concerning pension funds and lack of harmonisation in taxation procedures concerning social welfare, lead to a significant reduction in pension rights of those workers moving through various countries. For whatever reason, it is doubtless that labour is an immobile factor in Europe. The growing amount of non-EU residents in the EU is, instead, more mobile than the rest of the labour force. Having a higher number of immigrants can help Europe becoming a continent with a more mobile labour force. Due to the fact that Europeans are less mobile than the 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 to balance different markets. Immigrants settle themselves exactly in those areas having the widest labour opportunities. Initially, they tend to settle close to the borders, but if the labour opportunities in those areas turn out to be less favourable than anywhere else, they will probably move. Immigrants chose where to settle even considering the generosity of the social status. The different nature and generosity of the social status in the EU member states alters the composition of immigrants, selecting 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 to the decrease of the population growth rate and with the increase of the average age in the Union countries. Since early ‘70s in spite of a growth in population of the EU-15 member states from 49 to 375 million, working age population (20-64) has started to shrink: forecasting a reduction from 225 million in 1995 to 223 million in 2025. This decline, although it seems moderate, is however relevant, due to the forecast of a substantial increase in the number of elderly. The amount of population over 65 years old moved from 13% in 1975 to 15.4% in 1995; currently it is forecast that it will 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 the immigration younger than 25 and 80% younger than 35. The Netherlands and Sweden also received relatively more young immigrants than others: 70% were younger than 35. However, the proportion of younger immigrants in these countries was not 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 Slovakia data, half of people immigrating to this country were even older than 32. In Slovenia, this was mainly because of relatively older non national EU immigrants5, while in the Czech Republic, returning nationals were older. Thus, immigrants’ age composition varied markedly across the EU member, 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, we must notice that those European countries that traditionally have been of emigration are experiencing similar ageing trends of population: birth-rates of Southern European countries are equal or even lower than that of the 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 ‘50s and ‘60s provides the basis for relatively favourable international immigration policies towards EU member states. Subsequently, persistence in unemployment

5 Non-EU immigrant means an immigrant who has no citizenship of any EU Member States.
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% the amount of EU citizens that live in another member state. As a matter of fact, the majority of foreign citizens living in the Union is of extra-European origin. The overall macroeconomic scenario of the EU is 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 preoccupations concerning the financial account of a 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 on the real, currency and financial side. These phenomena include business cycle synchronisation, inflation rates convergence, exchange rates variability, interest rates convergence, trade openness, trade integration and convergence of income (Dorrucci et Alii, 2002). We focus on two of these integration phenomena in order to obtain one measure of real integration and one of monetary integration. The phenomena selected include the degree of trade openness, trade integration and financial market integration. This sub-section will illustrate how these integration measures have been built, their economic value and the evolution of their trend.

The first created measure is an indicator of trade openness \( (TO) \). According to the literature on economic integration and trade, a number of countries can take more benefit from the decrease or the elimination of exchange rate variability if they show a higher degree of trade openness. In order to measure the level of trade openness we use the ratio between the intra-regional trade\(^6\) and the total trade among the thirteen countries, considered as one single entity, that constitute the Monetary Union. The evolution of this ratio is shown in the figure 1, where it is possible to identify two different stages. The first step lasts from the Sixties to the Seventies where we can observe a very slow, almost stable rise, which is probably due to the fact that even before the ‘80s there was a tendency to reach economic

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\(^6\)In order to calculate the intra-regional trade we added the annual data related to the imports and exports of the thirteen countries to and from the Euro area, whereas for the total trade we added the total amount of imports and exports of these countries. To maintain homogeneity among the previous data used, which are quarterly, the trade data has been computed into quarters, enabling to then calculate the ratio between the two measures. The data source for intra-countries trade and total trade is Ameco and the period of time considered goes from 1960Q1 to 2007Q4.
integration by the removal of tariffs. The second step starts in the Seventies, where we notice a turning point that should be liked to the birth of SME. This change could derive from the stabilising function of exchange rates retained by SME that has generated a reduction of uncertainty and has consequently favoured exchanges. 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 defines the concept of Internal European Market, proposing to integrate national markets in order to convert them into a wider and sufficiently flexible booming market.

Figure 1: Trade Openness (TO)

![Trade Openness (TO) graph]

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

The second created measure is an indicator of trade integration (TI) which is obtained from the ratio between the total trade and the GDP (Gross Domestic Product)\(^7\) of thirteen of the Euro area countries. The trend of this indicator is represented in figure 2. From the figure it is possible to notice that the trade integration has a quite steady and not much volatile trend and, as we have already pointed out for trade openness, it is probably due to the fact that even before the ‘80s the idea of reaching trade integration was supported by the free flow of goods, people, services and capital. Differently from the degree of trade openness where the increase of the internal has a cyclical behaviour, in this case we can observe that the overall volume of trade rises in a more linear way.

\(^{7}\) The source of trade data is Ameco, while the GDP data has been taken from the European Central Bank and the period of time considered goes from 1970Q1 to 2007Q4. In order to calculate the total trade we summed up the annual data related to the import/export total amounts of these twelve countries. To maintain homogeneity among the previous data used, which are quarterly, the trade data has been computed into quarters, enabling to then calculate the ratio between the two measures.
The third measure is an indicator of financial market integration \((FMI)\). In order to measure financial market integration we used the correlation between short term interest rates through thirteen countries of the Euro Area. 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. The figure shows how financial market integration has an overall growing trend in the long run although its behaviour is oscillatory. This indicator can also be analysed in comparison to the evolution of the European Monetary Union. The first aspect to be considered is the fact that the ‘80s were characterised by severe economic crises which created a sort of fragmentation of financial markets. Countries searched for a compromise in order to restore a certain balance, that was carried out 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 of integration; in fact the aim of this phase was the liberalisation of capital and a higher 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.

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\(^8\) 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.
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 decided to use as 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 for LNJ (1991) model and in the same way is a microfounded structural model. Also in this case, we assume a theoretical context characterised by imperfect competition in the product market, the existence of an insider/outsider mechanism with phenomena of partial/total hysteresis and the presence of a monopolistic trade union. The first innovation is given from the introduction of an equation that models the migration flows. From the neo-classic approach of migration, 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, meaning the degree of trade openness (TO), trade integration (TI) and financial market integration (FMI). These three variables can be considered endogenous 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 statistic way and therefore would cause difficulties modelling them with the economic theory.
This theoretical model is characterised by six endogenous variables: output \(y\), prices \(p\), wages \(w\), employment \(n\), and migration \(mn\). The exogenous variables are capital stock \(k\), money stock \(m\), trade openness \(TO\), trade integration \(TI\) and financial market integration \(FMI\). The equations describing this economy are the following:

\[
\begin{align*}
(1) \quad & y_t = a n_t - (1 - \alpha)k_t + \varepsilon_t \quad \eta^e_t \approx w.n.(o, \sigma_e) \\
(2) \quad & y_t = \sigma TO_t + \rho TI_t + \psi(m_t - p_t) + \theta_t \quad \eta^\theta_t \approx w.n.(o, \sigma_\theta) \\
(3) \quad & p_t = w_t + \beta(y_t - k_t) - \delta FMI + \nu_t \quad \eta^\nu_t \approx w.n.(0, \sigma_n) \\
(4) \quad & w_t = p_t^e + \alpha\beta k_t - \alpha\beta\lambda n_{t-1} - (1 - \lambda)\alpha\beta l_t^e + \delta_2 FMI + \eta_t^\omega \quad \eta_t^\omega \approx w.n.(0, \sigma_\omega) \\
(5) \quad & l_t = m_{t-1} + \xi(w - p_t) + \gamma mn_{t-1} + \eta_t^l \quad \eta_t^l \approx w.n.(0, \sigma_l) \\
(6) \quad & mn_t = A_t - \alpha_1 l_{t-1} + \alpha_2 n_{t-1} + \alpha_3 w_t^e + \eta_t^{mn} \quad \eta_t^{mn} \approx w.n.(0, \sigma_{mn}) \\
(7) \quad & u_t = l_t - n_t
\end{align*}
\]

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

Equation (1) describes the log-linear version of a production function having technology and constant performance, 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 from 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 labour force depending positively on real expected wage and on migration flows and negatively on the passed level of unemployment. Finally, equation (6) describes migration, whereas (7) is a simple identity defining unemployment.

The choice of representing migration in this way is coherent with the indications coming from migration theories, and especially from the approach proposed by Harris-Todaro (1970). In this model the choice of migrating is based on the expected gains of employment; due to this, people move if the expected wage (that depends from the perspectives of finding jobs and from 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

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9 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.
high level of unemployment and low wages it will have limited migration flows. Considering
the Harris-Todaro structure, migration is determined from the prevailing wage level and
from the possibility of finding a job in a given region.

The migration equation will be given from:

\[ MN_t = A_t (u_{it}^{\alpha_t} w_{it}^{\alpha_s}) \]

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

\[ MN_t = A_t - \alpha_1 \ln u_{it} + \alpha_2 w_{it}. \]

In addition to these migration determinants, there can be other influencing factors that
can depend on differences in labour market institutions, as for example a higher level of
employment protection as well as a higher substitution rate that can impact labour supply.
Moreover, even regional differences can be important, for example, if getting a house in a
certain region results difficult and expensive, migration towards that region will be relatively
low. Another possible source of factors influencing migration decisions 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:

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

Taking expectations of (10), we find that:

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

Where we have:

\[ (12) \quad A_1^* = -(A_0 + \Gamma)^{-1} A_1 \]

\[ B_0^* = -(A_0 + \Gamma)^{-1} B_0 \]

\[ B_1^* = -(A_0 + \Gamma)^{-1} B_1 \]

If the expectations of vector \( X_t^e \) are defined in the following way:

\[ (13) \quad X_t^e = [k_t \ m_{t-1} \ TO_{t-1} \ TI_{t-1} \ FMI_{t-1}] \]

by replacing (13) in (11) we can solve the model in terms of expectations:
(14) \[ A_0 Y_t + A_1 Y_{t-1} + B_0^* X_t + B_1^* X_{t-1} = \Xi, \]

where we have:

\[ A_0^* = \Gamma A_1^* + A_0, \]
\[ B_0^* = \Gamma B_0 D_1 + B_0, \]
\[ B_1^* = \Gamma B_0^* D_2 + [\Gamma B_1^* + B_1] \]

### 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:

\[ (16) Y_t = -\left( A_0 + A_1^* \right)^{-1} \left( B_0^* + B_1^* \right) X = QX \]

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) we can make some considerations. The first one is that the monetary policy does not impact neither on the labour demand equilibrium nor on the labour supply equilibrium, in fact \( \partial u^*/\partial m = 0 \). Real wages on the other hand result in being influenced by the monetary policy \( \partial (w - p)^*/\partial m \neq 0 \). Secondly, the degree of trade openness \((TO)\) and trade integration \((TI)\) do not have any effect on long term unemployment \( \partial u^*/\partial TO = \partial u^*/\partial TI = 0 \), whereas from long term multipliers we observe some effects different from zero on real wages: in fact \( \partial (w - p)^*/\partial TO = \partial (w - p)^*/\partial TI \neq 0 \). This could be due to the fact that the degree of trade openness and trade integration are not structural factors, they only act on the demand, that does not influence long term unemployment, all this is coherent 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 \( \partial u^*/\partial FMI \neq 0; \partial (w - p)^*/\partial IMF \neq 0 \). As in the case of the LNJ model, variations in the capital stock produce some positive effects only on 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
exogenous variables have on equilibrium migration, we derive that all shocks have impacts different from zero.

### 3.5 The Impact Multipliers

Looking at the multipliers matrix $B^*_0$ (see the Appendix) emerges that: monetary policy shocks to the degree of trade openness and to trade integration 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 $\sigma$, $\rho$ and $\psi$ and negatively from $a$ and $\beta$. These three shocks have an impact that reduces real wages as well, consistently with unemployment tends. 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 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 data used in the estimation step and the relative sources.

The data are relative to the EU-15 member states considered as on 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 goes from the 1985 to the 2007. The period after 2007 is not included because it is characterized by too many turbulences in despite of a number of available observations not high enough to give these turbulences a correct interpretation.

The output ($y$) is represented by sets of gross domestic product with constant prices; for prices ($p$) we used the harmonised consumer price index, whereas for wages we decided to use sets of compensation per employee. For employment ($n$) we used total employment, whereas labour force is obtained adding employed and unemployed. All data is seasonally adjusted and the source is the European Central Bank. Capital stock ($k$) is obtained by combining Gross Fixed Capital Formation ($GFCF$) at constant prices, adjusting them seasonally, minding 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. The data source is the European Central Bank, 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 concerning the aggregate of Euro countries for such a long period of time (1980-2007), we have decided to use the seasonally adjusted M3. The data source is the European Central Bank.

The degree of trade openness (\( TO \)) is computed using the ratio between the intra-regional trade and the total EU-15 trade. The data used concern the amount of imports and that of exports both inside the EU-15 and outside the European Community. The data sources are both the European Central Bank and Ameco. The same sources are used in order to obtain the data necessary to show trade integration (\( TI \)). It is given from the ratio between total trade and the GDP of EU-15. Finally, in order to analyse the financial market integration (\( FMI \)), we have decided to use the correlation of the short-term interest rate 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 coming 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 temporal horizon of 10 quarters. Summarising, the estimate of the model is obtained considering the following variables:

\[
Y_t = \begin{bmatrix}
  n_t \\
  w_t - p_t \\
  l_t \\
  mn_t
\end{bmatrix} = \begin{bmatrix}
  n_t \\
  wr_t \\
  l_t \\
  mn_t
\end{bmatrix}
\]

\[
X_t = \begin{bmatrix}
  k_t \\
  m_t - p_t \\
  TO_t \\
  TI_t \\
  FMI_t
\end{bmatrix} = \begin{bmatrix}
  k_t \\
  mr_t \\
  TO_t \\
  TI_t \\
  FMI_t
\end{bmatrix}
\]
The estimated model is an unrestricted structural VAR with deterministic and exogenous lagging variables:

$$\Pi^\gamma(L)y_t = \Psi d_t + \Pi^\gamma(L)X_t + \epsilon_t, \epsilon_t \approx VWN(0, H^{-1})$$

$$\Pi^\gamma(L) = I_n - \sum_{i=1}^{h_1} \Pi^\gamma L_i, \Pi^x(L) = \sum_{i=0}^{h_1} \Pi^x L_i$$

This VAR 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:

$$y_t = d_t^*, C(L)X_t + \epsilon_t$$

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

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

### 4.2 The Impulse Response Functions

This section will present the impulse response functions of employment, real wages, labour force and migration flows to shocks on exogenous variables.

According to the obtained results, it is possible to make some general observations. Firstly, we can notice that the system shows a kind of inertia, in fact impulse responses often tend to stabilise in the mid-long run on significant values. This seems 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 are different depending on the type of shock. A shock to trade openness (TO) generates overall non significant effects both in the short and in the long run. Differently, shocks to trade integration (TI) 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:
From the impulse responses we can observe:
- a positive effect in the short and mid-term on employment; no effect in the long run;
- a negative effect on real wages in the short and long run;
- a not 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 causes effects on the labour market. This innovation generates an increase of both employment and labour force, but given that employment seems to increases more than participation, there should be a reduction of unemployment. Moreover, we observe a negative effect on real wages.

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 concept suggested by the theoretical model proposed by Bauer and Zimmermann (1995 and 2004) and Brücker (2002). Migration flows seem 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 out 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 suggest 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. In this situation there should be an overall increase of the level of employment and, due to their characteristics and their competitiveness, immigrant workers should find employment easily. While analysing this situation, the potential indirect effects that such a type of shock could cause on labour demand should not be forgotten. 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 increase could have positive effects on wage.

Impulse responses with respect to a shock to trade integration (TI) are the following:

We can observe that a positive shock to trade integration (TI) 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 not 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;
- positive and significant effects on the labour force participation that tend to be persistent in the long run;

---

10 Due to this result it is reasonable to assume migration from the enlargement countries is skilled.
11 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.
positive effects on migration in the short and mid-term; in the long run we can not make any consideration due to the fact that the impulse response results not significant.

Summarising, from the analysis of the impulse responses of shocks to trade integration, we can observe an increase in employment which is higher than the one of labour force participation, from which it follows a decrease of unemployment.

The results are coherent with the theoretical model presented in section 3. A higher 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 pushing consumption. These factors could lead firms to ask for a higher amount of labour increasing employment. On the other hand, a greater trade integration should 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 the aggregated demand. This should generate an increase in firm labour demand. At this point it is reasonable to assume that workers, seeing a decrease in unemployment and an increase in wages, will decide to increase labour supply. A 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 trade openness (TO) are the following:

<table>
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<tr>
<th>Response N to TO</th>
<th>Response WR to TO</th>
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<table>
<thead>
<tr>
<th>Response to L of TO</th>
<th>Response to MN of TO</th>
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From the plots we can observe that a positive shock on the degree of trade openness (TO) does not cause significant effects both in the short and in the long run on any endogenous variable. In this case it is not possible to make any consideration on 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:

- **Response of N to FMI**
  - 0.003
  - 0.002
  - 0.001
  - 0
  - 0.001

- **Response to WR of FMI**
  - 0.004
  - 0.003
  - 0.002
  - 0.001
  - 0

- **Response to L of FMI**
  - 0.002
  - 0
  - 0.0015
  - 0.001
  - 0.0005

- **Response to IMM of FMI**
  - 0.06
  - 0.05
  - 0.04
  - 0.03
  - 0.02
  - 0
  - 0.001

We observe:
- a negative effect on the level of employment in both short and long run
- an effect on real wages that cannot be defined, due to the fact that the impulse response results not significant both in the short and in the long run
- a negative effect on labour force participation in the short and mid-term, whereas in the long run the response becomes not significant
- a not 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 a greater financial market integration, generating a more efficient allocation of resources, leads to a reduction in transaction costs and therefore of firms marginal costs. Marginal costs for firms are represented by borrowing costs, and therefore this could generate an effect by which firms substitute labour with capital, causing an increase in unemployment.
The issues developed in this paper can be distinguished from the theoretical literature considered in a section 1, mainly due to different reasons. First, the analysis of the effects that economic integration have on migration flows is based of the theoretical model of reference that will then affect the estimated model. Second, the evaluation of the integration impacts is made considering in three different ways the concept of integration, enabling to understand what type of effects are generated by different shocks on endogenous variables. For example, we can observe how trade integration and financial market integration are the indicators having a stronger impact on both labour market variables and migration flows.

5 Conclusions

From the analysis of continental European labour market trends we observe two stylized facts characterizing many European countries in the last decades. The first one is the high level of unemployment persistence, while the second one is the slowness of the disinflation process that accompanies unemployment growth. On the contrary, the US and UK have experienced a more cyclic evolution of unemployment and lower price viscosity. These facts have encouraged an intense debate among economists on the causes of unemployment, about persistence and its differentials among countries. The problem of persistence can be interpreted, together with inflation viscosity, as a signal of a NAIRU shift. Coherently with this vision, many studies have interpreted the unemployment phenomena as being structural, underlining the relevance of labour market rigidities and the intrusive role of institutions, as for example unemployment benefits schemes and workers protection systems. A natural evolution of this phenomena (defined eurosclerosis) emphasizes the relevance of long term unemployment and combines the role of institutional rigidities with trade union activities as a cause of the hysteresis mechanisms that can extend in an undefined way the effects of aggregate demand shocks, otherwise temporary. This paper lays inside this wide literature and it focuses on one particular aspect, that is, on the analysis of the issue of economic integration and of migration in Europe and on their repercussions over the labour market. Before entering in the details 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 neighboring 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 convergence in prices, interest rates, unemployment rates and living
standards. In the case of the EU we observe that as the years pass, the integration project has created a single market for goods and capital, whereas the free mobility workers is still a problem in the integration process, as the a very low level of intra EU migration confirms. The aim is 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 pursuit through the constitutions of theoretical models that were than transferred to reality with empirical evidence. The context that seemed more suitable 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 hysterisis 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 have decided to use three of these to measure integration, thus to have two measures describing real phenomena (trade openness and trade integration) 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 to summarise European labour market characteristics is a modified version of the insider/outsider model proposed by LNJ (1991). This model joins together the hypothesis of rational expectations and the concept of natural unemployment rate with rigidities and imperfection in markets, thus results the most suitable for the study of modern economic systems. From the comparison of the theoretical model with the results obtained from empirical results seems to emerge some signal of novelty in the European labour market, that is 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 in the labour force but by being outsiders they are characterised by a low level of unionism; moreover Easter European migrants are well endowed in terms of human capital and for this they result competitive and therefore attractive for firms.
6. References


Eurostat (2008),”Eurostat Yearbook 2008”
Eurostat (2009),”Eurostat Yearbook 2009”


7. Appendix

7.1 The Long Run Effects

From the equilibrium solution we find that:

\[ \frac{\partial u}{\partial k} = \frac{\partial u}{\partial m} = \frac{\partial u}{\partial TO} = \frac{\partial u}{\partial TI} = 0 \]

\[ \frac{\partial u}{\partial FMI} = \alpha \beta (\lambda - 1) \neq 0 \]

\[ \frac{\partial (w - p)^{\ast}}{\partial k} = \frac{\alpha \beta (\psi + \gamma \alpha_2)}{\psi + \alpha \beta \zeta \psi + \alpha \gamma \alpha_2 + \alpha \beta \psi \alpha_2} \neq 0 \]

\[ \frac{\partial (w - p)^{\ast}}{\partial m} = \frac{-\psi}{\psi + \alpha \beta \zeta \psi + \alpha \gamma \alpha_2 + \alpha \beta \psi \alpha_2} \neq 0 \]

\[ \frac{\partial (w - p)^{\ast}}{\partial TO} = \frac{-\sigma}{\psi + \alpha \beta \zeta \psi + \alpha \gamma \alpha_2 + \alpha \beta \psi \alpha_2} \neq 0 \]

\[ \frac{\partial (w - p)^{\ast}}{\partial TI} = \frac{-\rho}{\psi + \alpha \beta \zeta \psi + \alpha \gamma \alpha_2 + \alpha \beta \psi \alpha_2} \neq 0 \]

\[ \frac{\partial (w - p)^{\ast}}{\partial FMI} = \frac{2 \lambda \psi \delta_1 - \psi \delta_2 - \gamma \psi \delta_1 - \alpha \gamma \alpha_2 \delta_1 + \gamma \psi \alpha_2, \delta_1 - \gamma \psi \alpha_2, \delta_2 + \alpha \beta \alpha_2 \delta_1}{\lambda \psi - \psi - \alpha \beta \zeta \psi - \alpha \gamma \alpha_2 + \alpha \beta \zeta \psi + \alpha \beta \alpha_2 - \alpha \beta \psi \alpha_2 + \alpha \beta \psi \alpha_2} \neq 0 \]

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

7.2 The Impact Multipliers

Looking at the multipliers matrix \( B_0^{\ast} \) emerges that:

\[ \frac{\partial u}{\partial k} = -\alpha \beta \lambda \frac{\zeta}{\alpha \beta \lambda \zeta - \alpha \beta \zeta - 1} \geq 0 \]

\[ \frac{\partial u}{\partial m} = -\frac{\psi}{\alpha (1 + \beta \psi)} \leq 0 \]

\[ \frac{\partial u}{\partial TO} = -\frac{\sigma}{\alpha (1 + \beta \psi)} \leq 0 \]

\[ \frac{\partial u}{\partial TI} = -\frac{\rho}{\alpha (1 + \beta \psi)} \leq 0 \]

\[ \frac{\partial u}{\partial FMI} = -\frac{\psi (\delta_1 - \delta_2)}{\alpha (1 + \beta \psi)} \neq 0 \]

Moreover the response of wages and migration to shocks on the exogenous variables:
\[
\frac{\partial (w - p)}{\partial k} = -\alpha \frac{\beta}{-\xi \alpha \beta + \beta \alpha \xi \lambda - 1} \geq 0
\]
\[
\frac{\partial (w - p)}{\partial m} = -\frac{\beta \psi}{1 + \psi \beta} \leq 0
\]
\[
\frac{\partial (w - p)}{\partial TO} = -\frac{\sigma \psi}{1 + \psi \beta} \leq 0
\]
\[
\frac{\partial (w - p)}{\partial TI} = -\frac{\rho \beta}{1 + \psi \beta} \leq 0
\]
\[
\frac{\partial (w - p)}{\partial FMI} = -\frac{(-\delta_1 + \delta_2)}{1 + \psi \beta}
\]
\[
\frac{\partial mn}{\partial k} = \alpha_z(1 - \alpha + \alpha \beta \xi - \alpha \beta \psi - \alpha \beta \lambda \xi) \\
\frac{\partial mn}{\partial \psi} = \psi(\alpha \beta \lambda \xi - \alpha \beta \xi - 1) \\
\frac{\partial mn}{\partial TO} = \frac{\partial mn}{\partial TI} = \frac{\partial mn}{\partial FMI} = 0
\]

### 7.3 The Model Specification

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

Considering the model specifies 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.
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