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16 October 2013

Online at https://mpra.ub.uni-muenchen.de/50749/ MPRA Paper No. 50749, posted 18 Oct 2013 06:10 UTC

Immigration Policy and Macroeconomic Performances in France¹

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October 16, 2013

¹We thank X. Thierry for having made available the database as well as X. Chojnicki and A. Mountford for usefull remarks. H. d'Albis acknowledges financial support from the European Research Council (ERC Stg Grant DU 283953).

Abstract

This paper proposes a quantitative assessment of the interaction between the Gross Domestic Product (GDP) per capita and the unemployment rate, and permanent immigration in France over the period 1994-2008. It uses a new database where immigration is measured by the flow of issuing residence permits of more than one year to foreigners. The flow is distinguished by age, sex and nationality of the migrant and depends on the reason for issuing the permit. Estimation of vector autoregression models (VAR) indicates that immigration increases GDP per capita, in particular, for female immigration and family immigration. In addition, family immigration from non-OECD countries reduces unemployment. Moreover, GDP per capita increases immigration while the unemployment rate reduces labor migration.

JEL classification: E20, F22, J61

Keywords: Immigration, Female and Family Migration, Growth, Unemployment, VAR Models

1 Introduction

The theoretical relationship between immigration and the economic growth of the host country is ambiguous. Migration represents an increase in population that can lead to a "capital dilution" and a temporary decline in GDP per capita if the returns-to-scale are constant or, alternatively, a "scale effect" leading to a permanent increase in the growth rate if returns are increasing. Migration is also a population inflow that may have different characteristics in terms of age, human capital, or assets than those of the resident population. The economic effect of this increase in diversity then depends on the degree of complementarity in the production process between the characteristics in question and that of the native born population. As most economic effects of migration pass through the labor market, the analysis must assess the specific effects on markets where migrants are working. The degree of geographical and occupational mobility of native born professionals and the mechanism of wage formation are key parameters. Several micro-econometric studies have proposed evaluations of these different mechanisms, but a macro-economic approach may be useful for assessing the overall impact of migration.

The purpose of this study is to provide a quantitative assessment of the relationship between immigration and macroeconomic performance without preconceptions or theoretical assumptions. As endogeneity between the variables is likely, we estimate VAR models from data sets on the flow of issuing residence permits of more than a year and the usual series of macroeconomics, the GDP per capita and the unemployment rate. The scope of the study is France between 1994 and 2008 and immigration from countries for which nationals are required to hold a residence permit in France¹. The INED es-

¹For a description of the migration policy in France during these years, see in particular, Schain (2008).

tablished the residence permit database from administrative data collected by the Ministry of the Interior. This database is extremely rich in terms of migrant characteristics (age, sex, and nationality) and residence permit characteristics (date of issue, period of validity, and administrative reason of issue). In addition, the database describes monthly changes, giving sufficient time coverage, and avoids the need for a panel of countries. This is the first time that the database has been used for econometric work.

VAR models are estimated in levels, and the effect of a shock to one variable on the temporal evolution of other variables in the model is calculated using the generalized impulse response functions (GIRF), according to the methodology proposed by Pesaran and Shin (1998). In particular, no restriction is imposed on the VAR. The estimates allow us to conclude a positive and significant effect of the migration rate on GDP per capita. Elasticity of GDP per capita one year after a permanent shock to the migration rate is 0.0172. This result differs from recent studies on United States data – Kiguchi and Mountfort (2013) found a negative effect– and studies on panel data, Ortega and Peri (2009) revealed that migration has no effect on the GDP per capita, suggesting that migration is more beneficial in France as it is on average in OECD countries. The characteristics of residence permits and their holders are also used to refine the analysis. We find that primarily female migration and family migration (both overlap) are at the origin of the effect on GDP. This validates, from a macroeconomic perspective, the ideas initially developed by Kremer and Watt (2006) and Cortes and Tessada (2011). In addition, the results remain valid when we restrict ourselves to migration from non-OECD countries. Finally, the effects on unemployment are mostly non-significant except for family migration from non-OECD countries for which we find it reduces the unemployment rate.

The advantage of the VAR modeling is the isolation of the effect of macroeconomic variables on migration. Estimates indicate a strong reaction of the migration rate on GDP per capita: elasticities of labor and family migration rates at one year are 0.29 and 0.17, respectively. This is explained either by a policy for issuing permits that is more favorable during high growth periods or by a greater demand for permits. The fact that family migration also reacts to the situation suggests that the demand effect cannot be eliminated. The unemployment rate in turn negatively affects labor migration. Overall, the econometric results indicate some pro-cyclicity between migration and macroeconomic performance.

This article is structured as follows: Section 2 presents the data sets, especially those concerning migration; Section 3 describes the estimated models and presents the response functions; Section 4 discusses the econometric results and compare them to related articles of the literature; and finally, Section 5 presents the conclusions.

2 Data Description

Three types of variables for which we have the time series are used: GDP per capita, the unemployment rate, and the migration rate. The latter is, for some estimations, broken down by age, gender, nationality and admission reasons. The monthly data sets used cover the period 1994-2008 and are adjusted seasonally. They concern metropolitan France.

GDP is calculated by converting the quarterly series of real GDP provided by the INSEE into monthly data (Denton, 1971) by using the monthly indicator of industrial production provided by the OECD. GDP per capita is then obtained by using the INSEE population series that determines the size of the population in France on the first of each month. Monthly unemployment rates are taken from the OECD "Labor Force Statistics" database.

Foreign immigration flow statistics are calculated by the INED from the AGDREF administrative database of the Ministry of Interior that gathers information on residence permit applicants². The statistics relate to the start date of validity of the first residence permit, valid for at least one year, issued to adult foreigners. The start date of the permit validity is after the arrival of the migrants because of the time the permit issue process may take, but also because the migrant may have previously received a permit of less than one year or may have resided illegally in the territory. However, the date of issue is valuable because it shows the date of entry into the long-term immigration status and, in some cases, grants new labor market rights. The major restriction is that migrant residence permits are not required for minors. Migration rates are obtained by dividing the monthly entries by the number of inhabitants in France on the first of each month.

In this study, only permits issued to nationals of a certain number of countries are retained. In the basic version of the estimates, we include all countries except the EU15 and the European Economic Area (which includes Iceland, Switzerland, Liechtenstein, and Norway). Exclusion of these countries is justified by the fact that since 2004, residence permits are no longer required for their nationals settling in France. However, we choose to retain the permits issued to nationals of Estonia, Latvia, Lithuania, Hungary, Czech Republic, Poland, and Slovenia, even if they are no longer obliged to hold a permit since July 1, 2008. It should be noted that since 2009, the process of issuing residence permits has been modified by the introduction of some visas, which are equivalent to residence permits and are issued abroad by French consulates. The date of issue shown on these permits may be prior to

 $^{^{2}}$ See Thierry (2001) for a more comprehensive presentation of the database.

arrival in the country. This is the reason why the study period ends in 2008.

A breakdown of the flow of residence permits depending on the nationality of the recipients reveals that permits issued to nationals of African countries are in the majority, while those issued to nationals of Asian countries account for nearly a quarter of the total number. To test the robustness of our results, we decomposed the permits issued according to the average standard of living in the migrant's country of origin. We created a database containing all the permits issued to nationals of non-OECD countries, constituting 87.3% of the permits issued during the period.

The INED statistics allow other decompositions of the flow of issued permits. A first decomposition by age and sex of the recipient of the permit indicates that permanent migration in France is overwhelmingly young and female. During the period, those under age 40 accounted for 83.2% of residence permit recipients, while men accounted for 48.3%.

A second decomposition distinguishes the reason for admission, i.e., the administrative reason for issuing the residence permit. Reasons are numerous, and to fit better the objectives of the study, they are grouped into three categories according to their economic relevance, particularly with regard to access to the labor market rights. The first category includes migrants who received a residence permit for work purposes. It represents 7.8% of the total issued permits and 5.8% of the permits issued to nationals of non-OECD countries. Men are in the majority among the recipients.

A second category of migrants obtains a permit for family reasons. It covers the permits issued based on a "foreign spouse," such as in the context of family reunification, but also on the grounds of "spouses of French nationals" and "ancestors and descendants of French nationals." The procedures for obtaining permits are not the same for foreign families and families of French nationals, but in both cases, the residence permit gives access to the labor market. During the reporting period, this category accounts for 37.7% of total permits issued and 40.6% of the permits issued to nationals of non-OECD countries. Women outnumber men among the recipients.

A final category includes all other reasons. In particular, "students" category, which is a significant proportion (29% of permits) and gives the right to work part-time, but usually treated in the international classifications as temporary migration. The "visitor" category is attributed to applicants with family ties with residents, but it does not give access to the labor market. The "retired" category, which exists since 2004, also does not give access to the labor market. However, permits issued for the "regularization" reason, which was relatively high in 1997 and 1998, and the "refugees and stateless persons" reason (11.9% of permits) give access to the labor market, but it is not possible to distinguish among them between labor and family reasons. Included, also, are permits issued for the "private and family life" reason, which concerns various situations, including families accompanying workers holding a one-year and more permit as well as the recent recipients of "Skills and Talents" cards designed e.g. for scientists.

3 VAR Analysis and Empirical Results

Analysis of the relationship between immigration and the macroeconomic situation is carried out using a VAR model according to the following function:

$$X_t = A(L)X_t + \varepsilon_t,\tag{1}$$

where X_t is a vector comprising the logarithm of the variables of interest observed at time t, A(L) is the lag polynomial, and ε_t is the residual. The purpose of the analysis is not to characterize a long-term relationship, which would be difficult and inappropriate given the temporal coverage of the series used. However, to investigate the short-run dynamic, variables are considered in level for the following reason. As explained in Sims *et al.* (1990), not taking the first-difference process avoids loss of information contained in the data when a cointegration relationship exists between the variables. For the estimation, a constant and a deterministic trend are added.

The dynamic effects of one variable on another are computed using the GIRF method proposed by Pesaran and Shin (1998). The purpose is to identify the impact based on the history of past correlations. This approach does not require an orthogonalization of shocks and is invariant to the order of variables in the VAR model. The choice of lag was made using AIC (Akaike information criterion) and BIC (Bayesian information criterion) tests and led to selecting three lags.

Two models are estimated as follows. The first includes all residence permits issued while the second distinguishes permits issued for work reasons and those issued for family reasons. For both models, several robustness tests are proposed.

3.1 Estimates with All Residence Permits

The first model we estimate is a three dimensional VAR where:

$$X_t = [Y_t, U_t, M_t]', (2)$$

which includes the logarithm of GDP per capita denoted Y_t , the logarithm of unemployment rate denoted U_t , and the logarithm of migration rate denoted M_t . This model incorporates all permits issued, regardless of the administrative reason for issuance. Figure 1 shows the GIRF generated by a 1% increase of a variable. The confidence interval is 5% on the left and 5% on the right.



The results, shown in Figure 1, are as follows³. The response of GDP per capita to the migration rate is positive and significant the first and the fourth months following the shock and continuously from the sixth to the 27th month. Furthermore, the response of the migration rate to GDP per capita is only positive and significant the first month following the shock. However, neither the response of the unemployment rate to the migration rate, nor the response of the migration rate to the unemployment rate is significant.

The robustness of this first model is evaluated using information on the nationality of the permit holders. If we only use residence permits issued to

³Using the following Cholesky ordering (M, Y, U), we get qualitatively similar results. Migration is placed first because the decision to migrate is based on the past values of the host country's economic conditions. GDP per capita is placed second as productivity shocks can contemporaneously impact unemployment.

nationals of non-OECD countries, very similar results, which are illustrated in Figure 2, are obtained. The response of GDP per capita to the migration rate from non-OECD countries is positive and significant the first and the fourth months following the shock and continuously from the seventh to the 34th month. The response of the migration rate to GDP per capita is only positive and significant the third month following the shock; the relationship with the unemployment rate remains non significant.



The results of the first model are completed by estimating two fourdimensional vectors that integrate a decomposition either by age or by sex of the residence permit recipients.

To account for the effects of age, the flow of residence permits was decomposed into two: recipients under age 40 (i.e. the younger migrants, denoted YM_t) and recipients aged 40 and over (i.e. the older migrants, denoted OM_t). The response functions are reproduced in Figure 3. The estimate indicates that the response of GDP per capita to the migration rate of recipients under age 40 is positive and significant the first and the fourth months following the shock and continuously from the ninth to the 22nd month. However, the response of GDP per capita to the migration rate of recipients aged 40 and over is not significant. In addition, the response of migration to GDP per capita is positive and significant for recipients aged 40 and over. The relationship between migration variables and unemployment remains non significant.



A similar estimate was made by distinguishing the permit recipients based on sex. Permits issued to men are denoted MM_t while those issued to women are denoted FM_t . The response functions are shown in Figure 4. The results indicate that the response of GDP per capita to the migration rate to men is positive and significant the first and the fourth month following the shock while the response to the migration rate of women is positive and significant from the 12th to the 25th month. In addition, the response of the migration of men and of women to GDP per capita is positive and significant the first and the sixth month following the shock. The relationship between migration variables and unemployment remains non significant.



3.2 Estimates with Residence Permits issued for Labor and Family Reasons

A second VAR model was then estimated using a four-dimensional vector:

$$X_t = [Y_t, U_t, MW_t, MF_t]', \tag{3}$$

where MW_t represents the logarithm of the labor migration rate and MF_t is the logarithm of the family migration rate. The latter two variables are the two categories of residence permits described in the previous section. Figure 5 shows the GIRF generated by the model.



The results are as follows. The response of GDP per capita to the family migration rate is positive and significant continuously from the sixth to the 27th month after the shock, while that associated with the rate of labor migration is not significant. Furthermore, the response rate of family and labor migration to GDP per capita is positive and significant from the third to the 37th month in the first case and from the third to the 17th month in the second case. The response of unemployment to migration, whether family or labor, is not significant. In contrast, the response of the labor migration rate to the unemployment rate is negative and significant from the sixth to the 22nd month while the response of the family migration rate to the unemployment rate is not significant.

As with the previous model, the robustness of these results was tested by limiting ourselves to the residence permits issued to nationals of non-OECD countries. The GIRF are shown in Figure 6. The response of GDP per capita to the family migration rate is positive and significant the first and fourth months after the shock and continuously from the sixth to the 39th month. Moreover, unlike the case where all nationalities are considered, the response of GDP per capita to the labor migration rate is positive and significant from the 22nd to the 39th month. Furthermore, the response rate of labor and family migration to GDP per capita is positive and significant in the first month following the shock, as well as from the third to the 40th month in the first case, and from the third to the 22nd month in the second. In addition, the response of unemployment to labor migration is not significant, but unlike the previous case, the response of unemployment to family migration is negative and significant from the 22nd to the 38th month following the shock. Finally, the response of labor migration to the unemployment rate is negative and significant from the sixth to the 20th month, while the response of family migration to the unemployment rate is not significant.



4 Discussion of the Results

VAR analysis on French data for the period 1994-2008 allow for a better understanding of the nature of the relationships between the policy of issuing residence permits to immigrants and national macroeconomic performances.

4.1 Effect of Immigration Policy on Growth

The GIRF built from the estimated models show that the GDP per capita responds positively to the migration rate. This reaction is robust to decomposition of migration by age, sex, reasons for issuing residence permits, and the migrant's birth continent. These results are different from those obtained from panel data estimations, which conclude a lack of the migration effect on GDP per capita. In particular, Ortega and Peri (2009) estimated a gravity model using data on 14 OECD countries, including France, over the 1980-2005 period. They found that immigration increased GDP one for one, and that it therefore had no effect on GDP per capita. In addition, some authors have estimated, using panel data, a Solow model with human capital to assess the respective magnitudes of the increase in human capital and the capital dilution. Dolado et al. (1994) found that the dilution effect was generally higher, while Boubtane and Dumont (2013) found that for a panel of 22 OECD countries (including France) over the period 1986-2006, the human capital effect prevailed. This result and the GIRF presented in the previous section indicate that migration is more favorable to economic activity in France than in the average of the OECD countries. Recently, Kiguchi and Mountfort (2013) used a VAR model to quantify the macroeconomic effects of immigration in the United States. The series of immigration flows was constructed from unanticipated shocks to the labor force. In addition, the shocks were identified by imposing sign restrictions. The increase in the labor force had a temporary negative effect on GDP per capita with no negative effect on wages. The authors interpreted these results using a model where the labor supply of migrants is complementary to the labor supply of skilled natives and substitute to capital.

Quantitatively, the effect on GDP per capita is high. Calculation of the

cumulative response one year after a permanent shock of 1% on the migration rate implies an elasticity of GDP per capita to the migration rate equal to 0.0172 (with a standard deviation of 0.0081). This impact reinforces previous studies that show, using alternative methodologies, the potential gain from an increase in the mobility of workers is higher than that of increased capital mobility or increased trade (see Clemens, 2011, and references cited therein). The long-term effect of migration on productivity in OECD countries was estimated by Aleksynska and Tritah (2010). They found an elasticity of 0.1.

When we do consider migration from non-OECD countries only, our results suggest that the response of GDP per capita to shock is of a similar magnitude, but it is more persistent. In addition, labor migration has been found to have a significant and positive effect on GDP per capita only when this migration is considered. This reinforces the recent study by Alesina *et al.* (2013), which showed that the diversity of migrant birthplaces had a positive effect on growth in rich countries. It is not possible with the data to know the level of education of migrants, but our results provide further evidence of the complementarity of labor supply of immigrants with the native born population.

Robustness exercises performed in the previous section also identify the migration factors most conducive to GDP per capita. Age appears to be a crucial variable because the estimation decomposing the flows between those over and under age 40 reveals that migrants aged 40 and over do not have a significant effect on GDP per capita. To explain the positive effect of younger migrants, several hypotheses are possible. From a microeconomic point of view, better integration in the labor market due in part to a higher human capital is possible. From a macroeconomic perspective, the migration of young workers can mitigate the effects of an aging workforce. According to the United Nations (2001), the net immigration that would be required to maintain the number of persons of working age in France is approximately equal to 150,000 persons per year.

The GIRF also indicate that migration of women has a higher effect on the GDP than migration of men: the cumulative response after a permanent shock of 1% on the migration rate is significant and positive when we consider only women, while it is not significant when considering only men. Similarly, we find that family migration has a positive effect while labor migration has, in most cases, no significant effect. Both results are consistent as family migration, which mainly consists of foreign spouses of foreigners or French nationals, is predominantly female. The positive effect of this migration was studied, in particular, by Kremer and Watt (2006) and Cortés and Tessada (2011) for the United States, Farré et al. (2011) for Spain, and Romiti (2011) for Great Britain. The idea is that female and/or poorly educated migration fits well in the market for home services, which allows the educated native born women to increase their participation in the labor market. There is, to date, no studies for France, but if this mechanism is effective, it is likely to be due to the lack of labor supply in the area of home services. Because of legislation on the minimum wage, it is indeed unlikely that migration leads to downward pressure on wages in this sector.

4.2 Effect of Migration on Unemployment

The estimated models in the previous section cannot conclude that, in most cases, migration has a significant effect on unemployment in France. A significantly negative relationship was found only in the case of family migration from non-OECD countries. The effect is quite offset, almost two years after the shock, and can be interpreted in the same way as the effect on GDP per capita. Apart from this particular case, our results are in line with previous studies, although sometimes contradictory, and which conclude either very moderate effects or a lack of effect of migration on unemployment⁴.

Among these studies, Hunt (1992) studied the effect of repatriates from Algeria in 1962 as a natural experiment and showed that the arrival of 900,000 people increased resident unemployment by 0.3 percentage points. In contrast, Gross (2002), who estimated a VAR on French data between 1975 and 1994 by imposing structural relationships on the variables, did not find any significant short-term effects of migration on unemployment. Studies on a range of countries, including France, also led to conflicting results. Angrist and Kugler (2003) studied 18 European countries between 1983 and 1999 and concluded that European foreigners reduced employment of the native born population, but non-Europeans had no significant effect. Jean and Jiménez (2011) studied these countries between 1984 and 2003 and found a positive but temporary effect of foreigners on the unemployment of the native born. In contrast, Ortega and Peri (2009) showed that immigration increased employment without any effect on native born populations and Damette and Fromentin (2013) found that immigration reduced short-term unemployment.

The long-term relationship between immigration and unemployment was studied in France and in British Columbia by Gross (2002) and Gross (2004), respectively. In both cases, a negative and significant relationship was established. Finally, work on the causal relationship between migration and unemployment concluded either no causal relationship between migration and unemployment (Withers and Pope, 1985, and Pope and Withers, 1993, for Australia, Shan *et al.*,1999, for Australia and New Zealand, and Islam, 2007,

 $^{^4\}mathrm{See},$ in particular, Card (2005) for the United States and Dustman et~al.~(2005) for the United Kingdom.

for Canada) or a negative causal relationship (Kónya, 2000, for Australia). Of course, our macroeconomic approach is not restricted to the unemployment rate of natives (Borjas, 2003), but in the case of France, Ortega and Verdugo (2012) showed that the natives were unaffected by migration and avoided competition with immigrants by changing profession.

4.3 Effect of Macroeconomic Performances on Migration

It is interesting to point out that the number of residence permits issued evolves according to the macroeconomic conditions. When estimates are made with all residence permits, the effect of GDP per capita is indeed positive and significant, but mostly over a very short interval of time, usually a month. In addition, the effect of unemployment is always non significant. However, when we restricted to permits issued for work or family reasons, the results are much more convincing. Indeed, eliminating the permits issued to students, refugees, or foreign patients can only improve the analysis of the effect of macroeconomic conditions on migration. It is more relevant to distinguish permits issued to workers than those issued to families. Permits issued to workers depend on political decisions, including the adoption of a list of jobs for which foreigners are allowed to apply for a permit, which is certainly affected by the labor market situation. We find that the reaction of labor migration, whether from OECD countries or not, to GDP per capita is positive and strong. Calculation of the cumulative response one year after a permanent shock of 1% on the GDP per capita implies an elasticity of migration rates on GDP per capita equal to 0.2898 (with a standard deviation of 0.1119). This result is consistent with the study of long-term causality by Morley (2006) using annual data between 1930 and 2002 for Australia, Canada, and the United States. Labor migration also reacts negatively and significantly to the unemployment rate. Elasticity of the migration rate to the unemployment rate equals -0.3136 (with a standard deviation of 0.1155). The effect of unemployment on migration confirms the results of Damette and Fromentin (2013), and studies of long-run causality by Withers and Pope (1985) and Pope and Withers (1993) for Australia and by Islam (2007) for Canada. Recently, these results were reinforced by a study by Beine *et al.* (2013) based on the estimation of a gravity model. They showed that relative business cycles and employment rates have an effect on bilateral migration flows.

Study of the impact of macroeconomic conditions on family migration also brings an interesting perspective. By definition, the policy of issuing residence permits is, for this reason, less dependent on economic conditions. An important part of this migration concerns the spouses of French nationals, who can benefit from non-discretionary residence permits. Similarly, the issue of permits to foreign spouses is governed by a number of regulatory mechanisms, such as the "family reunification procedure," which evolves slower than the macro-economic conditions. However, we find that family migration reacts sustainably and strongly to the GDP per capita. Elasticity of migration rates to the GDP per capita equals 0.1869 (standard deviation 0.0671). This confirms the numerous studies showing that migration choices depend on the economic conditions of the host country.

5 Conclusion

Contrary to an idea that is sometimes shared and despite the ambiguity of the effects highlighted by theoretical models, most empirical studies do not suggest a negative impact of immigration on the host country (Friedberg and Hunt, 1995, Chojnicki, 2004). The case study of France between 1994 and 2008 goes further. Although the majority of recipients of residence permits of more than a year immigrated for family reasons, immigrants contributed significantly to the growth of GDP per capita, and in some cases, reduced the unemployment rate. This reinforces the idea that some complementarities exists between the supply of labor of immigrants and that of native born populations, and that diverse places of birth is a positive factor for the economic performance of a country. In addition, the entry of migrants reacts significantly to the macroeconomic performance: all migrants react positively to GDP per capita and migrants in search of work react negatively to the unemployment rate. Additional microeconomic investigations are needed to distinguish among the possible causes, and most notably between the territory's attractiveness and the migration policy choices. However, examination of the reasons for issuing residence permits confirms that the choice of location made by migrants is based on the economic conditions.

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