On the potential interaction between labour market institutions and immigration policies

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Structured Abstract

Purpose – We analyse the effect of unemployment and labour institutions such as employment protection legislation, coverage of unemployment benefits, minimum wages, union power and tax wedge on migration flows. We allow for interactions of these institutions with migration entry laws, as both affect equilibrium wages and employment in destination countries, influencing mobility decisions of immigrants.

Design/methodology/approach – We use data on migration flows for a sample of 15 OECD countries over the period 1980-2006. The relationship between flows and labour institutions is analysed using OLS techniques and including destination and origin-by-year fixed effects. The coefficients of interest are identified through within country variation. We test the robustness of our results to different specifications using, among others, dynamic models for panel data.

Findings – We find strong and negative effects of unemployment, employment protection and migration policy on flows. The negative effect of migration policy on flows is larger in countries with high than in countries with low employment protection. We find positive effects for minimum wages, unemployment benefits and union power. We show heterogeneous effects depending on the group of countries of origin and destination.

Research limitations/implications – While the identification strategy allows us to estimate the effects of interest, our baseline estimates may suffer from endogeneity problems in terms of omitted variable bias and reverse causality. Our sensitivity checks provide mixed results and show that baseline estimates are not always robust to different specifications. Further work is needed to better address the problem of endogeneity.

Originality/value – The paper adds to the previous literature on the determinants of immigration flows by explicitly considering the labour market environment in destination countries. Our results provide insights into potential interaction effects and coordination of reforms in labour markets and immigration policies.

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1. INTRODUCTION

Do labour market institutions influence mobility decisions of migrants? Is there any interaction between such institutions and the tightness of migration policies set by governments in destination countries? In this paper we try to answer the above questions by focusing on the relation between bilateral migration flows, tightness of entry laws and labour institutions such as employment protection legislation (EPL), unemployment benefits, minimum wages, taxes and union power for a set of 15 OECD countries during the period 1980-2006.

Two recent papers by Mayda (2010) and by Ortega and Peri (2013) study the determinants of international migration flows focusing, among other factors, on the role of GDP per capita and tightness of migration policies in destination countries. Both papers show that higher levels of GDP per capita have a positive effect in attracting migrants, while the tightening of migration policies in terms of admission requirements has a negative effect on flows of new immigrants.[1] These papers identify entry policies as demand side determinants of migration flows, i.e., demand for immigrants in the destination country. Moreover, Mayda (2010) shows that such demand factors interact with supply side factors like geography and demographics, suggesting that, if the migration policy of a destination country becomes less restrictive, the effect of pull (push) factors should turn more positive (negative). In fact, a related strand of literature studies the supply side determinants of migration flows, i.e., the economic incentives that shape migrants' decisions, focusing in particular on the role of the generosity of welfare systems in attracting immigrants.[2]

In this paper, we extend previous work on the determinants of migration flows by considering the interaction between demand and supply factors. On the supply side, we include in the analysis further possible determinants of optimal migration decisions, explicitly considering the labour market environment in destination countries. We focus our attention on the role of labour market institutions, such as employment protection legislation, unemployment benefits coverage,

[1] A related strand of recent literature explicitly focuses on other determinants of migration flows. Grogger and Hanson (2011) focus on relative skill and earnings differentials. Adsera and Pytlikova (2012) conduct a careful study on the role of language and linguistic proximity, while Llull (2013) shows heterogeneous effects of income gains from migration depending on distance. Finally, two recent contributions by Bertoli and Fernández-Huertas Moraga (2013) and Bertoli et al. (2013) generalize previous empirical models and propose methodological advances in estimation of models of bilateral migration flows. We further discuss their contributions in next sections.

[2] See Giulietti and Wahba (2012) for a review of papers on the welfare magnet hypothesis and Boeri et al. (2002) for a comprehensive picture of the issue. De Giorgi and Pellizzari (2009) use micro data to analyse the role of welfare as a determinant of migration, Giulietti et al. (2013) analyse the effects of unemployment benefit spending as a proxy of welfare generosity, focusing on the potential endogeneity of unemployment benefits, Pedersen et al. (2008) jointly study welfare generosity and network effects. Finally, Razin and Wahba (2011) argue that the generosity of the welfare state may affect the skill composition of immigrants, depending on the type of immigration policy adopted.

minimum wages, union power and the tax wedge.[3] Furthermore, we include in our analysis the unemployment rate as a potential determinant of migration flows. In fact, in the standard theoretical framework of optimal migration (Harris and Todaro, 1970), the mobility decision of migrants depends on the expected wage at destination which is the product of the average wage, empirically proxied by GDP per capita, and the probability of finding an employment opportunity, proxied by the unemployment rate. Moreover, there is large empirical evidence that shows that labour institutions are correlated with unemployment across countries (Blanchard and Wolfers, 2000 and Belot and Van Ours, 2004). In our framework, labour institutions influence equilibrium wages and employment opportunities in destination countries, thus influencing expected costs and benefits of migrations. On the other hand, by directly influencing labour supply, migration policies will also have an effect on equilibrium wages and employment in the destination country, thus directly interacting with labour institutions.

There are further links between labour market institutions and immigration. In fact, Bruecker et al (2014) show that labour institutions affect the wage elasticity with respect to labour supply shocks. They find that in countries in which labour institutions are stringent, and wage flexibility is low, immigration has minor wage effects but high unemployment responses. This finding may explain why countries in which labour institutions are pervasive, and where immigration has a relatively larger impact on unemployment, tend to reduce labour supply by adopting relatively more strict immigration policies. In fact, as Angrist and Kugler (2003) discuss, labour institutions, such as employment protection legislation, insulate natives from competition reducing job loss in the short run, with counter-productive effects in the long run, possibly amplifying any negative employment consequences of immigration for natives.[4] Similarly, Rodrik (1997) suggests that the demand for social protection is in part a response to the forces of economic integration, including increased migration. In this sense, on the demand side, labour institutions can be viewed as potential complements or substitutes of migration policies (see Boeri and van Ours, 2008).

[3] The literature on the effects of institutions on labour market outcomes is vast and a review is outside the scope of this paper. See Blanchard and Wolfers (2000) and Bertola and Rogerson (1997) for rigorous analyses of their effects. Layard and Nickell (1999) and Belot and van Ours (2004) study the interaction of labour institutions, while Boeri (2011) provides an overview of reforms of such institutions. Finally, see Saint-Paul (2002), Bassanini et al (2009) and Conti and Sulis (2015) for studies that analyse the differential effects of employment protection across sectors.

[4] Further interactions between immigration and labour institutions are studied by D'Amuri and Peri (2011), who analyse how immigration affects the specialisation pattern of employment and jobs in countries with different degrees of hiring and firing regulations. Sà (2011) studies the differential impact of EPL on natives and immigrants, she finds that stricter EPL is found to reduce employment and reduce hiring and firing rates for natives. By contrast, stricter EPL has a much smaller effect on immigrants.

We analyse the effect of labour market institutions, migration policies and unemployment rates on immigration flows in a set of 15 OECD destination countries during the period 1980-2006, using data on bilateral flows and strictness of migration policies made available by Ortega and Peri (2013) and merging this source of data with different databases for labour market institutions.[5] After including standard controls used in the literature, such as geographic distance, contiguity, previous colonial relationships, common currencies, languages and institutions, we further investigate the importance of demographics and different proxies for network effects on migration flows.[6]

We find that a one point increase in the unemployment rate reduces flows by 15%, while a one point increase in the EPL index, which broadly corresponds to one standard deviation, reduces flows by 40%. Including labour institutions and unemployment rate, the role of GDP per capita in the destination country is substantially reduced with respect to previous estimates, with an estimated elasticity that varies between 0.5 and 0.25. We confirm a 2% reduction in flows found by Ortega and Peri (2013) for the typical immigration law. Moreover, our baseline results indicate that the size of the effect of migration policies on migration flows depends on the strictness of EPL: our estimates suggest that the typical restrictive law reduces migration flows by about 8% in a country with high EPL compared to less than 1% in a country with low EPL. We also find positive effects of higher unemployment benefits, minimum wages and union power on migration flows. We refine our analysis estimating our regressions splitting the sample of countries between EU and non-EU countries, OECD vs non-OECD, and countries in the European Neighbourhood Pact agreement.[7]

In order to deal with potential endogeneity issues, we supplement our baseline identification strategy with a series of additional specifications. In particular, we run regressions using negative binomial models, shorter frequency data, augmenting the set of interaction dummies, using suitably lagged variables and using the Arellano Bond dynamic estimator for panel data. The sensitivity checks and different specifications provide mixed results and suggest that our baseline OLS estimates are not always robust. Nevertheless, our estimates suggest that considering the labour market environment, and its potential interaction with migration policy, improves our understanding of international migration flows.

[5] Novotny (2013), Baziellier and Moullan (2012) and Geis et al. (2013) analyse the effect of different labour institutions on migration flows and their composition. These studies use microdata and not bilateral migration flows, focusing on a limited number of countries. Moreover they do not explicitly take into account migration policies.

[6] See, among others, Pedersen et al (2008) and Beine et al (2009) for analyses of network effects and migration flows.

[7] The ENP is a bilateral policy agreement between the EU and 16 countries from Eastern Europe and North Africa, with the objective to create a zone of stability, security, political association, deeper economic integration, increased mobility and more people contacts.

The rest of the paper is organized as follows. In section 2 we sketch the theoretical framework behind the empirical specification. In section 3 we present the data and discuss the methodology, while section 4 is dedicated to the presentation of main results and further analysis. We conclude in section 5.

2. THEORETICAL FRAMEWORK

In this section, we briefly present the theoretical framework behind our empirical application. We closely follow Ortega and Peri (2013) and illustrate how labour institutions and unemployment can be included in the random utility model of optimal migration decision.

Individuals decide whether to stay in their home country or move to other destinations. The (expected) utility from staying is the sum of two terms: a deterministic component, specific to the country of origin, which captures the average utility of not moving, and an idiosyncratic individual specific term. Similarly, the utility from migration to any destination is the sum of two components: the deterministic component that varies by origin-destination pair and the stochastic one that is individual specific. In particular, Ortega and Peri (2013) assume that the deterministic component of expected utility is given by the present value of expected earnings at destination (proxied by GDP per capita) minus the bilateral costs of migration to any destination from any origin.

Moreover, Ortega and Peri (2013) assume unobserved heterogeneity between movers and stayers, resulting in correlations across the idiosyncratic terms. In particular, the stochastic term of the migration option consists of individual random effects, that are allowed to be correlated within destinations, and a second term identically and independently distributed as type I extreme distribution (as the stochastic term of the stay option).[8] These assumptions on the stochastic components are mirrored in the nested logit model in the empirical application, which allows for quite general substitution patterns. Ortega and Peri (2013) show that the odds ratio between two destinations depends only on the relative attractiveness between those two destinations, while the odds ratio between the origin and any given destination contains an additional term, which controls for the correlation across destinations induced by unobserved heterogeneity.

In this framework, the probability that an individual chooses one location approximately coincides, in the aggregate population, with the share of individuals born in the origin country who choose that particular destination. The number of such individuals depends on terms that are

[8] Grogger and Hanson (2011) adopt a less flexible specification and assume that all stochastic terms are identically and independently distributed as type I extreme distributions

constant across destinations but vary by country of origin. Moreover, different destinations will experience changes in their relative attractiveness over time, and thus a period specific choice is reasonable. Ortega and Peri (2013) show that the (natural logarithm of) migration flows from country *o* to country *d* at time *t* depend on origin-year fixed effects that capture those time varying factors that are constant across destinations and vary only by year and country of origin.[9]

The expected utility of individuals from country *o* to destination *d* at time *t* is given by the expected earnings at destination *d* in year *t*, proxied by GDP per capita; a destination country fixed effect, which captures factors that vary across countries but do not vary much within countries, such as institutions and culture; and a set of variables that vary by country pair and affect the cost of migration. Ortega and Peri (2013) include in such specification a term that captures the tightness of entry laws, which varies over time and across countries. The latter term is expected to influence the costs of migration and thus reduce expected utility.[10]

We enrich this theoretical specification by including the unemployment rate and labour market institutions in the expected utility term. In our framework, the unemployment rate should proxy for the probability of finding a job and thus influences expected utility (Harris and Todaro, 1970). Moreover, labour market institutions such as employment protection legislation, coverage of unemployment benefits, minimum wages and union power influence wages and transition probabilities in the destination country, thus influencing expected utility and migration flows.

3. DATA AND METHODOLOGY

3.1. Data

Our main source of data for migration flows is the database made available by Ortega and Peri (2013). This is an unbalanced panel dataset on bilateral migration flows between 15 OECD destination countries and 221 origin countries all over the world for the period 1980-2006. Information on flows is originally derived from three different sources: the original OECD series

[9] The model takes into account measurement error due to the fact that probabilities are approximated by frequencies.

[10] Bertoli and Fernández-Huertas Moraga (2013) generalize the specification in Ortega and Peri (2013) which is valid only under a restrictive specification of the underlying random utility model and which assumes that potential migrants from different origin countries have identical preferences over the set of possible destinations. In particular, Ortega and Peri (2013) restrict the effect of changes in migration policies in different countries on the migration rates to be the same across countries, while the estimator proposed by Bertoli and Fernández-Huertas Moraga (2013) is more flexible and "allows for a differentiated responsiveness to variations in the attractiveness of alternative destinations." Hence, in more general cases, the inclusion of origin-year dummies does not control for what the authors call multilateral resistance to migration. See also Bertoli et al (2013).

initially used by Mayda (2010), the United Nation time series, and the International Migration database.[11]

Tables 1 and 2 provide the list of 15 countries used in the analysis and detailed information on available data and descriptive statistics on (natural logarithm of) migration flows, GDP per capita at destination and origin, tightness of entry laws, unemployment rate and labour market institutions. As most of the variables included in the dataset are made available by Ortega and Peri (2013), we refer to their paper for further details on descriptive statistics, and here we briefly discuss the index for migration policy and the labour market variables of interest.

We use the index of tightness of entry laws proposed by Ortega and Peri (2013). They build this quantitative measure of immigration policy restrictions to new immigration flows by summarizing the effects of quotas and admission requirements and classifying them based on whether they tightened or relaxed the requirements for entry.[12] The index considers only one specific aspect of migration policy, i.e., the costs of the admission process to a country, while it does not consider other relevant aspects, as for example, integration and citizenship. The index is equal to zero for the first year (1980) and then increases or decreases by one unit depending on the tightening (or loosening) of entry laws. Hence, positive (negative) values of the index suggest that, on average, the country has passed relatively more (less) restrictive legislation on entry with respect to its initial value during the sample period.[13]

In order to fully capture the effects of labour market environment in destination countries, we include in our regressions both the country level harmonized unemployment rate from the OECD database, defined as the share of unemployed individuals as a percentage of the labour force, and data on labour institutions obtained from different sources. The index for employment protection legislation (EPL) is derived from the OECD and it measures the strictness of hiring and firing restrictions. We use an unweighted average of sub-indicators for regular and temporary contract. As a measure of welfare generosity, we use unemployment benefits coverage, that is, the percentage of unemployed workers covered by unemployment benefits, which is derived from the

[11] Migration data measure the yearly inflow of foreign citizens who intend to be residents in the receiving countries. This definition implies that we measure all foreign-born (or in some cases foreign nationals) who come to the country to reside there and not for temporary tourism, study or business reasons (Ortega and Peri, 2013).

[12] This measure is derived from other sources: the laws collected by Mayda (2010) and the Social Reforms database of the Fondazione Rodolfo De Benedetti. The latter provides an index for strictness of migration policy obtained as a weighted sum of indexes that describe different aspects of the strictness of migration policies in the EU. It's an overall summary indicator for each country, averaging the values of six sub-indexes such as admission requirements; length of first stay; residence requirements; years to residence; administration involved; existence of a quota system. Unfortunately this indicator is available only from 1990 onwards and for a smaller set of countries.

[13] However, as Ortega and Peri (2013) discuss, in all our regressions we include destination country fixed effects, and we identify the impact of explanatory variables on the within-country variation over time, so this feature of the index does not affect our findings.

FRdB database (see Aleksynska and Schindler, 2011). Data for unions and the presence of the minimum wage are from Visser (2011). The former is the share of workers covered by collective bargaining agreements over total employment, while the second is a dummy equal to one for years in which the minimum wage (both at national and/or sectoral level) is in place, and zero otherwise.[14] Finally we include in our analysis a measure of the importance of payroll taxes: we use a variable calculated as consumption tax plus total tax wedge including employer's social security contributions, obtained from the CEP-OECD Institutions Data Set.

We include in our regressions a list of control variables that proxy bilateral costs of migration, that are standard in gravity models, made available by Ortega and Peri (2013). In particular, we include the logarithm of the distance, a dummy for sharing a contiguous border, a dummy for sharing a common language, a dummy for having previous colonial relationships, and dummies for common legal origins and common currency.

After merging the different datasets, we end up with an unbalanced dataset of 15 destination countries and 221 origin countries for the period 1980–2006, comprising 62,342 observations with 41,515 non-missing values for the dependent variable and 20,827 observations with missing information. The number of observations is about 70% of the 89,505 (221x15x27) potential maximum number of observations we should expect in case of a strongly balanced panel dataset. In fact, the dataset comprises 3,028 country pair observations (out of 221x15=3,315 possible ones). Of these, 65% are observed for the whole 27 years period, while for the remaining 35% country pairs there are gaps, but still about 75% of the available country pairs are observed for at least 16 years. On average, the main variables used in the analysis are observed for about 20 years. The initial dataset contains 425 observations with zero flows.

One limitation of the dataset comes from the fact that the dependent variable is constructed using three different sources of data and the definition of immigrants should be consistent across different sources. Moreover, interpolation has been used in rare cases (see Ortega and Peri, 2013). As reported in Table 1, we have missing information for tightness of entry laws for Italy, Finland and New Zealand, while the unemployment rate is not available for Switzerland. Again we cannot do much to solve this problem, as entry laws are directly provided in the original dataset by Ortega and Peri (2013). Data on labour institutions is almost complete and the main descriptive statistics are reported in Table 2. The evidence suggests that EPL is very high in continental EU countries,

[14] Note that we do not focus on the problems related to the centralization and coordination of wage bargaining, basically assuming they are strictly related to union power.

while it is much less stringent in the US, the UK and Canada. Similarly, union power and unemployment benefits generosity appear to be relatively more important in EU countries. Note that the UK is the only country that has changed its legislation on the minimum wage over the period 1980-2006.

In Table 3 we report pairwise correlations for the most important variables of interest. The GDP per capita is negatively correlated to the unemployment rate (-0.41), while its correlation with labour institutions does not show a clear pattern. On the other hand, there is a positive correlation between unemployment and institutions (0.21 and 0.18 for EPL and unions respectively). Interestingly, the correlation between EPL and the minimum wage is negative (-0.46), as most of the correlations of the minimum wage with other variables. Finally, countries that have passed more restrictive laws during the period are also those that have more strict EPL (correlation 0.29), stronger unions (0.42) and higher benefit coverage (0.10). Although such correlations are informative, it is important to remember that the correlations presented in the Table may be driven by (observed and unobserved) third factors affecting both institutions and migration legislation. The subsequent analysis tries to disentangle such effects.

3.2. Estimation

We analyse the relation between bilateral migration flows, migration policies and labour market institutions using the model proposed by Ortega and Peri (2013). Our specification is:

$$\begin{aligned}\ln flows_{d,o,t} &= \beta_0 + \beta_1 \ln GDP\_pc_{d,t-1} + \beta_2 Entry\_Laws\_Tightness_{d,t} + \beta_3 EPL_{d,t} + \beta_4 Entry\_Laws \times EPL_{d,t} + \\ &+ \beta_5 Unemployment\_Rate_{d,t} + \beta_6 \ln \text{Distance}_{d,o} + \beta_7 Contiguity_{d,o} + \beta_8 Common\_Language_{d,o} + \\ &+ \beta_9 Common\_Currency_{d,o,t} + \beta_{10} Common\_Legislation_{d,o} + \beta_{11} \text{Previous\_Colony}_{d,o} + \\ &\beta_{12} I_d + \beta_{13} I_o \times I_t + \varepsilon_{d,o,t}\end{aligned} \quad [1]$$

where *d* denotes destination country, *o* is the origin country and *t* denotes time, *I* denotes country and time dummies. The dependent variable is the natural logarithm of bilateral migration flows, where we imputed 1 when zero flows were available.[15]

Following Ortega and Peri (2013), we include in our regressions (lagged) GDP per capita at destination (as a proxy of expected average wage) plus different groups of variables. First, we

[15] In the robustness section we explicitly consider the problem of zero or missing flows running negative binomial regressions.

include a measure of tightness of entry laws (Entry Laws Tightness), which is lagged one year by construction. Second, we add employment protection legislation (EPL), the unemployment rate and, in one specification, the interaction term between entry laws and EPL (Entry Laws x EPL). Third, we include controls for traditional gravity models (Ln Distance, Contiguity, Common Language, Previous Colony) with further controls for common currency (Common Currency) and common legal origins (Common Legislation). In some specifications we also consider network effects (Beine et al., 2009) including lagged population at destination and another proxy for the size of network effects. Finally, we add, one at the time, the other labour market institutions (Unemployment Benefits, Tax Wedge, Minimum Wage, Adjusted Union Coverage). All regressions include destination and origin-year fixed effects. Standard errors are clustered at the country pair level to take into account heteroskedasticity and allow for correlation over time of country pair observations.

3.3. Endogeneity

One potential important objection to our econometric approach is the possibility of endogeneity bias for estimated coefficients for the main variables of interest. In particular, omitted variable bias and reserve causality may be an issue when analysing the effect of migration policies and labour institutions on migration flows. There are various different sources of endogeneity.

First, labour market institutions and immigration could be simultaneously determined, generating reverse causality. Giulietti et al (2013) show that the relation between labour institutions (unemployment benefit spending in their case) and immigration flows may be influenced by two different sources of simultaneity: codetermination of flows and institutions (immigrants may impact labour institutions), and response of institutions to immigration (destination countries may adjust their labour institutions in response to immigration flows).[16] Second, unobservable shocks could affect both labour institutions and immigration flows, leading to omitted variable bias.

Another source of endogeneity is related to the definition of expected earnings discussed in the theoretical framework and originally proposed by Harris and Todaro (1970). In fact, as Giulietti (2013) discusses, migration and labour market outcomes of the destination country are

[16] Note however that the probability that migration from one specific country to another affects the legislation is somewhat limited, at least in the short run.

simultaneously determined. In this case, reverse causality arises because the expected wage (proxied by GDP per capita) can be affected by immigration, and viceversa. Similarly, the unemployment rate is affected by immigration and it is also a cause of it. Hence, the components of the expected wage included in the regressions are simultaneously determined by immigration (and labour institutions).

Finally, the problem of endogeneity matters also for the entry laws index. In fact, higher values of the entry laws index could depend on previous year migration flows. To take into account this problem, we relate current migration flows to lagged values of the entry index (and of GDP per capita at destination). As a matter of fact, the policy index is constructed referring to previous year changes in migration legislation. Hence, in our baseline estimates, while we do not assume that migration polices are strictly exogenous, we plausibly assume that they are predetermined, i.e., current migration flows (and third unobserved factors) can only influence future migration policies (see also Mayda, 2010).

While our econometric specification includes destination and origin-year country fixed effects, and identifies the effect of interest through within-country variation, thus attenuating the problem of omitted variable bias typical in cross section studies, the problem of endogeneity may still be relevant. Identifying exogenous variation through external instruments for labour institutions and migration policies would be the ideal strategy to deal with the problem of endogeneity, but unfortunately the panel dimension of our dataset places severe constraints in this respect. Hence, in order to deal with the endogeneity concern, we supplement our identification strategy based on inclusion of destination and origin-year country fixed effects with a series of robustness checks. In particular, we run regressions on lower frequency data, augmenting our model with a full set of origin by destination dummies, using suitably lagged regressors and explicitly take into account endogeneity in the Arellano Bond dynamic estimator for panel data.

One additional concern of our estimation strategy is the possibility that there is serial correlation and non stationarity in our dependent variable. In fact, most of the previous empirical work on the determinants of immigration has typically relied on static model specifications for migration flows. In principle, static regressions should capture a cointegrating relationship between the dependent variable and the explanatory variables. However, we believe that this interpretation is not appropriate in this context. In fact, using the Fisher test for unit roots in panels, we can reject

the unit root hypothesis for ln of migration flows at the 1% level. Moreover, many of the variables representing immigration and labour market regulation are unlikely to contain unit roots. Such variables often change their regime and could be erroneously interpreted as unit root processes. In the robustness section, we use a dynamic specification for panel data that includes lagged migration flows, since it is likely that the short-run and long-run effects of labour institutions differ.

4. RESULTS

4.1. Main results

In column 1 of Table 4, we begin with a benchmark specification of equation (1), estimated with OLS, in which we include destination country, origin-by-year fixed effects and the other gravity control variables mentioned in the previous section. Results replicate those in Ortega and Peri (2013) for the period 1980-2006 with minimal differences in the size of coefficients for some control variables.[17] Our estimates indicate that the GDP per capita of the destination country positively affects migration flows: the estimated elasticity is equal to 0.78 indicating that 1% increase in GDP per capita at destination is associated to a 0.78% increase in migration flows. The regression also includes a measure of strictness of migration policy. In analysing the quantitative effect of this variable, it is important to remind that Ortega and Peri (2013) themselves provide a series of warnings concerning the interpretation of such a measure, that captures only partial aspects of the immigration legislation and it is operationalized imputing the value of zero for each country at the beginning of the sample period and then increases (decreases) by one unit if the passed legislation is more (less) restrictive the following year. The estimated coefficient is negative, indicating that countries that increase the tightness of migration policies experience a reduction in migration flows. The estimated effect is equal to -0.0189 and it is statistically significant at 10% level, suggesting that the typical restrictive law in terms of migration policy reduces flows by about 1.9% the following year. Results suggest that common language, common legislation, common currency and previous colonial relationship are pull factors for immigrants, while distance has a negative and significant effect on migration flows. Note that the direction and size of the coefficients on standard gravity controls is overall constant across columns.[18]

[17] We replicate results in column 1 of Table 4 of their paper. Note that in a previous version of our paper we replicated their regression including only destination, origin and year fixed effects separately. Results are available upon request.

[18] Ortega and Peri (2013) also include in their analysis two dummies for countries participating in the Maastricht and Schengen treaties to take into account the increasing degree of economic interaction within the EU. We also replicate their analysis obtaining similar results to

As discussed above, one rationale for adopting more strict migration policies is to protect natives from external competition of immigrants in the labour market, thus reducing their probability of losing a job (Angrist and Kugler, 2003; Rodrik, 1997). As long as employment protection legislation and migration policies have the same goal of protecting workers from labour market risk, we may expect that, by affecting quantities in the labour market, they may have similar effects on migration flows. To further investigate this hypothesis, in column 2 we temporarily drop the index for strictness of migration polices and we include a standard indicator for employment protection legislation. The latter turns out to be positive and statistically significant, suggesting that EPL may have a positive effect on migration decisions of individuals.

However, as our previous discussion emphasized, labour institutions exert both direct and indirect effects on employment and wages in the labour market (Boeri and Van Ours, 2008). In particular, there is evidence that EPL has a direct effect on flows and transitions, reducing both the job destruction and the job finding rates with a resulting increase in the duration of unemployment and an ambiguous effects on unemployment (Blanchard and Wolfers, 2000). As long as the mobility decision of migrants depends on the expected wage at destination, which is the product of the wage and the probability of finding an employment opportunity, in our regressions it is essential to control for both determinants. While the level of GDP per capita can be considered a proxy for wage factors (see Mayda, 2010), the unemployment rate should be included as a proxy for the probability of getting a job.

Moreover, we also emphasized in Table 3 that employment protection is positively correlated with the unemployment rate in our sample, thus not including this variable may lead to a severe omitted variable bias for our coefficients of interest. Hence, in order to fully capture the labour market determinants of migration flows, in column 3, we include the unemployment rate.[19]

As expected, higher unemployment rate has a large negative statistically significant effect on migration flows, with a coefficient of -0.15, suggesting that one point increase in the unemployment rate reduces migration flows by about 15%. Results for other regressors show interesting patterns. First, the elasticity of migration flows with respect to GDP per capita in destination countries decreases to 0.53 (against 0.79 found in column 2). Second, the effect of more stringent employment protection turns out to be negative and statistically significant: the estimated coefficient is equal to -

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those presented in column 1, with a positive and negative statistically significant effects on migration flows for the Maastricht and Schengen treaties, respectively. Results confirm our basic findings and are available upon request.

[19] In principle, the ideal measure needed to capture the probability of finding a job is the average duration of unemployment, unfortunately we were not able to find complete information for many countries and years.

0.40, suggesting that one point increase in EPL (which broadly corresponds to one standard deviation) reduces flows by about 40 percentage points.[20] These estimates indicate that firing restrictions and entry laws may have similar effects on expected costs and benefits of migration. In particular, these results suggest that lower flexibility and entry restrictions, by affecting quantities in the labour market, have similar negative effect on flows.

In column 4 we include in the same regression the indicator of tightness of entry laws, the unemployment rate and EPL: the coefficients for the three variables are negative and statistically significant at conventional levels, while the coefficient for GDP per capita is equal to 0.56, and it is smaller than the one previously estimated. Interestingly, our estimates confirm the size of the negative effect of 2% reduction in flows for the typical entry law found in Ortega and Peri (2013), but also reveal an important role for the unemployment rate and labour institutions (estimates are -0.15 and -0.40 respectively). This suggests that explicitly considering the labour market environment may directly influence the estimated elasticity of other determinants as potential pull factor for immigrants, and that previous estimates of migration determinants were possibly upward biased because of omitted variables.

As discussed above, there may be reasons to believe that there is an economically meaningful interaction between migration policies and employment protection, hence in column 5 we explicitly allow for the interaction between our indicators for strictness of migration policies and firing restrictions. The inclusion of the interaction term further reduces the elasticity of GDP per capita to 0.44, while leaving the coefficient for unemployment almost unaltered.[21] In this case, the interpretation of the level effects for the index for tightness of migration policies and EPL is somewhat different from the standard one. The coefficient for entry laws suggests that in countries in which EPL is zero, stricter admission criteria would have a positive effect on flows (note that no country in our sample has zero EPL). The negative coefficient for EPL suggests that countries that did not change their admission requirements with respect to their initial value in 1980 (that is set to zero by default at the beginning of the period) experience a decrease in migration flows. However, the interaction coefficient of strictness of migration policies with employment protection turns out

[20] Boeri and Van Ours (2008) note that labour market institutions and unemployment are also correlated with a large size of the informal sector in the economy. In this respect, the large negative effect of EPL on legal flows can hide big flows of illegal immigrants that are attracted by the vast informal sector. Although we do not consider explicitly such a possibility, we may argue that such effect is absorbed by the destination fixed effects. Further research is needed to further study these interactions.

[21] It is important to emphasise that these results are not robust to the exclusion of the unemployment rate from the regression equation. However, we already emphasized both in the theoretical and in the previous empirical part that there are fundamental reasons to include the unemployment rate into the analysis.

to be negative and statistically significant with a coefficient of -0.0373. Considering that the EPL index has mean 1.97 and standard deviation 1.05 in our sample, to have an idea of the size of this interaction effect, we compare the differential effects of strictness of migration policies at high (one standard deviation above the mean) and low (one standard deviation below the mean) levels of EPL, which broadly correspond to the 75th and 25th percentile of the EPL distribution. Results indicate that an increase of one point in the migration index (that corresponds to the approval of the typical entry law) reduces migration flows by about 8% in a country with high EPL compared to (less than) 1% in a country with low EPL. The differential effect of about 7 percentage point being statistically significant with a p value of 0.052.

Note that with very low levels of EPL, the interaction effect does not outweigh the linear effect, thus the typical entry law would have a positive effect on migration flows. In our sample, this would be the case for less regulated labour markets such as the UK, the US and Canada. While this result is difficult to reconcile with standard theoretical arguments, it is important to note that, without including labour market determinants in destination country, Ortega and Peri (2013) found a positive effect for migration policies for more regulated European labour markets (see column 3 of their Table 4). This suggests two important considerations. First, there are potentially important interactions between labour institutions and migration policies, as both affect quantities in the labour market. Second, a deeper exploration of the content of the entry tightness index provided by Ortega and Peri (2013) is necessary to better understand if there are relevant differences in the type of immigration legislation passed.

Our analysis has showed that the negative effect of restriction of migration policies on flows is larger in countries in which EPL is stricter. As we pointed out in previous sections, this may be due to the fact that in countries in which labour markets are tightly regulated, with limited wage flexibility, and in which immigration has large unemployment effects, the governments may push for more restrictive immigration legislation, suggesting that migration laws and firing restrictions can be viewed as political complements. In fact, both entry laws and EPL act on quantities in the labour market and both have a negative effect on flows, which also suggests that they may be perceived in a similar way by immigrants.

So far, we have showed that the labour market environment is one important determinant of migration flows. Still, our analysis has neglected another determinant of migration flows that is strictly related to the labour market, i.e., network effects. There is evidence that network or

diaspora's effects are important determinants of migration flows (see Mayda, 2010, Giulietti et al, 2013 and Beine et al, 2009). In column 6, we include the (lagged) log of population at destination (see Llull, 2013), the latter should capture demographic factors that are related to migration flows and are not captured by our previous specifications.[22] The estimated elasticity is very large, and it is equal to 3.8 suggesting an important role for such demographic factors. Interestingly, the elasticity of GDP per capita increases to its initial value of 0.7 while the other main variables of interest remain basically unchanged.[23]

In column 7 we use a different source of data to shed further light on these issues. We use information on outflows derived from United Nation sources and directly available in the Ortega and Peri (2013) database. We calculate net inflows and divide them by population at destination to obtain a (undoubtedly) raw measure of the share of migrants in destination country as a proxy for network effects (see Mayda, 2010).[24] Results confirm that network effects are very important, with an estimated coefficient equal to 2.6. The elasticity of GDP per capita is equal to 0.29, while the typical entry law reduces flows by about 5% the following year.[25] The negative effect of the unemployment rate and EPL are strongly reduced in size with respect to those found in previous columns, but they are still statistically significant.[26]

4.2. Robustness and Endogeneity

As discussed in subsection 3.3, although the inclusion of destination and origin-by-year fixed effects allows us to identify the effects of interest and take into account endogeneity problems, there may still be additional concerns regarding endogeneity bias for our estimates. In Table 5 we conduct additional checks to test the robustness of our estimates to omitted variables and reverse causality and other possible other sources of bias.

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[22] Most studies use the stock of immigrants from a particular origin country as percentage of the total population as a proxy of network effects. Unfortunately, this variable is available in our dataset only for few countries and only in recent years, leading to a severe drop in the number of observations and completely implausible results.

[23] Note that in columns 6 and 7 and subsequent Tables 5-7 we drop the interaction term between entry laws and EPL. In fact, our aim is that of testing the robustness of the main variables of interest to endogeneity concerns, and not that of providing a quantitative measure of the interaction term. In fact, as we stressed in other parts of the paper, the interpretation of the coefficient when using other estimation methods is not straightforward. Below, we further elaborate on this important point.

[24] Note that the net immigration rate (the ratio between the stock of immigrants in two periods and the population in destination country) is a proxy for the effective net flow of immigrants (difference between inflows and outflows). We use this relation to derive our measure.

[25] It is important to remind that in this case, both our dependent variable and the network measure are derived from UN sources, hence results are not strictly comparable with those in other columns.

[26] As a further robustness check, using the data from UN sources, we drop our control for network effects and run the regression in column 4 obtaining very similar results to those in that column in the same Table. The coefficients, that are all statistically significant, are as follows: GDP per capita (0.40), tightness of migration laws (-.074), unemployment rate (-.12), EPL (-.26). Complete results are available upon request.

We begin considering the problem of zero and missing flows in the dependent variable. In fact, some countries do not report information for very small flows, resulting in zero or missing values for the dependent variable. In order to overcome this problem, in previous regressions, we added one to migration flows and used a logarithmic transformation. In column 1 we estimate a negative binomial regression in which zero flows are explicitly modelled as possible outcomes. Results are in line with previous findings, although the size and significance of coefficients is overall reduced. The estimated coefficients for GDP per capita is now much lower (0.13) than the one found in previous Table 4, similarly the negative effect of unemployment and EPL are confirmed (although the latter coefficient is substantially reduced and barely significant). This model confirms that entry laws have a negative effect on flows but the coefficient is poorly estimated and it is not statistically significant at conventional levels. In column 2, we impute zeros to missing observations, and the sample size increases substantially. Results are in line with those found in the previous Table, with possibly one relevant exception: in this case the effect of entry laws is positive even if it is not statistically significant.

Column 3 includes a full set of origin-by-destination dummies (Ortega and Peri 2013). Such demanding specification controls for all time invariant bilateral factors that affect migration flows from a specific origin to a specific destination; moreover, it also absorbs time by origin factors. For this reason, results are only partially comparable to those discussed above that separately included destination and origin by year fixed effects and are somewhat mixed. While GDP per capita, unemployment and EPL still have the predicted significant effects on flows, the effect of entry laws turns out to be positive and statistically significant. Such result is difficult to reconcile with previous evidence and suggests that our results are not very robust when taking into account all possible bilateral specific factors.

As we said above, short term confounding factors and reverse causality of immigration on our set of regressors generate different types of endogeneity problems that may bias our results. In columns 4 to 6 we explicitly address these issues by using different specifications and estimators. In column 4 we report estimates obtained on a subsample where only 5-year periods are considered (1985, 1990, 1995, 2000 and 2005). In fact, longer time lags in the explanatory variables should attenuate the above problems. The estimated coefficients for our variables of interest have all the expected signs, but most of them are not significant at conventional levels, with p values around 0.16-0.19. We only obtain a negative and statistically significant effect for the unemployment rate.

In column 5 we return to the full sample and include the whole set of our regressors with one year lag. In fact, suitably lagged values should attenuate the endogeneity concerns discussed above. Results confirm previous findings of a negative effect of unemployment and employment protection on migration flows, although the size of the effects is substantially reduced. When lagging the other variables of interest, the lagged GDP per capita has a smaller positive effect on flows (0.17), while the significant negative effect of entry laws is equal to -0.048.

In column 6, as a further specification check, we estimate a dynamic version of the model by including among regressors the lagged migration flows. The lagged dependent variable should take into account persistence in flows to changes in the fundamental determinants of migration, or help to account for omitted variables that evolve slowly and are not already captured by the other control variables in the model.[27] Moreover, we also switch to treating lagged entry laws and EPL as potentially endogenous, generating instruments for them using the Generalized Method of Moments (GMM) technique developed by Arellano and Bond (1991).

The findings from the dynamic model show the highly significant estimate for the lagged dependent variable (0.686). The GDP per capita, the unemployment rate and EPL coefficients estimates are reduced in absolute magnitude but they are still statistically significant, while the effect of entry laws is negative but marginally insignificant. The inclusion of the lagged migration flow can also be interpreted as helping to distinguish between the short-run and long-run effects of EPL on migration flows. Using the estimates reported in the Table, we find that -0.12 is the short-run coefficient for EPL while -0.56 (=-0.12/(1 - 0.686)) is the long-run coefficient.

Overall, the sensitivity checks and different specifications reported above provide mixed results and suggest that estimates obtained in our previous OLS regressions with fixed effects are not always robust. Although possible concerns about endogeneity and other econometric issues are warranted, we showed that using appropriate dynamic models, results are in line with those found in our preferred OLS specification.[28] Still we want to emphasise that standard instrumental variable methods would be more appropriate to estimate unbiased coefficients.

[27] Nickell (1981) shows that including the lagged dependent variable among regressors introduces a bias in standard panel regressions. Although the length of our panel (27 years) suggests that the size of this bias may be relatively small, we decide to use the technique developed by Arellano and Bond (1991) to estimate the dynamic model.

[28] In regressions not reported, but available upon request, we included the interaction term between migration entry laws and EPL in all specifications estimated in columns 1 to 6 of Table 5. Results are not clear cut, with alternating positive and negative interaction effects that are hardly statistically significant. Interestingly, the interaction effect turns out to be negative and statistically significant, as in our OLS specification, only when switching to the Arellano Bond estimator.

4.3. Additional labour institutions

Our previous analysis focused on the potential interaction of migration policy with employment protection. However, EPL is correlated with other labour institutions (Blanchard and Wolfers, 2000), and such institutions are also correlated with migration policy (Boeri and Van Ours, 2008). In other words, the correlation between EPL and entry laws may be driven by third unobserved factors that haven't been considered in the analysis.

For example, EPL is correlated with coverage of unemployment benefits, as both institutions aim at protecting workers from labour market risk: EPL reduces the probability of being fired, while benefit coverage sustains income level after separation. In this respect they are imperfect substitutes. Hence, such institutions may interact depending on how migrants consider the probability of finding and losing a job in a particular country. Moreover, they may interact with migration policy as the latter seems to be tighter in countries in which the unemployment response to immigration is large.[29]

To try to capture possible interaction effects, in Table 6 we add to our analysis other labour market institutions, including them one at the time. In column 1 we begin by including unemployment benefit coverage.[30] Results suggest that higher benefit coverage has a positive effect on migration flows, while the effect of EPL is still negative but is not statistically significant anymore.[31] This result may indicate that although EPL and benefits are imperfect substitutes, their differences are perceived by potential migrants. Finally note that after introducing benefit coverage, the elasticity of GDP per capita at destination turns out to be 0.43, while the effect of the unemployment rate is very strong (-0.17). Similarly, the negative effect of restrictive migration policies increases. In column 2 we add tax wedge as a further control. In fact, in countries in which the benefit coverage is high, also payroll taxes are high. One may expect higher taxes to have either a positive or a negative effect on flows, in fact, higher taxes are associated with lower disposable income but also more welfare and available services for immigrants. Results indicate that higher taxes have a negative but not statistically significant effect on flows. The effects of migration policies and EPL are still statistically significant, while the effect of unemployment is reduced (-0.12).

[29] See Boeri and Van Ours (2008) for an exhaustive discussion of possible interaction effects.
[30] We have already mentioned the vast literature that studies the effect of welfare on migration flows, obtaining non clear cut results.
[31] We also run regressions dropping EPL from the analysis, obtaining similar results, however, we prefer to keep both EPL and other institutions to emphasise the interactions at work.

Next, we add a dummy equal to one for countries in which the minimum wage (MW) is in place in all years after the introduction and zero otherwise.[32] In Table 3 we observed a large negative correlation between EPL and MW. In principle, the two institutions have very different objectives: while EPL aims at protecting workers against labour market risk, MW has the objective of increasing the participation rate of less skilled (native) workers. Results in column 3 indicate that the minimum wage has a positive effect on migration flows while the negative effects of entry laws and EPL are estimated to be equal to -0.02 and -0.41 respectively.[33] This is not surprising, as in the short run, the presence of the minimum wage may attract less skilled migrants (by increasing the average wage without perverse employment effects) thus raising their expected utility from migration.[34] Of course this result does not take into account possible long run adjustments of employment that may take place in the market. In fact, our previous results showed that institutions that act on quantities (as EPL and migration policies) have negative effect on flows, thus it may be the case that in the long run the effect of the MW may go in different directions.[35]

In column 4 we include an indicator of coverage of union bargaining agreements as a proxy for union power. In Table 3 we showed that union coverage is related to both EPL and entry laws, thus we expect large interaction effects. Moreover, Boeri and Van Ours (2008) suggest that there are political economic reasons to believe that EPL and unions are complementary institutions. Union power has a positive and statistically significant effect on flows (0.04) and interesting effects on other variables. First, the elasticity of GDP per capita is strongly reduced (0.25); second, the effect of migration policies turns out to be no longer statistically significant, while the effect of EPL is substantially reduced and becomes statistically not significant. The opposite effects of EPL and union power on flows may suggest that immigrants take into different consideration the institutions that act on prices (unions, benefits, MW) to those that act on quantities (EPL and entry laws).

Finally, in column 5, we run a regression including the five labour market institutions, migration policies and the unemployment rate (plus the standard controls). In this case, the sample

[32] Exploiting across-states variation in wages generated by exogenous changes in federal legislation, Giulietti (2013) finds that minimum wage laws had a positive effect on the flow of unskilled immigrants in the US.

[33] Moreover, the minimum wage is positively correlated with the size of the informal sector in the economy (see Boeri and Van Ours, 2008), hence it may be the case that this positive correlation between the MW and flows is driven by third unobserved factors.

[34] In this case, identification of the effect derives from the change in minimum wage legislation in the UK, and it can be interpreted as a short run effect, while the estimation of a dynamic model in the spirit of Arellano Bond as the one reported in previous Table 5 may help to evaluate a long run effect.

[35] In regressions not reported, but available upon request, we also allowed for the interaction term between migration policies and the MW. We find that in countries in which entry laws are set to zero (i.e., at the same level of 1980), the MW increases migration flows by 0.33%; on the other hand, the interaction of MW with migration policies is negative and statistically significant suggesting that the typical law decreases migration flows relatively more in countries in which the minimum wage is in place.

size is strongly reduced. Results suggest that the elasticity of GDP per capita is equal to 0.31, while the negative effect of higher unemployment rates is equal to -0.13. Given the high correlation of institutions, it is not surprising to find that some of them are not statistically significant because of multicollinearity problems. In fact, unemployment benefit coverage, minimum wage and union coverage have a positive effect on migration flows, while EPL and tax wedge seem to exert no direct effect.

4.4 Country heterogeneity and the European Neighbourhood Policy (ENP)

So far we have presented empirical evidence showing how migration policies and labour institutions tend to affect the intensity of migration flows. However, it might be of some interest to assess whether the magnitude of these effects varies depending on country heterogeneity or with the presence of particular mobility agreements across countries. For this reason, we have run a series of baseline regressions (corresponding to column 4 of Table 4) splitting the sample across different groups of destination and origin countries.

In columns 1 and 2 of Table 7 we run our regressions splitting the sample of destination countries between EU and non-EU countries. Results indicate that GDP per capita is a pull factor for both destinations, with effects of similar size. Interestingly, the unemployment rate and entry laws have a large and negative statistically significant effect only on migrants to EU destinations. We find a strong negative effect for EPL, which is larger in size for non-EU destinations. This confirms our hypothesis that migration laws and EPL are possible complements.

In columns 3 and 4 we split the sample according to the country of origin of migrants, dividing between OECD and non-OECD. The elasticity of GDP per capita at destination is slightly larger for OECD origins, while we do not find any other particular differences for other variables. In columns 5 and 6 we replicate the exercise dividing the sample of migrants in two groups of origin countries: the set of 16 European Neighbourhood Policy countries and the rest.[36] Some interesting patterns emerge: the elasticity of GDP per capita at destination matters only for migrants from countries outside the ENP agreement, while the unemployment rate at destination seems to matter

[36] The ENP is a bilateral policy agreement between the EU and 16 countries from East Europe, Middle East and North Africa, with the objective to create a zone of stability, security, political association, deeper economic integration, increased mobility and more people-to-people contacts. North Africa includes Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt. The rest includes both countries from the Middle East such as Jordan, Lebanon, Syria, Israel, the Palestinian Authority, and from Eastern Europe such as Moldova, Ukraine, Belarus, Georgia, Armenia and Azerbaijan. Again we should warn the reader that the two samples are quite different in terms of observations.

more for countries within the agreement with a coefficient of -0.23 against -0.14 for the other migrants. As far as EPL is concerned, we do not find significant effects for the group of ENP countries. In turn, entry policies negatively influence flows within the ENP agreement.

Finally, it is interesting to investigate if, within the group of countries participating in the ENP agreement, there are relevant differences between relatively less skilled migrants from the North African countries and relatively more skilled ones from Eastern Europe and the Middle East.[37] Interestingly, for migrants from North Africa, the only variable that really matters is the geographic distance (not reported), with a very large coefficient of -1.5. On the other hand, migrants from Eastern regions are very reluctant to migrate to countries with high unemployment rates, with a negative effect equal to -0.26. Finally, note that migration policies and labour institutions seem to matter only for migrants from Eastern Europe.

5. CONCLUDING REMARKS

In this paper we analyse the relation between migration flows, labour market institutions and the strictness of migration policies. We extend previous work on the determinants of migration flows by considering the potential interaction between demand and supply factors. On the supply side, we explicitly consider the labour market environment in destination countries. We focus our attention on the unemployment rate and the role of labour market institutions, such as employment protection legislation, unemployment benefits coverage, minimum wages, union power and the tax wedge. Labour institutions have a direct effect on expected employment and wages in the labour market, thus influencing incentives for migrants to move in a particular country. Moreover, by directly influencing the responses in terms of wages and unemployment to immigration shocks, labour institutions interact with migration policies, i.e., with the demand side of migration.

Results indicate that a one point increase in the unemployment rate reduces flows by 15%, while a one point increase in the EPL index (which broadly corresponds to one standard deviation) reduces flows by 40%. While the role of GDP per capita in the destination country is substantially reduced with respect to previous estimates, we confirm a 2% reduction in flows for the typical immigration law found by Ortega and Peri (2013). Further results suggest that benefit coverage, union power and minimum wage have a positive effect on flows.

[37] Using data from Ortega and Peri (2013), we see that about 33% of migrants from the East of Europe and the Middle East are skilled ones, while this percentage drops to 23% for migrants from North Africa.

In order to deal with the endogeneity concerns, we supplement our identification strategy with a series of robustness tests. We run regressions using negative binomial models, on lower frequency data, on a full set of origin by destination dummies, using suitably lagged dependent variables and using the Arellano Bond estimator for panel data. The sensitivity checks and different specifications provide mixed results and suggest that estimates of the effects obtained in our OLS regressions with fixed effects are not always robust.

Nevertheless, we believe that the analysis presented in this paper may have possible policy implications and it opens new avenues for further research. The main potential implication of our analysis is that labour market institutions and migration policies may have an important degree of interaction that could be explicitly taken into account when coordinating reforms in either direction. Moreover, mobility agreements between countries should also consider the heterogeneous effects of policies on migration flows in order to better regulate such flows. Future research should aim at investigating the role played by product market regulation and the interaction between labour regulation, migration laws and the shadow economy.

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Table 1. Summary statistics for main variables of interest

Country	Bilateral Migration Flows	GDP per capita destination	GDP per capita origin	Entry Laws Tightness	Unemployment Rate
Australia	4.14	21305.31	6068.37	1.21	7.59
Belgium	5.95	21497.91	7207.78	-0.54	8.59
Canada	4.73	20104.61	5541.06	-0.88	8.87
Switzerland	6.81	36427.14	8277.22	1.15	
Germany	6.65	22430.24	5540.36	-1.63	8.83
Denmark	4.11	27540.78	5509.53	-0.64	6.13
Spain	4.57	13087.26	5503.88	-0.49	14.9
Finland	2.69	22131.56	5402.02		9.87
United Kingdom	5.75	25445.09	8368.13	-0.18	6.67
Italy	5.37	17945.12	5279.46		9.25
Netherlands	5.03	22335.35	5577.98	0.94	5.35
Norway	3.19	31485.6	5495.74	0.06	4.39
New Zealand	4.86	15114.25	10317.14		5.77
Sweden	3.81	25095.64	5370.17	-1.37	5.68
United States	5.83	26421.01	5504.88	-3.52	6.15

Notes: Data in columns 1 to 4 are from Ortega and Peri (2013). Data for unemployment rate are from the OECD. Bilateral migration flows is the natural logarithm of 1 + migration flow; GDP per capita is in PPP 2000 US dollars. Entry laws tightness is a time varying index for strictness of migration laws from Ortega and Peri (2013). Positive values indicate more strict migration policies over the sample period, negative values less strict policy.

Table 2. Summary statistics for labour market institutions.

Country	EPL	Unem. Benefits coverage	Tax wedge	Minimum wage	Adj. Union Coverage
Australia	1.09	61.74	34.30	1	69.31
Belgium	2.68	89.20	57.33	1	96.00
Canada	0.75	60.10	39.56	1	35.56
Switzerland	1.14		30.14		46.96
Germany	2.69	47.70	54.66	0	67.61
Denmark	1.9	85.46	62.98	0	68.00
Spain	3.32	44.58	44.11	1	77.68
Finland	2.15	55.86	53.92	0	83.55
United Kingdom	0.66	46.57	42.99	0.65	37.40
Italy	2.97	42.85	56.57	0	81.72
Netherlands	2.5	55.33	55.22	1	83.66
Norway	2.75	64.82	53.25	0	71.42
New Zealand	1.18	96.48	41.22	1	42.35
Sweden	2.74	82.01	63.41	0	87.6
United States	0.21	35.46	34.54	1	16.46

Notes: EPL is an index of employment protection legislation, unemployment benefit coverage is the percentage of unemployed covered by benefits, tax wedge is taxes and contributions over labour costs, minimum wage is equal to one is the min wage is in place in a particular year, adjusted coverage is the percentage of employees covered by bargaining agreements. See also Table 3 and the main text for data sources and further definitions.

Table 3. Pairwise correlations for main variables of interest

	GPD per capita destination	Entry Laws Tight	EPL	Unemp. rate	Unemp. Benefits coverage	Tax Wedge	Minimum Wage	Adj. Union Coverage
GPD per capita destination	1.000							
Entry Laws Tight	-0.2898* 0.000	1.000						
EPL	-0.2724* 0.000	0.2969* 0.000	1.000					
Unemp. rate	-0.4121* 0.000	0.0102* 0.000	0.2165* 0.000	1.000				
Unemp. Benefits coverage	0.0178* 0.000	0.1023* 0.000	0.1420* 0.000	-0.1446* 0.000	1.000			
Tax Wedge	0.1467* 0.000	0.0202* 0.000	0.6593* 0.000	-0.1136* 0.000	0.4188* 0.000	1.000		
Minimum wage	-0.1546* 0.000	0.0577* 0.000	-0.4607* 0.000	0.0964* 0.000	-0.1478* 0.000	-0.6668* 0.000	1.000	
Adj. Coverage	-.01326* 0.000	0.4297* 0.000	0.7905* 0.000	0.1874* 0.000	0.3600* 0.000	0.6743* 0.000	-0.4095* 0.000	1.000

Notes: GDP per capita at destination is ln of GDP per capita. Entry laws tight is a quantitative measure (index) of immigration policy restrictions to new immigration flows. The index is equal to zero for the first year and then increases or decreases by one point depending on tightening (or loosening) of entry laws. The index is provided by Ortega and Peri (2013). EPL is an index of employment protection legislation, derived from the OECD and it measures the strictness of hiring and firing restrictions. We use an un-weighted average of sub-indicators for regular and temporary contract. Unemployment benefit coverage is the percentage of unemployed covered by benefits and it is derived from the FRdB database. Tax wedge is taxes and contributions over labour costs, it's a measure calculated as consumption tax plus total tax wedge including employer's social security contributions obtained from the CEP-OECD Institutions Data Set. Minimum wage, is a dummy equal to one for years in which the minimum wage (both at national and/or sectoral level) is in place, and zero otherwise and is from Visser (2001). Adjusted coverage, from Visser (2001) is the share of workers covered by collective bargaining agreements over total employment.

Table 4. Determinants of bilateral migration flows: migration policies, employment protection legislation and networks

Dep Var: Ln of 1+bilateral flows	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
LnGDP per cap (t-1)	0.779***	0.789***	0.529***	0.564***	0.439***	0.775***	0.289**
	(0.121)	(0.0829)	(0.0824)	(0.083)	(0.087)	(0.088)	(0.158)
Entry Laws Tightness	-0.0189*			-0.0209**	0.0329*	-0.029***	-0.054***
	(0.0109)			(0.007)	(0.0139)	(.007)	(.009)
EPL		0.0757**	-0.401***	-0.396***	-0.389***	-0.637***	-0.082**
		(0.0291)	(0.033)	(0.0339)	(0.0339)	(.048)	(0.045)
Entry Laws × EPL					-0.0373***		
					(0.0081)		
Unempl. Rate			-0.152***	-0.154***	-0.166***	-0.157***	-0.027***
			(0.005)	(0.005)	(0.0063)	(.006)	(0.008)
Ln Pop per cap. (t-1)						3.869***	
						(0.523)	
Network (t-1)							2.632***
							(0.276)
Common Currency	1.025***	.0994***	0.881***	0.883***	0.877***	0.881***	-0.004
	(0.226)	(0.067)	(0.066)	(0.0667)	(0.0662)	(.0707)	(0.082)
Ln Distance	-0.980***	-0.975***	-0.981***	-0.9805***	-0.9804***	-0.98***	-0.808***
	(0.0696)	(0.0165)	(0.0162)	(0.0162)	(0.0162)	(.0179)	(0.027)
Contiguity	-0.0807	-0.115	-0.097	-0.0958	-0.0943	-0.096	0.019
	(0.246)	(0.066)	(0.065)	(0.0652)	(0.0652)	(.071)	(0.069)
Common Language	0.665***	0.697***	0.693***	0.693***	0.692***	0.693***	0.243***
	(0.108)	(0.697)	(0.0287)	(0.0287)	(0.028)	(0.029)	(0.058)
Common Legislation	0.248***	0.269***	0.276 ***	0.276***	0.276***	0.274***	0.559***
	(0.0919)	(.0242)	(0.0239)	(.0239)	(0.023)	(0.025)	(0.038)
Previous Colony	1.418***	1.508***	1.509***	1.506***	1.504***	1.504***	0.791***
	(0.199)	(.0427)	(0.0421)	(.0421)	(0.0421)	(0.053)	(0.107)
Constant	0.942	4.703	8.4702***	6.227***	7.571***	-33.88***	3.923***
	(1.257)	(2.253)	(2.226)	(2.229)	(2.247)	(5.335)	(1.52)
Destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,749	29,322	29,322	29,322	29,322	29,322	9,981
R-squared	0.797	0.797	0.802	0.802	0.802	0.803	0.795

Note: Dependent variable is natural logarithm of 1+bilateral migration flows. Dep. Var. in column 7 is from UN sources. All regressions include destination fixed effects and origin by year fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The variable Entry Laws Tightness is set to 0 at the beginning of the period and increases (or decreases) by one unit if the passed legislation is more (or less) restrictive in terms of admission requirements (see Ortega and Peri, 2013). EPL is a measure of employment protection legislation; Entry Laws × EPL is the interaction term. Ln Pop per cap. (t-1) is the ln of population at destination, lagged one year. Network (t-1), is the ratio of net inflows over population of destination, lagged one year. Remaining variables and sources of data are discussed in Section 3.1.

Table 5. Robustness and endogeneity

Dep Var: Ln of bilateral flows	**(1) Neg. Bin. Zeros**	**(2) Neg. Bin. Missing**	**(3) Full dummies**	**(4) Five Years**	**(5) Lagged variables**	**(6) Arellano Bond**
Ln GDP per cap. (t-1)	0.125**	0.419***	0.285***	0.133	0.173**	0.058***
	(0.0713)	(0.078)	(0.087)	(0.0992)	(0.0910)	(0.0201)
Entry Laws Tightness	-0.0133	0.042	0.0198***	-0.0227		
	(.01396)	(0.034)	(0.008)	(0.016)		
Entry Laws Tightness (t-1)					-0.0479***	-0.005
					(0.0147)	(0.004)
Entry Laws Tightness (t-2)						0.017***
						(0.004)
EPL	-0.0826*	-0.286***	-0.405***	-0.1021		
	(.0507)	(0.053)	(0.056)	(0.078)		
EPL (t-1)					-0.127**	-0.124***
					(0.061)	(0.022)
EPL (t-2)						0.0804***
						(0.021)
Unemployment Rate	-0.134***	-0.1506***	-0.14***	-0.154***		-0.035***
	(0.0092)	(0.009)	(0.01)	(0.0118)		(0.002)
Unemployment Rate (t-1)					-0.125***	
					(0.0101)	
Ln of bilateral flows (t-1)						0.686***
						(0.015)
Ln of bilateral flows (t-2)						0.093***
						(0.012)
Ln Distance	Yes	Yes	Yes	Yes	Yes	Yes
Contiguity	Yes	Yes	Yes	Yes	Yes	Yes
Common Currency	Yes	Yes	Yes	Yes	Yes	Yes
Common Language	Yes	Yes	Yes	Yes	Yes	Yes
Common Legislation	Yes	Yes	Yes	Yes	Yes	Yes
Previous Colony	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin-by-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Origin-by-destination fixed effects	No	No	Yes	No	No	No
Observations	29,322	38,148	29,322	6,260	28,274	24,594
R-squared			0.953	0.469	0.47	

Notes: In cols 1 and 2 the dep var is migration flows, in cols 3 to 6 is the ln of 1+ bilateral migration flows. All regressions include destination fixed effects and origin by year fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Notes to Tables 1, 2, 3 and 4 for definition of variables. Variables and sources of data are discussed in Section 3.1. Cols 1 and 2 report negative binomial regressions, in col. 1 zero flows are modeled, while in col. 2 missing values are replaced with zero values, col. 4 includes origin by year and origin by destination fixed effects, col. 4 uses only data for years 1985, 1990, 1995, 2000, 2005. Col 5 uses the first lag of the main variables of interest. Col. 6 reports a one-step difference robust estimate of the model with the Arellano Bond estimator where lags of Entry Laws, EPL and the Dep. Var. are lagged and treated as endogenous. Sargan test of overid. restrictions: chi2(509) =2912.66 Prob > chi2 = 0.000. Hansen test of overid. restrictions: chi2(509) = 123.86 Prob > chi2 = 1.000. Tests for auto correlation in residuals are z = -22.83 Pr > z = 0.000 and AR(2) z = 0.28 Pr > z = 0.779.

Table 6. Determinant of bilateral migration flows: additional labour market institutions.

Dep Var: Ln of bilateral flows	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Ln GDP per cap. (t-1)	0.431**	0.456***	0.471***	0.248**	0.311***
	(0.108)	(0.106)	(0.0975)	(0.095)	(0.114)
Entry Laws Tightness	-0.0471***	-0.0789***	-0.0245*	0.005	-0.0597***
	(0.0106)	(0.012)	(0.0107)	(0.009)	(0.0134)
EPL	-0.0804	-0.327***	-0.413***	-0.104	0.0225
	(0.0669)	(-0.327)	(0.064)	(0.0590)	(0.0597)
Unempl. Benefits	0.0096***				0.0064***
	(0.0011)				(0.0011)
Tax Wedge		-0.005			-0.0001
		(0.003)			(0.003)
Minimum Wage			0.45***		0.254***
			(0.104)		(0.0858)
Adj. Union Coverage				0.0402***	0.0249***
				(0.003)	(0.003)
Unemployment Rate	-0.1705***	-0.119***	-0.156***	-0.152***	-0.134***
	(0.0115)	(0.0107)	(0.0115)	(0.0105)	(0.0106)
Ln Distance	Yes	Yes	Yes	Yes	Yes
Contiguity	Yes	Yes	Yes	Yes	Yes
Common Language	Yes	Yes	Yes	Yes	Yes
Common Currency	Yes	Yes	Yes	Yes	Yes
Common Legislation	Yes	Yes	Yes	Yes	Yes
Previous Colony	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes
Destination fixed effects	Yes	Yes	Yes	Yes	Yes
Origin-by-year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	26,131	24,589	29,322	29,322	22,653
R-squared	0.805	0.803	0.803	0.805	0.806

Note: Dependent variable is natural logarithm of 1+bilateral migration flows. All regressions include destination fixed effects and origin-by-year fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Notes to Tables 3 and 4 for definition of variables. Remaining variables and sources of data are discussed in Section 3.1.

Table 7. Determinants of bilateral migration flows: country heterogeneity

Dep Var: Ln of bilateral flows	**EU dest.**	**NON EU dest.**	**OECD origin**	**NON OECD origin**	**ENP origin**	**NON ENP origin**	**EAST origin**	**NORTH origin**
Ln GDP per cap. (t-1)	0.619***	0.592***	0.686***	0.461***	-0.343	0.645***	0.206	-0.064
	(0.176)	(.154)	(0.168)	(.114)	(0.262)	(0.104)	(0.36)	(0.354)
Entry Laws Tightness	-0.054***	-0.009	-.017	-.007	-0.136***	-0.009	-0.137***	-0.074
	(0.012)	(0.014)	(.014)	(0.012)	(0.032)	(0.011)	(0.025)	(0.056)
EPL	-0.384***	-2.158***	-.627***	-0.307***	-0.19	-0.418***	-0.711***	-0.089
	(0.062)	(0.301)	(.092)	(0.0787)	(0.194)	(0.067)	(0.216)	(0.33)
Unemployment Rate	-0.182***	0.001	-.141***	-.152***	-0.23***	-0.147***	-0.265***	-0.193***
	(0.013)	(0.02)	(0.016)	(0.0145)	(0.0419)	(0.011)	(0.051)	(0.062)
Ln Distance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contiguity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Common Language	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Common Currency	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Common Legislation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Previous Colony	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin by year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,533	11,789	6,202	23,120	2,514	26,808	1,389	1,125
R-squared	0.838	0.904	0.755	0.801	0.809	0.806	0.843	0.842

Notes: Dependent variable is natural logarithm of 1+bilateral migration flows. All regressions include destination fixed effects and origin by year fixed effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Notes to previous Tables for definition of variables. Column 1 includes only EU destination countries, column 2 non EU destination countries. Column 3 and 4 include OECD and non OECD countries of origin respectively. Columns 5 and 6 divide origin countries between ENP and non ENP countries (see text for further details). Column 7 and 8 divide ENP countries between East Europe and North Africa.