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International Factor Mobility, Wages and Prices

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Abstract

This paper analyzes the joint influence of migration inflows and outward foreign direct investment (FDI) on wage bargaining. Labor migration and offshoring supported by FDI affect wage deals by changing the outside options of workers and firms. Unemployed workers may find alternative jobs either in the legal or in the illegal labor markets. Wages in this latter case are highly affected by migrants crowding this segment more than any other market. Firms may have the option of moving production partly or entirely to foreign low-cost countries. A wage curve is designed theoretically, reflecting cross-border labor and capital mobility, and estimated on panel data for 13 European countries over the period 1995–2013. The theoretical predictions of a joint negative effect on wages of FDI outflows and labor migration inflows are confirmed with some novel results.

1. Introduction

In an open economy wages depend on variables relating both to the domestic labor market and to globalization of goods and factor markets. To the first group belong the rate of unemployment, the dynamics of labor productivity, the institutional setting, the diffusion and shape of the welfare state, the extent of flexibility of the labor market, the effectiveness of central bank inflation targeting, the size of the illegal labor market. The second group captures the intensity of international integration of a nation in terms of competition in goods and services and cross-border mobility of labor and capital. While on the former group of variables we enjoy an abundant crop of theory and applied analyses, contributions on international factor mobility are more recent and contain a bunch of controversial results. Moreover, the main thrust of the research in this field is on the influence of international labor migration on wage levels in host countries, while the investigation of the upshot of capital mobility is often neglected.

It is this issue, i.e. the effect on wages of cross-border mobility of both factors of production in an age of intensive labor migration and production offshoring, that is at the center stage of our investigation.

During the last twenty years, a large chunk of literature[1] on international factor mobility has concentrated on the degree of substitutability between migrant and native labor neglecting capital mobility. Zhao and Kondoh (2007) find that in the USA temporary and permanent migrants reduce the gap between union and non-union workers in manufacturing. In a similar vein D'Amuri et al. (2010) explore the German labor market over the 1990s, empirically adapting a general equilibrium model and discover that new immigrants are not close substitutes for native workers, but only for old migrants with similar education and skill. Still Ottaviano and Peri

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(2012) maintain that migration decreases the pay of low-skilled workers, while increasing high-skill wages. In a study of the USA David Card writes: "If immigrants and natives in the same skill group are imperfect substitutes, the competitive effects of additional immigrant inflows are concentrated among immigrants themselves, lessening the impacts on natives" (Card, 2009, p. 2). In a detailed coverage of the UK by Manacorda et al. (2012) migration is seen to exert a negative effect primarily on the pay of incumbent immigrants while natives do not suffer in any discernable way. In these contributions immigration seems to increase employment and growth with negligible adverse effects on natives' wages.

Nearly opposite results appear in Borjas (2003, 2009) where the pressure of migration on labor incomes is fairly negative. In Borjas et al. (2011) skilled immigrants and natives in the USA turn out to be perfect substitutes, as proved by elasticities of substitution between natives and migrants quite higher than those of Ottaviano and Peri (2012). On the same tune, Blanchflower and Shadforth (2009) consider migration from Eastern Europe to Britain since 2004, coming across an increased fear of unemployment and a significant downward pressure on salaries.

In spite of the polarization of the discussion there seems to be an indirect channel of influence of migration through incumbent migrants and a certain degree of substitutability between mature migrants and natives after controlling for education and skill. Even though the overall evidence is mixed, there is a moderate agreement that migration touches on the earnings at least of incumbent foreign workers.

A different strand of literature discusses the role of international mobility of capital in wage deals. Zhao (1998) points to the distributive implications of international mobility of capital that is far higher than that of labor. Feenstra and Hanson (1999) find that wages of low-skilled workers have fallen relative to those of high-skilled workers owing to foreign outsourcing in the USA between 1979 and 1990. Skaksen and Sorensen (2001) see foreign direct investment (FDI) as reducing or increasing negotiated wages depending on whether the activities in the host country are substitutes or complements of those at home. In Koskela and Stenbacka (2008) international outsourcing of either intermediate inputs or entire production processes play a role similar to outward FDI since labor demand is more elastic the higher is the share of outsourced inputs. In Skaksen (2004) the threat of international outsourcing reduces the wage rate, while realized international outsourcing has the opposite effect since residual jobs are higher skill. Causality is investigated in Bandyopadhyay and Wall (2010) where immigration reduces both offshoring and wages. Jayadev (2007) reports a negative correlation between capital account openness and the labor share of income in a large panel of countries, while Geishecker and Görg (2011) find, on British microdata, that service offshoring affects the real wage of low- and medium-skilled individuals negatively, yet high-skill workers may benefit widening the gap between expert and less proficient employees.

Our paper starts from the point that both migration and capital movements alter the conditions of wage bargaining between firms and workers, through different channels. We model their joint effects on wage deals in a bargaining scheme where inward labor flows change the outside option of incumbent workers and FDI outflows improve the outside option of firms. If negotiations fall apart, workers must take into account the risk of unemployment. In that unfortunate case the most likely option they may get is the salary offered by the informal sector (Marjit and Kar, 2012). This in turn is affected by immigration flows since new migrants crowd this sector more than any other segment of the labor market. Migration inflows tend to lower the informal sector wage generating a smaller value of the workers' outside option that translates into a lower bargained wage. The idea that migrations may impinge on wage bargaining by shifting workers' outside option through the specific influence on informal labor markets has never been considered before, and makes our contribution depart from existing literature. The outside option for firms is represented by the possible profit that can be realized by moving production, mostly through FDI, to a low-wage country. Potential offshoring shifts and upgrades the outside option of entrepreneurs mimicking a credible threat of dismissing some (or all) domestically employed workers. That translates into a lower bargained wage.

We build this framework theoretically and we derive an aggregate wage equation that can be estimated to assess the model's predictions. The empirical investigation is conducted on quarterly data over the period 1995–2013 for a panel of 13 European countries for which comparable data on migration and FDI outflows are available. We shall see that both outsourcing and labor migration have a negative effect on the bargained wage and that migration acts mostly via the illegal labor market.

2. The Wage Curve

The theoretical approach we adopt is one of partial equilibrium based on an individual bargaining between workers' and firms' representatives.

We assume that aggregate production Y requires labor L and raw materials R, in Cobb–Douglas proportions:[2]

$$Y = L^{\alpha} R^{1-\alpha}. \tag{1}$$

Labor consists of two components, native (L_N) and immigrant (L_M) workers, which we presume, following Borjas (2003, 2009), to be perfect substitutes in production ($L = L_N + L_M$). The rationale for this assumption lies in the diffusion, especially in Europe, of national contracts whereby no discrimination in terms of jobs and wages can be made between native and foreign workers. This is consistent with our hypothesis that the effects of migration inflows feedback mostly in the informal sector wage. This pseudo market is made by new migrants, some native and old migrants, unemployed and ready to work for a salary that is quite lower than the one that prevails in legal contracts.

The aggregate profit function, in real terms, is given by:

$$\Pi = Y - wL - vR \tag{2}$$

where w is the real wage and v is the (real) price of raw materials.

We envisage a scenario where the real wage is not determined in a supply–demand framework but, owing to market imperfections on both sides, via a procedure that closely resembles a bargaining between workers' and entrepreneurs' delegates. Specifically, we consider a Nash–Rubinstein bargaining solution resulting from many identical firms and workers' representatives who set real wages so as to maximize the following joint utility or bargaining function:

$$\Omega = [V - V^{\circ}]^{\mu} [\Pi - \Pi^{\circ}]^{1-\mu} \tag{3}$$

where V and Π are the unions' and firms' objectives respectively, while V° and Π° are the outside options that the two parties face if the bargaining falls apart.

We assume that the workers' objective is simply given by the average real wage:

$$V = w. \tag{4}$$

The workers' outside option is either the real wage that can be earned by getting employed in some other firm, w', or the alternative salary, w_0, that can be earned in case one becomes unemployed and works irregularly in the informal sector (moonlighting). If the probability of unemployment is a positive function f of the total unemployment rate u, then the worker's outside option can be expressed as:

$$V_0 = [1 - f(u)]w' + f(u)w_0. \tag{5}$$

The real salary in the case of unemployment, w_0, is a fraction of the real wage that depends on the "moonlight" pay that jobless workers can earn from off-the-book employment.[3]

We assume that the "moonlight" wage is a negative function of migration inflows, which in turn may be captured by the ratio between the unemployment rate of foreigners and the total unemployment rate. Since new migrants tend to be unemployed for a while when they arrive, a fresh immigration flow should be mirrored by a rise of the ratio between migrants' and total unemployment rates,[4] and a drop of the moonlight wage. This novel assumption departs from existing literature and is consistent with a large portion of evidence on immigration that endorses the substitutability between new and incumbent unemployed migrants.

The expression for w_0 is then:

$$\frac{w_0}{w} = b\left(\frac{u_f}{u}\right) \quad \text{with} \quad b' < 0, \tag{6}$$

where u_f is the unemployment rate for migrants.

The outside option for firms embodies the possible transfer of production facilities to a lower wage country via FDI. As emphasized in the introduction a bunch of papers points out that this opportunity is going to affect wages in a way that is unfavorable to workers. For this reason we assume that:

$$\Pi^\circ = g(\text{FDI}) \quad \text{with} \quad g' > 0, \tag{7}$$

in other words, firms are assumed to be able to obtain a return from moving production abroad in case the bargaining falls apart. Such a return is assumed to be a positive function of the amount of FDI the firms carry out abroad.

The joint maximization of Ω (equation 3) with respect to w implies that the real wage must satisfy the following first order condition:

$$\frac{\Pi - \Pi^\circ}{L} = \frac{1-\mu}{\mu}(V - V_0). \tag{8}$$

When maximizing Ω individual bargainers take w' as given and behave as if the outcome of their bargaining had no effect on the wage paid elsewhere in the economy.[5] However, since an isomorphic bargaining is taking place between all firms and workers' representatives in the economy, the real wage is eventually going to be the same across all bargaining units.

On the basis of these arguments we may maintain that $w' = w$, so that:

$$V - V_0 = f(u)w - f(u)w_0 = wf(u)\left(1 - \frac{w_0}{w}\right) = wf(u)\left(1 - b\left(\frac{u_f}{u}\right)\right). \tag{9}$$

From equations (2) and (7) we get:

$$\Pi - \Pi^{\circ} = Y - wL - vR - g(\text{FDI}). \tag{10}$$

Substituting (9) and (10) into the first order condition (8) we can write:

$$\frac{Y - vR}{L} - w - \frac{g(\text{FDI})}{L} = \frac{1-\mu}{\mu} wf(u)\left[1 - b\left(\frac{u_f}{u}\right)\right], \tag{11}$$

and finally:

$$w = \left(\frac{Y - vR}{L} - \frac{g(\text{FDI})}{L}\right)\left[1 + \frac{1-\mu}{\mu} f(u)\left(1 - b\left(\frac{u_f}{u}\right)\right)\right]^{-1}. \tag{12}$$

Given that $vR = \frac{1-\alpha}{\alpha} wL$, equation (12) may also be written as:

$$w = \left(\frac{Y}{L} - \frac{g(\text{FDI})}{L}\right)\left[\frac{1}{\alpha} + \frac{1-\mu}{\mu} f(u)\left(1 - b\left(\frac{u_f}{u}\right)\right)\right]^{-1}. \tag{12$'$}$$

A log-linearized version of (12′) can be taken to be our "core" wage equation, valid as a long-run equilibrium relationship:

$$\log w = a_0 + a_1 \log\left(\frac{Y}{L}\right) - a_2 \log(u) - a_3 \log\left(\frac{u_f}{u}\right) - a_4 \log\left(\frac{g(FDI)}{L}\right), \tag{13}$$

which suggests that, in equilibrium, the real wage is affected by four fundamental variables: labor productivity, the total unemployment rate, migration inflows as measured by the ratio between migrant and total unemployment rates and the firms' outside option of offshoring captured by outward FDI. Notice that the specification of equation (13) in principle implies that the presence of migrations not only has a (negative) level effect on the real wage, but should also lower its response to unemployment (i.e. it flattens the wage curve).

3. Estimation of the Wage Setting Parameters

The level wage equation (13) is relevant when one thinks of long-run (equilibrium) behavior. To estimate its parameters in a quarterly panel data framework, we will follow an autoregressive distributed lag (ARDL) approach.

Given data on time periods $t = 1, 2, \ldots, T$ and countries $i = 1, 2, \ldots, N$, we model the short-run dynamics of wage adjustment as an ARDL $(p, q, \ldots, q)$ model, which can be written in an error correction mechanism form as:

$$\Delta \log w_{it} = \Phi_i \log w_{i,t-1} + \mathbf{b}_i' \mathbf{x}_{i,t} + \sum_{j=1}^{p-1} c_{ij} \Delta \log w_{i,t-j} + \sum_{j=0}^{q-1} \mathbf{d}_{ij}' \Delta \mathbf{x}_{i,t-j} + \mu_i + \varepsilon_{it}$$
$$i = 1, \ldots, N; \quad t = 1, \ldots, T, \tag{14}$$

where $\mathbf{x}_{it}$ is the 4×1 vector of the explanatory variables in the core wage equation (13), $\mathbf{b}_i$ and $\mathbf{d}_{ij}$ are 4×1 vectors of coefficients, Φ_i and c_{ij} are scalar coefficients and μ_i is a fixed effect. Time trends, seasonal dummies and a constant can be included; we omit them in the text for the sake of notational simplicity, yet we shall include them in the empirical estimates.

The error terms, ε_{it}, are assumed to be identically distributed with zero mean and constant variance, independent across time and groups. Notice that equation (14) is identified if lagged levels of w do not enter the determination of the $\Delta\mathbf{x}$'s.[6]

Given (14), the parameters of the long-run level relation between log w and the log $\mathbf{x}$'s (i.e. coefficients a_1, a_2, a_3 and a_4 in (13)) can be derived as: $\mathbf{a}_i = [a_{1i}, a_{2i}, a_{3i}, a_{4i}] = -(\mathbf{b}_i/\Phi_i)$.

We perform estimations on quarterly data over the period 1995(q1)–2013(q2) for a group of 13 European countries.[7] Data on real value added per worker, total and migrant unemployment rates come from Eurostat; FDI and wage data are from Organisation for Economic Co-operation and Developmet (OECD).[8] We use outward FDI over GDP as a proxy for $g(\text{FDI})/L$. The group size is limited by the availability of homogeneous data on migrant unemployment over a time span long enough to allow meaningful estimations. The panel includes 13 countries and (where possible) 74 quarterly observations per country.[9]

Before proceeding with the estimation, we test for the existence of a long-run level relationship among the variables. We first check for unit roots in each series, using the Im, Pesaran and Shin (2003) test (IPS) for heterogeneous panels. The test, reported in panel (a) of Table 1, accepts the unit root hypothesis for all variables. Then, we test for cointegration, using the Kao (1999) and the Pedroni (1999, 2004) Engel–Granger based panel cointegration tests. As it appears in panels (b) and (c) of Table 1, the null hypothesis of no cointegration is rejected both by the Kao test and by the Pedroni's Panel PP, Panel ADF, Group PP and Group PP statistics.[10]

Having assessed cointegration, we now turn to the estimation of the short-run dynamics of wage adjustment (14) and the derivation of the associated long-run parameters in (13).

To implement the model on panel data, we apply the pooled mean group (PMG) estimator devised by Pesaran et al. (1999). Contrary to traditional pooling approaches such as dynamic fixed effects, the PMG estimator allows all the short-run parameters and the lag structures in (14) to differ freely across countries, and constrains only the long-run coefficients in (13) to be the same across groups ($\mathbf{a}_i = \mathbf{a}$); this homogeneity constraint need not be imposed on all the long-run coefficients, but can be limited to a subset of them, while the others are left free to differ (Pesaran et al., 1997, 1999). While traditional pooling estimators may lead to potentially misleading parameter estimates unless all of the short-run and long-run coefficients are in fact identical across countries, the PMG estimator is consistent and efficient provided homogeneity of (a subset of) the long-run parameters holds (Pesaran et al., 1999).

The results of the PMG estimates of the long-run parameters in equation (13) are reported in column (a) of Table 2, which also reports the Hausman (H) tests for homogeneity of long-run coefficients across countries.[11]

Focusing on the H tests first, we notice that the hypothesis of homogeneity of long-run coefficients is accepted at high levels of significance both by the H tests for each individual parameter and by the joint H test.

Looking at the coefficient estimates, we may notice that all the coefficients are highly significant and their signs are in line with theoretical priors. Productivity has a positive effect on the real wage with an estimated elasticity close to unity, as one

Table 1. Panel Unit root and Cointegration Tests for Variables in the Wage Equation

*(a) Panel Unit Root Test**

*Series***	*IPS W statistic****	P-*value*
log (w)	0.24475	0.5967
log (U)	–1.17101	0.1208
log(VA/L)	–1.27796	0.1006
log(U_M/U)	0.34225	0.6339
FDI/GDP	–0.96537	0.1672

Lag length selection based on SIC. Individual effects included. 13 cross-sections. No trend included.

(b) Kao Residual Cointegration Test[§]

	t-*Statistic*	p-*Value*
ADF	4.284939	0.0000
Residual variance	0.009880	
HAC variance	0.001505	

No deterministic trend included. Automatic lag length selection based on SIC.

(c) Pedroni Residual Cointegration Test

Series: log(w), log(U), log(VA/L), log(U_M/U), FDI/GDP
Null hypothesis: No cointegration
No deterministic trend included. Automatic lag length selection based on SIC

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	p-*Value*	*Statistic*	p-*Value*
Panel v statistic	0.208712	0.4173	–2.955951	0.9984
Panel rho statistic	–4.641396	0.0000	–1.520270	0.0642
Panel PP statistic	–13.06102	0.0000	–7.554804	0.0000
Panel ADF statistic	–2.759855	0.9971	–3.265359	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	p-*Value*
Group rho statistic	–4.078968	0.0000
Group PP statistic	–15.02968	0.0000

Notes: * Null hypothesis: unit root (individual unit root process). ** w: real wage; U: unemployment rate; VA/L: real value added per employed worker; U_M: unemployment rate of migrants. *FDI/GDP*: share of outward FDI on GDP. *** Im et al. (2003). [§] Null Hypothesis: No cointegration. Series: log(w), log(U), log(VA/L), log(U_M/U), FDI/GDP.

Table 2. Wage Equation: Pooled Mean Group Maximum Likelihood Estimates of the Long-run Coefficients and Tests for Homogeneity of Long-run Parameters

	(a)		*(b)*		*(c)*	
*		*H test*§		*H test*		*H test*
log(U)	−0.173	0.25	−0.251	1.13	−0.202	1.29
	(−11.9)	[0.62]	(−8.61)	[0.29]	(−12.1)	[0.26]
log(Y/L)	1.363	0.009	2.461	1.93	1.239	0.13
	(21.7)	[0.76]	(19.8)	[0.17]	(18.20)	[0.72]
log(U_M/U)	−0.116	0.95	−0.786	1.25	−0.694	1.39
	(−6.27)	[0.33]	(−6.79)	[0.26]	(−8.39)	[0.24]
O_FDI	−0.577	0.53	−0.720	4.91	unrestricted (average value reported in last row)	
	(−3.92)	[0.47]	(−8.17)	[0.03]		
log(U) × log(U_M/U)			0.326	1.27	0.251	1.51
			(6.52)	[0.26]	(7.393)	[0.22]
Joint H Test	4.90		29.08		2.54	
	[0.30]		[0.00]		[0.64]	
O_FDI: average of unrestricted coefficients					−0.491	
					(−1.82)	

Notes: * Dependent variable: log(w); t-ratios in parenthesis; p-values in square brackets. § H test = Hausman test for homogeneous long-run parameters, applied to difference between Mean Group (MG) and Pooled Mean Group (PMG) estimates.

would expect, while the wage effect of the total unemployment rate is negative, with an estimated elasticity of −0.17.[12] As to the effects of mobility of international factors, both migration inflows (as proxied by the ratio between migrant and total unemployment rates) and the share of outward FDI on GDP have the predicted negative effect on the real wage: the elasticity to migration inflows is −0.1 and the semi-elasticity to outward FDI is −0.577.

The group specific diagnostic statistics for the short-run equations are reported in the left panel of Table 3.

Overall, the performance of the country specific dynamic equations is satisfactory, considering that in the present context we are not able to incorporate the specific traits of each country, and that our standard estimates cannot but sketch a broad-brush picture. A high percentage of the change in the log real wage is explained in most nations, the standard errors of the regressions are reasonably low, and at the 5% level of significance there is evidence of residual autocorrelation in only six countries and of heteroskedasticity in seven.

Columns (b) and (c) of Table 2 report the estimates of a slightly different specification, which includes an interaction term between (log) unemployment and (log) migration inflows among the explanatory variables. This specification allows one to test explicitly whether migration inflows, besides having a negative level effect on the real wage, have also a slope effect, affecting the wage response to unemployment, as implicitly suggested by equation (13).

In column (b) of Table 2 the joint H test strongly rejects the null hypothesis that all the long-run coefficients are homogeneous across countries in this new specification,

Table 3. Wage Equation: Group-specific Diagnostic Statistics

	Specification of column (a) Table 3				*Specification of column (c) Table 3*			
Country	*Adj.* R^2	*SER*	χ^2_1*-AR*	χ^2_2*-HET*	*Adj.* R^2	*SER*	χ^2_1*-AR*	χ^2_2*-HET*
BE	0.98	0.014	12.82	6.72	0.97	0.017	61.20	0.23
DK	0.44	0.037	0.38	1.96	0.57	0.032	0.33	0.14
GE	0.71	0.062	0.28	22.62	0.81	0.042	24.33	4.33
GR	0.91	0.058	13.42	27.14	0.91	0.058	13.28	25.15
ES	0.93	0.021	11.09	3.54	0.89	0.026	65.41	1.22
FR	0.26	0.069	6.43	14.09	0.25	0.069	2.31	7.29
NL	0.27	0.112	3.26	1.02	0.34	0.106	4.12	0.05
AT	0.95	0.048	10.30	45.53	0.99	0.024	21.32	8.35
PT	0.53	0.097	1.75	0.02	0.58	0.092	12.22	1.54
FI	0.04	0.036	0.01	32.94	0.05	0.038	0.02	3.22
SE	0.88	0.003	2.36	0.10	0.86	0.003	2.85	0.40
UK	0.47	0.068	5.06	58.47	–1.00	0.090	13.57	13.28
NO	0.04	0.014	0.05	1.65	0.06	0.013	0.32	0.78

Notes: Adj. R^2: adjusted R^2. SER: Standard error of the regression. AR(χ^2_1): LM test for first and second order autocorrelation of residuals. χ^2_2-HET: test for heteroskedasticity.

and the individual H tests specifically reject the homogeneity hypothesis for the coefficients of outward FDI, while accepting it for the coefficients of all other regressors. Since homogeneity does not hold for all long-run coefficients, the PMG estimates of column (b) are unreliable.[13] In column (c) of Table 2 the estimates are therefore repeated imposing common long-run coefficients for unemployment, productivity, migration inflows and the interaction term, while leaving the long-run effect of outward FDI free to differ across countries. The homogeneity restrictions are now accepted by the joint H test as well as by the individual H tests. Focusing on the coefficient estimates, we may notice that all the (restricted and unrestricted) coefficients are significant and have the expected sign. The coefficient of the regressors that are not influenced by the interaction term are very close to the estimates in column (a); this is the case for productivity, whose wage effect is still positive with an estimated elasticity around 1, and for outward FDI whose effect, which is now allowed to differ across countries, continues to be negative, with an average cross-country semi-elasticity around –0.5.

The coefficient of the interaction term is positive, as expected. This means that the negative wage effect of unemployment is weaker, the higher are our proxy of migration inflows: given the range of values for $\log(U_F/U)$ in our sample, the elasticity of the real wage to unemployment is always negative, and its average value is around –0.04. Of course, the positive coefficient of the interaction term also means that the negative wage effect of migration inflows is weaker, the higher is the total unemployment rate. Given the values for $\log(U)$ in our sample, the wage elasticity to migration inflows is always negative, with an average value of –0.19 and ranging from –0.04/–0.09, in higher unemployment countries,[14] to –0.31/–0.38, in lower unemployment countries.[15] The country specific diagnostic statistics for the short-run equations, reported in the right panel of Table 3, are fair.[16]

Overall, the empirical findings strongly confirm our theoretical predictions as to the effects of international factor mobility on wages. Both migration inflows and FDI outflows have a robust negative level effect on real wages, with the negative effect of immigration flows being stronger, the lower are the unemployment levels. Migration inflows also tend to flatten the wage curve, weakening the wage response to unemployment.

4. Conclusions

We have tried to evaluate the joint effect of migration and capital mobility on aggregate wages.

The analysis has been conducted in two phases. In the first stage we have proposed a theoretical model where wages are determined in a representative bargaining framework in which migration inflows and the threat of moving production abroad via FDI change the outside option of incumbent workers and firms respectively. Labor faces the risk of becoming unemployed. In such unlucky cases for fired workers there are opportunities outside regular markets. An employee, in the case of dismissal, may be able to find a job in the informal sector where the wage is affected by immigration flows since foreign newcomers crowd this sector more than any other segment of the labor market. Migration inflows tend to lower the informal sector wage. The consequent smaller value of the outside option for workers tends to partially translate into a lower aggregate bargained wage. This way of modeling the influence of migration on wages is quite novel and is where our paper departs from existing literature. On the side of enterprises, the outside option is the possible profit that can be earned by moving production entirely or partially, mostly through FDI, to a low wage land. Potential offshoring shifts and upgrades the outside option of entrepreneurs mimicking a severe threat of dismissing some (or all) domestically employed workers. This cannot help translating into a lower bargained wage. With this reference scheme in mind, we have derived an aggregate equation where the level of the real wage is a function of unemployment, productivity, migration inflows and outward FDI. The theoretical construction has gone through empirical validation, by estimation of the wage equation on a panel of quarterly data for a group of 13 European countries over the period 1995(q1)–2013(q2), using the pooled mean group (PMG) maximum likelihood estimator.

The findings strongly back up our theoretical predictions on the negative wage effects of both capital outflows and migration inflows. The empirical results also suggest that the negative effect of migration inflows is stronger for lower levels of the total unemployment rate. In addition, migration inflows tend to weaken the wage response to total unemployment, flattening the wage curve.

The moral is that international labor and capital mobility shape a novel wage equation even if the empirical basis is still limited owing to the relatively short time-span over which radical globalization has occurred.

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Notes

1. Two comprehensive works deserve mentioning. The first considers migration effects in a historical perspective (Hatton and Williamson, 2005). The second provides a survey of recent literature focusing on wage and assimilation effects of migration (Kerr and Kerr, 2011).
2. We ignore capital for the sake of simplicity. Therefore, interpreted strictly, Y should be final output net of capital compensation.
3. Unemployment benefits could easily be introduced (they are a constant fraction of the wage), without altering the analysis. See, for instance, Podrecca (2011).
4. See Bentolila et al. (2008).
5. This sort of conjecture is similar to the one adopted in Lucas (1973).
6. This hypothesis means that past values of the wage level do not affect current changes of the explanatory variables (i.e. of unemployment, productivity, migration flows and FDI). Notice that the hypothesis does not exclude that lagged changes of w enter the determination of $\Delta\mathbf{x}$'s.
7. The list of countries is: Belgium (BE), Denmark (DK), Germany (GE), Greece (GR), Spain (ES), France (FR), Nederland (NL), Austria (AT), Portugal (PT), Finland (FI), Sweden (SE), United Kingdom (UK), Norway (NO).
8. We use an index of hourly earnings in manufacturing as our wage variable.
9. The panel is unbalanced, owing to some missing observations. Four countries lack data on migration in the earlier years (NL migration data start in 1998, PT in 1999, SE in 1997 and NO in 2000).
10. At 10% significance also by the Panel Rho test. We tested many different specifications besides those of the tests reported in Table 2 (with and without trend and with different lag orders). The cointegration result is always supported.
11. These tests are applied to the differences between the PMG estimates and the mean group estimates (i.e. the mean of the estimates of long-run parameters obtained separately on time series data for each individual country). See Pesaran et al. (1999).
12. This magnitude is higher than found in previous results in the cross-country literature, where the elasticity of the real wage to unemployment varies from around –10% to around –5% (see, e.g. Podrecca, 2011).
13. In fact they are not consistent, since consistency of the PMG estimator requires homogeneity of long-run parameters.
14. These are the average values in Spain and Greece respectively.
15. These are the average values in the Netherlands and Norway respectively.
16. The adjusted R^2 are good in all but three countries. At a 5% significance level there is evidence of autocorrelation in eight countries and of heteroschedasticity in five.