ECONOMIA ITALIANA

Fondata da Mario Arcelli

Le sfide della migrazione

2018/1

LUISS
CASMEF Centro Arcelli
per gli Studi Monetari e Finanziari

UNIVERSITÀ CATTOLICA del Sacro Cuore
CESPEM
Centro Studi di Politica economica
e monetaria "Mario Arcelli"

Economia Italiana

Fondata da Mario Arcelli

COMITATO SCIENTIFICO

(Editorial board)

Economia italiana

Fondata da Mario Arcelli

numero 1/2018
Pubblicazione quadrimestrale
Roma

ECONOMIA ITALIANA
Rivista quadrimestrale fondata nel 1979 da Mario Arcelli

(Pubblicità inferiore al 70%)

Autorizzazione Tribunale di Roma n. 43/1991

ISSN: 0034-6799

Finito di stampare nel mese di maggio 2018 presso Press Up, Roma.

www.economiaitaliana.org

Editrice Minerva Bancaria srl

DIREZIONE E REDAZIONE Largo Luigi Antonelli, 27 – 00145 Roma
redazione@economiaitaliana.org

AMMINISTRAZIONE EDITRICE MINERVA BANCARIA S.r.l.
presso P&B Gestioni Srl, Viale di Villa Massimo, 29 - 00161 - Roma -
Fax +39 06 83700502
amministrazione@editriceminervabancaria.it

Segui Editrice Minerva Bancaria su:

Sommario

Le sfide della migrazione

CONTRIBUTI

RUBRICHE

Dealing with Illegal Immigration: the Role of Informality, Taxation and Trade§

Carmen Camacho *
Fabio Mariani **
Luca Pensieroso ***

Abstract

We develop a two-good, three-sector model of a small open economy with illegal immigration and both formal and informal production. In this framework, we explore the consequences of fiscal policy and trade openness for illegal immigration and the shadow economy. We find that (i) the effect of trade openness on illegal immigration crucially depends on the degree of substitutability between native and illegal labor in the informal sector, (ii) the reach of fiscal policy goes beyond its traditional domain: fiscal instruments can be effectively used as immigration policy tools.

§ We thank Giuseppe De Arcangelis for his valuable remarks on a previous draft. This research is part of the ARC project 15/19-063 on "Family Transformations", funded by the French-speaking community of Belgium. The usual disclaimer applies.

* Paris School of Economics and CNRS. E-mail: maria.camacho-perez@univ-paris1.fr.
** IRES, Université catholique de Louvain; IZA, Bonn. E-mail: fabio.mariani@uclouvain.be.
*** IRES, Université catholique de Louvain. E-mail:luca.pensieroso@uclouvain.be.

Sintesi - *Un'analisi delle determinanti dell'immigrazione clandestina: economia sommersa, politica fiscale e commercio internazionale*

Questo articolo cerca di comprendere come l'apertura al commercio internazionale e la politica fiscale influenzino il numero di immigrati clandestini, in un'economia caratterizzata dalla presenza di un settore informale. La nostra analisi, che è principalmente teorica e si sviluppa in un'ottica di equilibrio parziale, mostra che l'effetto dell'apertura al commercio internazionale sul numero di immigrati clandestini dipende dalla composizione della forza lavoro, ed in particolare dal grado di sostituibilità tra lavoratori legali e immigrati clandestini nel settore informale. Per quanto riguarda tassazione e controllo dell'evasione fiscale, i nostri risultati mostrano che, laddove coesistano economia sommersa e immigrazione clandestina, la politica fiscale può rappresentare un'efficace alternativa al controllo delle frontiere, in un'ottica di gestione e contenimento dei flussi di immigrazione illegale.

JEL Classification: O17; F22; J61.

Keywords: Illegal immigration; Informal sector; Shadow economy; Taxation; Immigration policy; Globalisation; Open economy.

Parole Chiave: *Immigrazione clandestina; Economia informale; Economia sommersa; Tassazione; Politiche migratorie; Globalizzazione; Economia aperta*.

1. Introduction

In this article, we consider how globalization and taxation affect illegal immigration, in an economy characterized by the presence of an informal sector. We show that the presence of an informal sector together with the explicit consideration of the illegal character of immigration introduce an additional margin that influences the effect of both fiscal policy and openness to trade on the domestic economy.

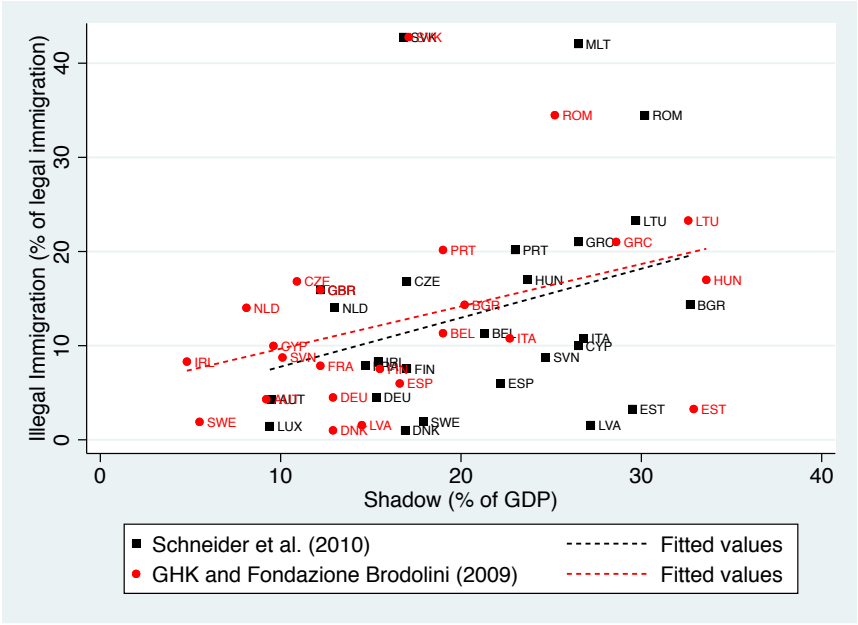
Globalization and immigration are currently major political concerns across Europe and beyond. In the public debate, hardly any distinction is made between legal and illegal immigration.[1] Furthermore, both the public debate and the scientific literature by and large ignore the interplay between the presence of an informal sector in the economy and immigration.[2] In a previous article (Camacho et al. (2017)), we have advanced theoretical arguments suggesting that a widespread informal sector may foster illegal immigration, while the presence of illegal immigrants may induce firms to switch to informal production. In this context, a welfare-maximizing Government can use fiscal policy as an effective instrument targeted at controlling illegal immigration. A significant drawback of that analysis is that the argument runs in a one-good, closed-economy model. There may be reasons to believe, however, that in many cases informal production (and illegal immigration) is concentrated in specific sectors. For instance, Hillman and Weiss (1999), Maroukis et al. (2011), Schneider (2011) and Pinto and Sablik (2018) highlight that illegal workers are mainly active in sectors such as private household services, construction and agriculture. Accordingly, a two-good model might deliver additional insights on the working of actual economies. Furthermore, such a richer model could shed new light on the possible implications of openness to international trade on both the volume of illegal immigration and the dimension of the informal sector.

---

1 Major scientific contributions on illegal immigration are Borjas (1994), Chassamboulli and Peri (2015), Djajic (1997), Djajic and Vinogradova (2013), Djajic and Vinogradova (2017), Hazari and Sgro (2003), Moy and Yip (2006).

2 The literature on the shadow economy includes Amaral and Quintin (2006), Dabla- Norris et al. (2008), Ihrig and Moe (2004), Schneider and Enste (2000), Tanzi (1983) and Tanzi (1999) among others.

Figure 1 **Illegal immigration and the shadow economy: EU27, 2008**



In this article, we extend the analysis by Camacho et al. (2017) to a two-good, three-sector, small-open-economy model in partial equilibrium. The economy produces a modern and a traditional good using labor and sector-specific capital. Both the good and the labor market are perfectly competitive. We assume that the modern sector pays all its taxes and employs only legal workers, while part of the output in the traditional sector is produced underground (i.e. avoiding taxes), and can therefore employ illegal immigrants. Like in Camacho et al. (2017), a crucial assumption is that, while legal workers can work both in the formal and in the informal economy, illegal immigrants can only work in the informal sector, due to their paperless status.

We find that globalization influences both the number of illegal immigrants in the economy and the dimension of the informal sector, in a way that is non trivial and crucially depends on the degree of substitutability between legal and illegal workers in the informal sector producing the traditional good. For instance, if natives and illegal immigrants are perfect substitutes, then a higher degree of openness to international trade will bring about larger

inflows of illegal migrants. If instead natives and illegal immigrants are complements, globalization will go together with less illegal immigration.

Although empirical evidence on naturally underground phenomena like illegal immigration and the dimension of the shadow economy must be taken with a pinch of salt, available data suggest the existence of intriguing links between illegal immigration, the dimension of the shadow economy, taxes and international trade. Our theory provides a rationale for these links.

In Figure 1, we plot the number of illegal immigrants as a percentage of legal immigrants from CLANDESTINO (2009) against two different estimations of the shadow economy, one from Schneider et al. (2011) and one from Ciccarone et al. (2009) (submitted by *GHK* and *Fondazione G. Brodolini*). The data refer to the EU27 countries for the year 2008. The graph suggests a positive correlation between illegal immigration and the dimension of the shadow economy, a finding in in accordance with our theoretical results. In the specific context of Italy, the empirical analysis by Bracco and Onnis (2015) confirms the existence of a robust positive relationship between immigration and the informal economy; interestingly enough, they also find that the strength of this correlation is substantially weakened after the 2002 amnesty.

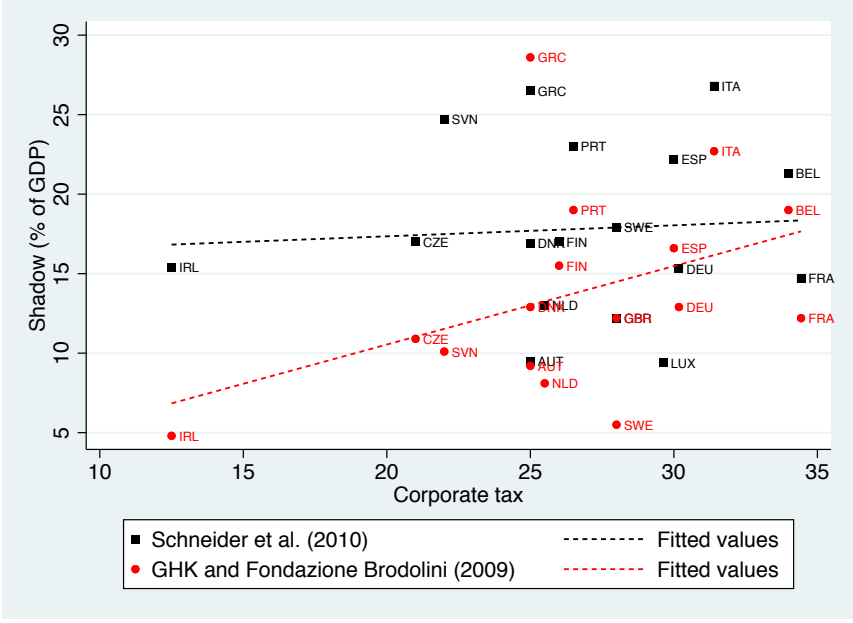
In Figure 2, we plot both the dimension of the shadow economy (upper panel) and the measure of illegal immigrants (lower panel) from Figure 1 against a measure of the 2008 corporate tax from the OECD. The upper panel graph suggests a slightly positive correlation between corporate tax and the dimension of the shadow economy. The lower panel graph suggests a slightly negative or possibly non-monotonic correlation between corporate tax and illegal immigration. The sign of these correlations is again compatible with our theoretical analysis, for in our model the shadow economy is always increasing in the tax rate, while the effects of changes in the tax rate on illegal immigration depend on the degree of substitutability between natives and immigrants in the informal sector.

In Figure 3, we plot both the dimension of the shadow economy (upper panel) and the measure of illegal immigrants (lower panel) from Figure 1 against the 2008 trade balance position (exports minus imports over GDP) from EUROSTAT. In both panels, we find a negative correlation, suggesting

that countries with more illegal immigrants and a bigger shadow economy tend to experience a worse position in terms of trade balance. Our model provides a possible rationale for such correlation, when the improvement in the trade balance is driven by an increase in the relative price of export. In our framework, indeed, an increase in the relative price of export brings about a contraction of underground production and a reduction in the number of illegal foreign-born workers, provided that undocumented immigrants and native workers are imperfect substitutes.

The remainder of this article is organized as follows. In Section 2, we introduce the benchmark model, in which native and illegal immigrants are substitutes in the production of the traditional good in the informal sector. Section 3 discusses how changes in the parameters of the model affects the equilibrium value of the number of illegal immigrants and the dimension of both the traditional sector and the shadow economy. After discussing the relevance of the perfect substitutability assumption, in Section 4 we relax it, by referring to the limit case of unitary elasticity of substitution. We discuss how this affects the main results of the model, and suggest some policy implications. Section 5 concludes.

Figure 2 **Taxation, illegal immigration and the shadow economy: EU27, 2008**



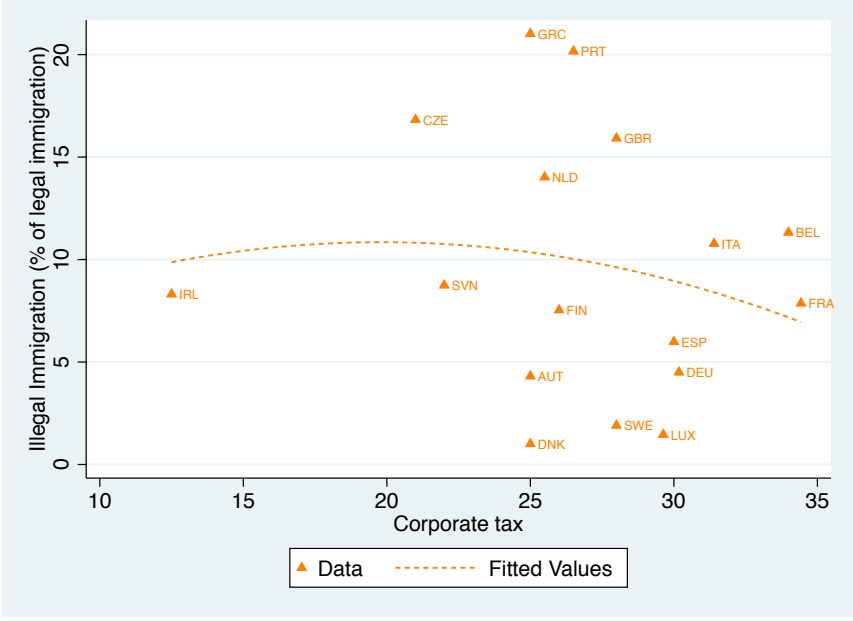
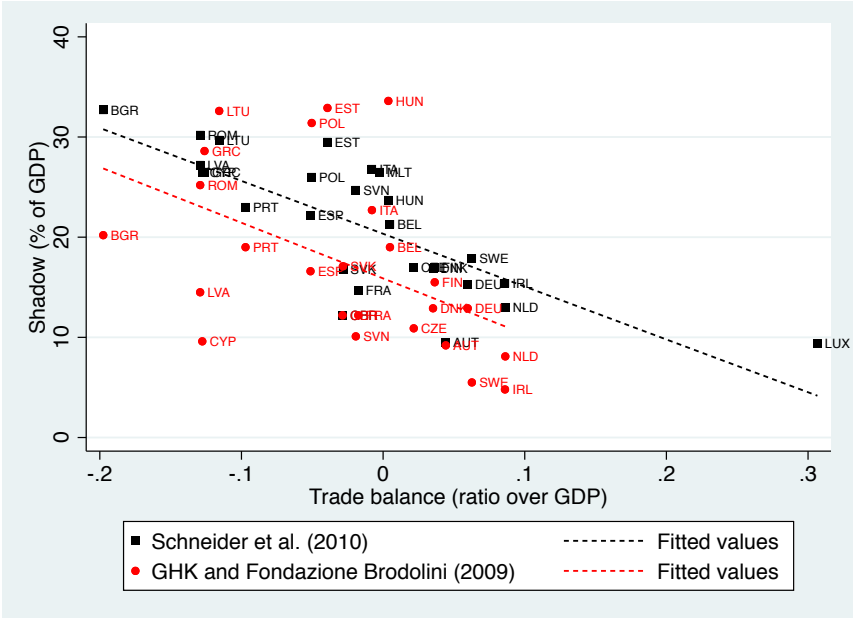
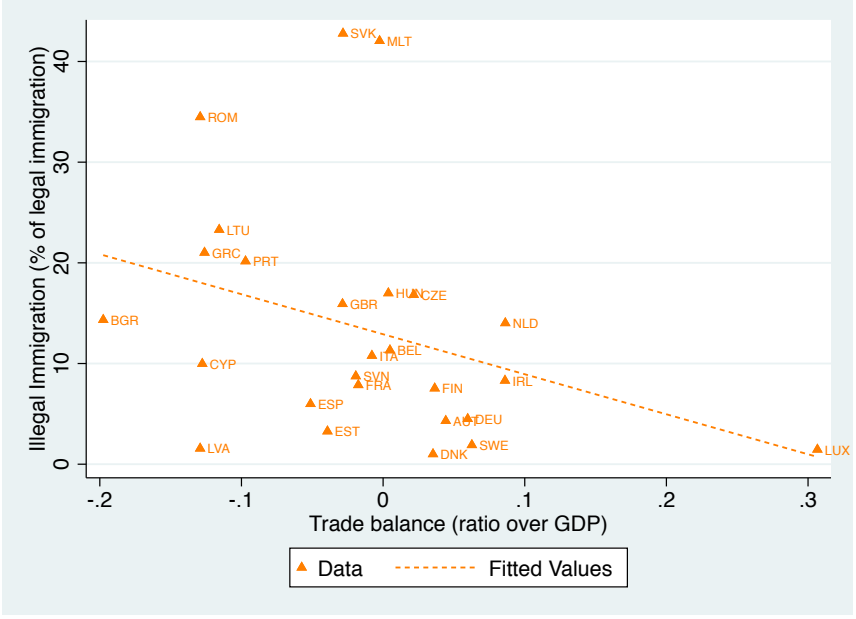


Figure 3 **Trade balance, illegal immigration and the shadow economy: EU27, 2008**





2. The benchmark model

The economy produces two different goods, modern M and traditional T. While the modern good can be only produced formally, the traditional good can be produced both formally and informally. The native labor force is perfectly mobile across sectors. Illegal immigrants, instead, can only be employed by the informal sub-sector.[3] In the benchmark version of the model, we assume that illegal immigrants are perfect substitutes for native workers in the informal sector producing the traditional good.[4] Capital serves as a sector-specific factor of production.

2.1 Production

The production function of the modern good writes as

$$\Upsilon_M = K_M^{1-\beta} N_M^{\beta}, \tag{1}$$

where K_M is the capital endowment of the modern sector, N_M is the quantity of labor supplied by native workers employed in this sector, and $\beta \in (0, 1)$.

As far as the traditional good is concerned, formal production is carried out through

$$\Upsilon_{TF} = K_{TF}^{1-\beta} N_{TF}^{\beta}, \tag{2}$$

while the informal technology is described by

$$\Upsilon_{TI} = K_{TI}^{1-\beta} N_{TI}^{\beta}, \tag{3}$$

3 There is ample evidence that illegal immigrants are concentrated in specific sectors – such as construction, household services and agriculture – characterized by a high degree of informality. See for instance Hillman and Weiss (1999), Maroukis et al. (2011), Schneider (2011).

4 We shall relax this assumption in Section 4.

where $L_{TI} = N_{TI} + Z$ and Z denotes the stock of illegal immigrants.[5]

Native workers can produce both the modern and the traditional good, and work both formally and informally. We denote by v the share of the native workforce employed in the production of the traditional good, while ρ is the share of native workers producing T who are employed by informal firms. Accordingly, if we denote by P the size of native workforce, the total number of natives working in the shadow economy is given by $\rho v P$.[6] Given that native labor is perfectly mobile across sectors, its equilibrium allocation is described by v^* and ρ^*, and will be determined by wage equalization.

The government levies taxes at the rate $\tau \in (0, 1)$, to finance unproductive public expenditures. We assume that the informal sector does not pay taxes, but incurs detection with probability $\delta \in (0, 1)$. Detection implies the destruction of the whole production.[7] As a consequence, after denoting by p_M and p_T the monetary price of the two goods, the net value of production in the three sectors is given by

$$J_M = (1-\tau) p_M \Upsilon_M, \tag{4}$$

$$J_{TF} = (1-\tau) p_{TF} \Upsilon_{TF}, \tag{5}$$

$$J_{TI} = (1-\delta) p_T \Upsilon_T, \tag{6}$$

respectively.

At equilibrium, native wages must be equalized across sectors, so that

5 For analytical convenience, we have assumed that the three sectors have the same factor shares. Our analysis would hold qualitatively unchanged had we assumed that traditional and/or informal production are inherently more labor intensive.

6 In the model, we abstract from legal immigration, for it is not relevant to our purpose. To the extent that legal immigrants enjoy the same economic rights as natives, one can easily interpret P as the total number of legal workers (both natives and foreign-born).

7 We can also interpret δ as the cost of avoiding detection, measured as a fraction of informal production.

$w_M = w_{TF} = w_{TI}$. Perfect competition ensures that in each sector, wages must be equal to the marginal productivity of labor. Moreover, because of the assumption of perfect substitutability between Z and N_{TI}, w_Z must be equal to w_{TI}. Computing the marginal productivity of labor from Equations (4), (5) and (6) we obtain the following system of two equations in two unknowns,

$$w_M(\nu, \rho) = w_{TF}(\nu, \rho) \tag{7}$$

and

$$w_{TF}(\nu, \rho) = w_{TI}(\nu, \rho, Z), \tag{8}$$

whose solution allows us to express v and ρ as functions of Z.

Note that, because of perfect substitutability between native and immigrant workers in informal production, there is an inverse relationship between illegal immigration Z, and the proportion of native workers employed in the shadow economy.

2.2 Illegal immigration

In order to determine the equilibrium value of illegal immigration (Z^*), we need a further equation describing the incentive to migrate illegally from the source economy. To this end, we assume that in their origin country, would-be illegal migrants would receive an exogenous wage ω. In the destination country, they would be paid $w_Z = \partial J_{TI} / \partial Z$. Furthermore, we shall assume that (i) illegal migrants face an exogenous probability $\eta \in (0, 1)$ to be caught at the border (and deported), and (ii) they incur a specific migration cost, equal to $c > 0$. A potential migrant will migrate illegally if the net expected income as an illegal migrant is at least equal to the wage in the source economy, i.e.

$$(1 - \eta) w_Z(\nu, \rho, Z) + \eta\omega - c \geq \omega \tag{9}$$

Solving this equation for Z, we can express illegal immigration as a func-

tion of v and ρ.[8] Given perfect substitutability, higher values of ρ and v would translate into a lower Z.

2.3 Equilibrium

Equations (7), (8) and (9) form a system of three equations in three unknowns, whose solution (v^*, ρ^*, Z^*) fully characterizes the equilibrium of our economy.

The solution reads:

$$\nu^* = 1 - \frac{K_M}{P}\left(\frac{\beta(1-\eta)(1-\tau)p_M}{c+\omega(1-\eta)}\right)^{\frac{1}{1-\beta}} \quad , \tag{10}$$

$$\rho^* = 1 - \frac{\frac{K_{TF}}{K_M}\left(\frac{p_T}{p_M}\right)^{\frac{1}{1-\beta}}}{\frac{P}{K_M}\left(\frac{c+\omega(1-\eta)}{\beta(1-\eta)(1-\tau)p_M}\right)^{\frac{1}{1-\beta}} - 1} \quad , \tag{11}$$

and

$$Z^* = \left(K_{TI}((1-\delta)p_T)^{\frac{1}{1-\beta}} + K_M((1-\tau)p_M)^{\frac{1}{1-\beta}} + K_{TF}((1-\tau)p_T)^{\frac{1}{1-\beta}}\right)\times$$

$$\times\left(\frac{\beta(1-\eta)}{c+\omega(1-\eta)}\right)^{\frac{1}{1-\beta}} - P\,. \tag{12}$$

3. Comparative statics

We can now proceed to analyze how given policy variables affect the number of illegal immigrants, once we take into account that illegal immigration and informal production are interrelated phenomena.

8 We assume that the supply of potential migrants is large enough for Equation (9) to hold as an equality.

3.1 Fiscal policy

Since the fiscal stance of a country is often considered as a major determinant of informal activity, we start by looking at the effect of the tax rate τ and the fiscal detection δ on our variables of interest.

Result 1 *Given v^*, ρ^* and Z^* as specified by Equations (10), (11) and (12), it can be shown that*

$$(i) \quad \frac{\partial v^*}{\partial \tau} > 0, \frac{\partial \rho^*}{\partial \tau} > 0 \; and \; \frac{\partial Z^*}{\partial \tau} < 0,$$

$$(ii) \quad \frac{\partial v^*}{\partial \delta} = 0, \frac{\partial \rho^*}{\partial \delta} = 0 \; and \; \frac{\partial Z^*}{\partial \delta} < 0.$$

Higher taxes make ρ^* increase, as they raise the relative returns to informal production. This causes v^* to increase as well: since good T can be produced informally, the traditional sector becomes overall more attractive. On the other hand, a higher tax rate discourages illegal immigration: the economy pays lower net wages, while native workers flocking to the shadow economy crowd out prospective illegal migrants. This negative effect of taxes on Z^* stands in contrast with Camacho et al. (2017) and crucially depends, as will become clear in Section 4, on the assumption of perfect substitutability between legal and illegal workers in the informal sector. It is also interesting to highlight that taxation does not only affect the relative attractiveness of formal and informal production of the traditional good, but also influences the relative supply of the two goods; in particular, a higher τ redistribute resources from the modern to the traditional sector, since the latter can rely on a tax-free technology. Finally, notice that, since public expenditure is unproductive, higher taxes imply lower net national income. As taxes increase, the economy becomes poorer, with a larger share of underground production, and less illegal immigration. Therefore, different from Camacho et al. (2017), a higher tax rate can be used to contrast illegal immigration. This comes, however, at the price of lower, less modern and more informal production.

As far as the detection probability is concerned, we see that if δ increases, Z^* decreases, while v^* and ρ^* remain unchanged. An increase in δ lowers wages in the informal sector for both natives and immigrants. This has a straightforward effect on the equilibrium size of illegal immigration, as lower expected wages in the shadow economy attract less illegal aliens. For what concerns natives, the negative effect due to the decrease in wages is compensated by the positive effect due to the decrease in the number of illegal immigrants. Overall, the two effects offset each other, so that the equilibrium allocation of native labor, represented by v^* and ρ^*, is unaffected by changes in δ. Accordingly, fiscal detection turns out to be inefficient as a deterrent for informal activity, but becomes on the contrary an effective migration policy instrument.

Overall, our analysis shows that, once one explicitely considers the interplay between illegal immigration and the underground economy, the reach of fiscal policy goes beyond its traditional domain: fiscal instruments can be effectively used as immigration policy tools.

3.2 Migration and demography

For what concerns the parameters governing directly the demography of the model, i.e. the cost of migration, the probability of detection at the frontiers and the size of native populations, we can prove the following.

Result 2 *Given v^*, ρ^* and Z^* as specified by Equations (10), (11) and (12),*

(i) $$\frac{\partial \nu^*}{\partial \eta} > 0, \frac{\partial \rho^*}{\partial \eta} > 0 \; and \; \frac{\partial Z^*}{\partial \eta} < 0;$$

(ii) $$\frac{\partial \nu^*}{\partial c} > 0, \frac{\partial \rho^*}{\partial c} > 0 \; and \; \frac{\partial Z^*}{\partial c} < 0;$$

(iii) $$\frac{\partial \nu^*}{\partial P} > 0, \frac{\partial \rho^*}{\partial P} > 0 \; and \; \frac{\partial Z^*}{\partial P} < 0.$$

The effect of the deportation probability η and the migration cost c on the endogenous variables of the model can be inferred directly from Equation (9). An increase in both parameters lowers the net expected income of illegal immigrants, thus decreasing Z^*. A smaller number of illegal immigrants translates into a higher share of native workers employed by the traditional sector, namely in informal production. Thus, in this model contrasting illegal immigration has two side effects: first, it increases the dimension of the informal sector; second it pushes the country to specialize in the production of the traditional good.

For what concerns the size of the native workforce, an increase in P has a negative effect on Z^*, because of the perfect substitutability assumption. *Ceteris paribus*, if there are more natives willing to work in the informal sector, there is less room for illegal immigrants. In order to understand the observed increase in both v^* and ρ^*, notice that, *ceteris paribus*, an increase in P implies a decrease of the relative size of illegal immigrants. This in turn implies that for natives, the expected return to labour increases in the informal sector and more generally in the production of the traditional good.

3.3 Globalization

Finally, our model allows us to study the effects of globalization on illegal immigration and the shadow economy in a partial equilibrium setup. Indeed, the model can be suitably interpreted as a Ricardo-Viner model, with native labor as the only mobile factor; capital is sector-specific and can be regarded – in the absence of TFP parameters – as a source of differential productivity across sectors ("modern", "traditional-formal" and "traditional-informal"). We look at the effect of trade (or globalization) in the same fashion of Grossman et al. (2017), i.e. by examining the comparative statics of the model with respect to output prices. The idea is that opening to trade typically generates an increase in the relative price of a country's export good. We consider the modern good M as the export good of the domestic economy (with respect to its trading partner).[9] The effect of an exogenous variation in the prices of the two goods on the endogenous variables of our model can be described as follows.

9 Notice the partial-equilibrium nature of the analysis: 1) we do not model the trading partner; 2) we assume that the potential inflow of illegal migration originates from a third country.

Result 3 *Given* v^*, ρ^* *and* Z^* *as specified by Equations (10), (11) and (12), there exists a threshold level* $\overline{P}$ *such that*

$$(i) \quad \frac{\partial v^*}{\partial p_M} < 0, \frac{\partial \rho^*}{\partial p_M} < 0 \text{ and } \frac{\partial Z^*}{\partial p_M} > 0 ,$$

$$(ii) \quad \frac{\partial v^*}{\partial p_T} = 0, \frac{\partial \rho^*}{\partial p_T} > 0 \text{ if } P < \overline{P} \text{ and } \frac{\partial Z^*}{\partial p_T} > 0 .$$

The intuition behind the comparative statics of p_M is as follows: if for a given level of p_T the price of the modern good increases, the *M*-sector becomes relatively more attractive and draws labor from the the *T*-sector, so that both v^* and ρ^* decrease. Because of the perfect substitutability assumption, the decrease of native labor in the informal sector will increase expected wages for perspective immigrants, thereby calling for more illegal immigration.

As far as the price of the traditional good is concerned, an increase in p_T will directly increase the expected wages in both the formal and informal production of *T*, and hence calls for a higher Z^*. This crowds out natives from the informal sector. However, an increase in the price of the traditional good will also bring about a reallocation of native labour away from the modern sector, as the *T*-sector becomes relatively more attractive. The two effects perfectly offset each other, which explains why v^* remains unchanged. The overall effect on ρ^* is also ambiguous *a priori*. It turns out that for sufficiently low values of *P* the equilibrium share of legal workers employed in the in the informal sector increases.

In order to gain additional insights on the effects of international trade on illegal immigration and the shadow economy, we now focus on the relative price p_M / p_T . We can show that there exist a sufficient condition such that an increase in the relative price p_M / p_T makes illegal immigration grow.

Result 4 *There exists a threshold level* $\tilde{K}$ *such that, if* $K_M < \tilde{K}$ *, an increase in* p_M / p_T *brings about an increase in* Z^*.[10]

If the modern sector is not productive enough (K_M low), more globalization - as proxied by an increase of the relative price of the modern good - can result into more illegal immigration. This happens because the reallocation effect on labor (from T to M) is not strong enough to counteract the call effect of higher equilibrium wages on perspective migrants.

Accordingly, economies characterized by lower productivity in the modern sector will experience higher illegal immigration after opening to international trade. On the contrary, economies with higher productivity in the modern sector will receive smaller inflows of illegal migrants following globalization. This may concur to explain why different countries are characterized by different attitudes and policies towards globalization and immigration: countries that fails to modernize are more likely to resist globalization or limit trade openness in order to avoid large inflows of illegal migrants (even if international trade *per se* is beneficial in terms of production).

4. An alternative scenario: imperfect substitutability

The benchmark model presented in Section 2 was built on the assumption of perfect substitutability between natives and illegal immigrants in the informal sector. The degree of realism of this assumption is an empirical question. There is a burgeoning literature, pioneered by Ottaviano and Peri (2012), attempting to estimate the elasticity of substitution between migrants and natives. This literature finds that values of the elasticity of substitution between natives and immigrants (of comparable skills and experience) typically ranges between 6 and infinity (Docquier et al. (2014)). The value of 6 is found by Manacorda et al. (2012) for the United Kingdom, that of infinity by Peri (2011) for the United States. A somewhat intermediate estimate is provided

10 The proof of this result is omitted for brevity, but is available upon request.

by Ottaviano and Peri (2012), who find a value of 20 for the United States.[11]

Overall, these studies point to a high degree of substitutability between natives and migrants, justifying our assumption in the benchmark model. However, they share the common limitation of considering legal immigrants only. Since our contention is that the employment opportunities of migrants crucially depends on their illegal status, it would be important to know to what extent illegal migrants, as opposed to legal immigrants, are substitute for native workers. In this respect, we can rely on a couple of papers that, although not considering illegal immigration explicitly, refer to situations in which most migrants are undocumented. For instance, Özden and Wagner (2014) find the elasticity of substitution between natives and immigrants to be around 2.4 in Malaysia, where half of the existing migrants are allegedly paperless. In a similar vein, Wei et al. (2016) find an elasticity of substitution of about 2 in the US farming sector, which is known to extensively employ illegal aliens. This suggests that the illegal status of foreign-born workers may substantially reduce their degree of substitutability with natives.

In this Section, we are going to explore this possibility by relaxing the assumption of perfect substitutability. We shall do it by assuming a very special case, one in which the elasticity of substitution between illegal immigrants and natives is exactly equal to one.[12]

4.1 Production

With respect to our benchmark, Equation (3) is replaced by

$$Y_{TI} = Z^{1-\beta} N_{TI}^{\beta} \tag{13}$$

This formulation highlights the possible complementarity between natives and illegal migrants in the shadow economy.[13] Furthermore, we have simpli-

11 See Peri (2016) for a survey.

12 Similarly, Hazari and Sgro (2003) contrast the two cases of perfect and imperfect substitutability when studying the effects of illegal immigration on growth.

13 This is a convenient formulation that preserves the analytical tractability of the model. The shadow economy could however be described by using in Equation (3) a more general CES labor aggregator such as

$$L_{TI} = \left(\zeta N_{TI}^{\frac{\alpha-1}{\alpha}} + (1-\zeta) Z^{\frac{\alpha-1}{\alpha}} \right)^{\frac{\alpha-1}{\alpha}}$$

with $\alpha > 0$ and $\zeta \in (0, 1)$, which would encompass perfect substitutability as a special case.

fied the model by assuming that production in the informal sector uses only labor as an input.

4.2 Equilibrium

As in Section 2, the equilibrium values of v, ρ and Z can be obtained by solving a system of three equations: the first two derive from the equalization of native wages across sectors, while the third one describes the incentives to migrate illegally. Different from Equations (7) and (8), however, both ρ and v are now increasing functions of Z, because of complementarity: the availability of illegal workers pushes up native wages in the traditional sector, more specifically in the informal subsector. Symmetrically, higher values of ρ and v would translate into a higher Z as they increase the net expected income of illegal migrants.

At equilibrium, we have

$$v^* = 1 - \frac{K_M((1-\tau)p_M)^{\frac{1}{1-\beta}}}{P\left(\frac{(1-\beta)(1-\eta)}{c+\omega(1-\eta)}\right)^{\frac{1}{\beta}}((1-\delta)P_T)^{\frac{1}{(1-\beta)\beta}}}, \tag{14}$$

$$\rho^* = 1 - \frac{K_{TF}\left(\frac{1-\tau}{1-\delta}\right)^{\frac{1}{1-\beta}}}{P\left(\frac{(1-\beta)(1-\eta)}{c+\omega(1-\eta)}\right)^{\frac{1}{\beta}}((1-\delta)p_T)^{\frac{1}{(1-\beta)\beta}}}, \tag{15}$$

and

$$Z^* = P\left(\frac{(1-\beta)(1-\delta)(1-\eta)p_T}{c+\omega(1-\eta)}\right)^{\frac{1}{\beta}} - \left(\frac{1-\tau}{1-\delta}\right)^{\frac{1}{1-\beta}}\left(K_{TF} + K_M\left(\frac{p_M}{p_T}\right)^{\frac{1}{1-\beta}}\right). \tag{16}$$

4.3 Comparative statics

We now proceed to analyze how changes in the main parameters of the model affect the number of illegal immigrants, under the complementarity hypothesis. We start with the parameters concerning fiscal policy.

Result 5 *Given v^*, ρ^* and Z^* as specified by Equations (14), (15) and (16), it can be shown that*

(i) $$\frac{\partial v^*}{\partial \tau} > 0, \frac{\partial \rho^*}{\partial \tau} > 0 \; and \; \frac{\partial Z^*}{\partial \tau} > 0;$$

(ii) $$\frac{\partial v^*}{\partial \delta} < 0, \frac{\partial \rho^*}{\partial \delta} < 0 \; and \; \frac{\partial Z^*}{\partial \delta} < 0.$$

As in the benchmark model, higher taxes determine an increase in ρ^* and v^*. However, unlike the case of perfect substitutability, heavier taxation also attracts more illegal immigration because of the complementarity between natives and illegal workers. This result highlights the role of tax reduction as an effective policy to reduce illegal immigration. Notice that there is no trade off associated to the tax policy: lower taxes imply a richer economy, with less underground production and less illegal immigration. This result stems from two specific assumptions: 1) different from the benchmark case, there is imperfect complementarity in production between natives and illegal immigrants; 2) different from Camacho et al. (2017), public expenditure is not productive. This suggests that the use of taxes to tackle illegal immigration is relatively more attractive for countries whose labor force is not easily substitutable with illegal immigrants in the shadow economy.

For what concerns fiscal detection, an increase in δ lowers the relative returns to informality, thereby reducing illegal immigration and the share of native labor employed by the *T*-sector. As in the case of perfect substitutability, fiscal detection emerges as an effective migration policy tool. Countries willing to reduce illegal immigration can always do so by increasing the effec-

tiveness of their fiscal controls over tax evasion.

For what concerns the parameters governing the demography of the domestic economy, we can state the following.

Result 6 *At equilibrium,*

(i) $\frac{\partial \nu^*}{\partial \eta} < 0, \frac{\partial \rho^*}{\partial \eta} < 0 \, and \, \frac{\partial Z^*}{\partial \eta} < 0;$

(ii) $\frac{\partial \nu^*}{\partial c} < 0, \frac{\partial \rho^*}{\partial c} < 0 \, and \, \frac{\partial Z^*}{\partial c} < 0;$

(iii) $\frac{\partial \nu^*}{\partial P} > 0, \frac{\partial \rho^*}{\partial P} > 0 \, and \, \frac{\partial Z^*}{\partial P} > 0.$

The picture that emerges from these findings is different from the benchmark case. Because of complementarity, all factors that, like an increase in η or c, decrease the size of illegal immigration, make also the shadow economy and the traditional sector shrink. Taken together, Results 5 and 6 show that more effective institutions (as proxied by higher values of η and δ) are conducive to both a more productive economy (higher share of modern and formal production) and less undocumented immigration. Furthermore, fiscal control can always be used as an alternative to border control, either in order to control for illegal immigration, or for reducing the share of the underground economy.

As far as P is concerned, an increase in the mass of native population - through complementarity - attracts more migrants, thus increasing also ρ^* and ν^*.

We now explore the possible implications of trade openness.

Result 7 *As far as prices are concerned, we can show that*

$$(i) \quad \frac{\partial \nu^*}{\partial p_M} < 0, \frac{\partial \rho^*}{\partial p_M} < 0 \; and \; \frac{\partial Z^*}{\partial p_M} < 0;$$

$$(ii) \quad \frac{\partial \nu^*}{\partial p_T} > 0, \frac{\partial \rho^*}{\partial p_T} > 0 \; and \; \frac{\partial Z^*}{\partial p_T} > 0.$$

Under complementarity, an increase in the price of the modern (traditional) good drives a reduction (expansion) of both traditional and informal production, thereby decreasing (increasing) illegal immigration.

Similar to Section 3, we now want to see whether we can identify the effect of more trade openness (i.e. an increase in the relative price of export goods, produced by the *M*-sector) on illegal immigration. It turns out that, because of complementarity, globalization may discourage illegal immigration. In particular,

Result 8 *There exists a threshold level* $\tilde{P}$ *such that, if* $P < \tilde{P}$*, an increase in* p_M / p_T *makes* Z^* *shrink.*

The intuition for this result is as follows.[14] If the relative price of the export good increases, this removes native workers from the traditional sectors, and namely its shadow component. Such reduction in ρ^* and ν^* will be associated with a smaller Z^*, because of complementarity. However, if the increase in p_M / p_T is such that both p_T and p_M are increasing, then an opposite effect may emerge, since higher expected wages attract a larger number of undocumented migrants. If the native population is very large, this latter effect will be rather moderate, and the former dominates.

Contrary to what is often maintained in the public debate, this result shows that globalization might be an effective mean to contain illegal immi-

14 Proof available upon request.

gration. Otherwise said, political parties whose political agenda is opposed to both trade openness and illegal immigration may face a trade off between those two objectives, as protectionism may backfire and result in larger flows of undocumented workers.

Finally, let us underline that a more comprehensive measure of the shadow economy could be constructed as

$$\sigma^* = \frac{\rho^* \nu^* P + Z^*}{P + Z^*}$$

i.e. the share of total workforce employed by the shadow economy. In the case of complementarity, the comparative statics of σ^* would reproduce, in qualitative terms, that of ρ^* and ν^*.

5. Conclusions

In this article, we have studied how fiscal policy and globalization affect illegal immigration when the shadow economy matters.

We have shown that the degree of substitutability between migrants and natives turns out to be crucial to identify the effects of both fiscal policy and globalization on the economy. In particular, when natives and migrants are perfect substitutes in production, lower taxes or more trade openness both result in a larger number of illegal immigrants. These results are reversed under imperfect substitutability. This suggests that policy interventions dealing with illegal immigration should take into account simultaneously the fiscal stance of the country, its degree of openness to international trade (and the ensuing specialisation pattern) and the composition of the native and foreign-born labor force in terms of skill and characteristics.

Our analysis can be extended in several directions. First, one may want to delve into a full-fledged welfare analysis. Although we have been able to assess how the main parameters of the model affect several policy-relevant variables, we have not specified a social welfare function and are thus unable

to identify optimal policies. Second, we have abstracted from the costs of policy interventions and considered public expenditure to be unproductive. Activities such as fiscal detection and border patrolling are costly, while public provision of infrastructures and the like might be enriching the economy. Accordingly, there may be interesting trade-offs related to these alternative policies that are financed out of taxes. Third, we have limited our analysis to a small-open advanced economy that receives illegal immigrants, without explicitly characterizing trading partners or the origin country of migrants. A general equilibrium model would certainly enrich the analysis and generate additional insight. All these extensions are left for future research.

References

Amaral, P. S. and E. Quintin, "A Competitive Model of the Informal Sector," *Journal of Monetary Economics*, 2006, *53*, 1541–1553.

Borjas, G. J., "The Economics of Immigration," *Journal of Economic Literature*, 1994, *XXXII*, 1667–1717.

Bracco, E. and L. Onnis, "Immigration, Amnesties and the Shadow Economy," Notebook 418, Collegio Carlo Alberto 2015.

Camacho, C., F. Mariani, and L. Pensieroso, "Illegal immigration and the shadow economy," *International Tax and Public Finance*, 2017, *24* (6), 1050–1080.

Chassamboulli, A. and G. Peri, "The Labor Market Effects of Reducing the Number of Illegal Immigrants," *Review of Economic Dynamics*, 2015, *18*, 792–821.

Ciccarone, G., E. Marchetti, and I. Pavlovaite, "Study on indirect measurement methods for undeclared work in the EU," Technical Report, European Commission, Unit EMPL/D1-Employment Analysis 2009.

CLANDESTINO, "Undocumented Migration: Counting the Uncountable – Data and Trends across Europe," http://clandestino.eliamep.gr/2009.

Dabla-Norris, E., M. Gradstein, and G. Inchauste, "What Causes Firms to Hide Output? The Determinants of Informality," *Journal of Development Economics*, 2008, *85*, 1–27.

Djajic, S., "Illegal Immigration and Resource Allocation," *International Economic Review*, 1997, *38* (1), 97–117.

_and A. Vinogradova, "Undocumented Migrants in Debt," *Labour Economics*, 2013, *21*, 15–24.

_and _, "Immigration Policies and the Choice between Documented and Undocumented Migration," *Economica*, 2017, forthcoming.

Docquier, F., C. Ozden, and G. Peri, "The Labour Market Effects of Immigration and Emigration in OECD Countries," *Economic Journal*, 2014, *124*, 1106–1145.

Grossman, G. M., E. Helpman, and P. Kircher, "Matching, Sorting, and the Distributional Effects of International Trade," *Journal of Political Economy*, 2017, *125* (1), 224–264.

Hazari, B. R. and P. M. Sgro, "The Simple Analytics of Optimal Growth with Illegal Migrants," *Journal of Economic Dynamics and Control*, 2003, *28*, 141–151.

Hillman, A. and A. Weiss, "A theory of permissible illegal immigration," *European Journal of Political Economy*, 1999, *15*, 585–604.

Ihrig, J. and K. S. Moe, "Lurking in the Shadows: the Informal Sector and Government Policy," *Journal of Development Economics*, 2004, *73*, 541–557.

Manacorda, M., A. Manning, and J. Wadsworth, "The impact of immigration on the structure of wages: theory and evidence from Britain," *Journal of the European Economic Association*, 2012, *10* (1), 120–151.

Maroukis, T., K. Iglicka, and K. Gmaj, "Irregular Migration and Informal Economy in Southern and Central-Eastern Europe: Breaking the Vicious Cycle?," *International Migration*, 2011, *49*, 129–156.

Moy, H. M. and C. K. Yip, "The simple analytics of optimal growth with il-

legal migrants: A clarification," *Journal of Economic Dynamics and Control*, 2006, *30* (12), 2469 – 2475.

Ottaviano, G. and G. Peri, "Rethinking the effect of immigration on wages," *Journal of the European Economic Association*, 2012, *10* (1), 152–197.

Özden, C. and M. Wagner, "Immigrant versus natives? Displacement and job creation," 2014. mimeo.

Peri, G., "Rethinking the Area Approach: Immigrants and the Labor Market in California," *Journal of International Economics*, 2011, *84*, 1–14.

_, "Immigrants, Productivity and Labor Market," *Journal of Economic Perspectives*, 2016, *30* (4), 3–30.

Pinto, S. and T. Sablik, "Unauthorized Immigration: Evaluating the Effects and Policy Responses," *Richmond Fed Economic Brief*, 2018.

Schneider, F., "The Shadow Economy and Shadow Economy Labor Force: What Do We (Not) Know?," IZA Discussion Papers 5769, Institute for the Study of Labor (IZA) June 2011.

_, A. Buehn, and C. E. Montenegro, "Shadow economies all over the world: New estimates for 162 countries from 1999 to 2007," *Handbook on the Shadow Economy*, 2011, pp. 9–77.

_and D. H. Enste, "Shadow Economies: Size, Causes, and Consequences," *Journal of Economic Literature*, 2000, *XXXVIII*, 77–114.

Tanzi, V., "The Underground Economy in the United States: Annual Estimates, 1930-80," *Staff Papers - International Monetary Fund*, 1983, *30* (2), 283–305.

_, "Uses and Abuses of Estimates of the Underground Economy," *Economic Journal*, 1999, *109* (456), pp. F338–F347.

Wei, X., Z. Guan, G. O¨ nel, and F. Roka, "Imperfect Substitution between Immigrant and Native Farm Workers in the United States," 2016. mimeo.

ECONOMIA ITALIANA

BUSINESS PARTNER

SOSTENITORI

ACQUIRENTE UNICO

CASSA NAZIONALE DEL NOTARIATO

CASSA NAZIONALE DEI DOTTORI COMMERCIALISTI - CNPDAC

BANCA PROFILO

DEUTSCHE ASSET MANAGMENT

MERCER

OASI

SACE

PFIZER

SISAL

Per attivare un nuovo abbonamento
effettuare un **versamento** su:

c/c bancario n. 36725 UBI Banca
Via Vittorio Veneto 108/b - 00187 ROMA
IBAN IT 47L 03111 03233 000 0000 36725

intestato a: **Editrice Minerva Bancaria s.r.l.**

oppure inviare una **richiesta** a:
amministrazione@editriceminervabancaria.it

Condizioni di abbonamento ordinario per il 2018

	Rivista Bancaria Minerva Bancaria bimestrale	**Economia Italiana** quadrimestrale	**Rivista Bancaria Minerva Bancaria + Economia Italiana**
Canone Annuo Italia	**€ 100,00** causale: MBI18	**€ 50,00** causale: EII18	**€ 130,00** causale: MBEII18
Canone Annuo Estero	**€ 145,00** causale: MBE18	**€ 75,00** causale: EIE18	**€ 180,00** causale: MBEIE18
Abbonamento WEB	**€ 60,00** causale: MBW18	**€ 30,00** causale: EIW18	**€ 75,00** causale: MBEIW18

L'abbonamento è per un anno solare e dà diritto a tutti i numeri usciti nell'anno.
L'abbonamento non disdetto con lettera raccomandata entro il 1° dicembre s'intende tacitamente rinnovato.
L'Amministrazione non risponde degli eventuali disguidi postali.
I fascicoli non pervenuti dovranno essere richiesti alla pubblicazione del fascicolo successivo.
Decorso tale termine, i fascicoli disponibili saranno inviati contro rimessa del prezzo di copertina.

Prezzo del fascicolo in corso **€ 25,00**
Prezzo di un fascicolo arretrato **€ 40,00**

Pubblicità

1 pagina **€ 1.000,00** - 1/2 pagina **€ 600,00**

ECONOMIA ITALIANA 2018/1

Le sfide della migrazione

Quali sono gli effetti economici dell'immigrazione e dell'emigrazione in Italia e in Europa? Tra il 1990 e il 2015 il numero dei residenti nati all'estero nei maggiori paesi è raddoppiato raggiungendo i 34 milioni. Gran parte è proveniente da paesi a basso reddito e in via di sviluppo, ma recentemente sono aumentati anche i flussi intra-europei con movimenti di persone con diverse caratteristiche, soprattutto in termini di grado di istruzione. L'Italia è tra i paesi che hanno avuto il più rapido aumento insieme alla Spagna, quasi quadruplicando il numero di stranieri negli ultimi 15 anni e superando i 5 milioni**. Quali sono gli effetti sul nostro mercato del lavoro?**

Come è possibile far funzionare il meccanismo UE per la riallocazione dei rifugiati? Economia Italiana presenta una nuova proposta basata su un meccanismo di abbinamento, in base al quale i rifugiati esprimono le loro preferenze sui paesi di destinazione e i paesi possono scambiare le loro quote di diversi tipi di rifugiati (quote negoziabili di ammissione dei rifugiati, TRAQ).

Questi ed altri ancora i temi che questo numero di Economia Italiana, coordinato da Giuseppe De Arcangelis, si propone di approfondire.

ECONOMIA ITALIANA nasce nel 1979 per approfondire e allargare il dibattito sui nodi strutturali e i problemi dell'economia italiana, anche al fine di elaborare adeguate proposte strategiche e di *policy*. L'Editrice Minerva Bancaria si impegna a riprendere questa sfida e a fare di Economia Italiana il più vivace e aperto strumento di dialogo e riflessione tra accademici, *policy makers* ed esponenti di rilievo dei diversi settori produttivi del Paese.

EMB
EDITRICE MINERVA BANCARIA