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Unemployment and the Immigration Surplus

by

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Abstract

Within a small open economy fair wage model with unemployment of unskilled workers, we show that exogenous unskilled immigration increases the welfare of natives if the elasticity of the inverse labour demands exceeds a positive finite threshold. This threshold depends positively on the displacement ratio of native workers by immigrants and negatively on the share of immigrants in the unskilled workforce.

JEL classification: F16, F22

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Outline

Non-Technical Summary

In a small open economy framework that features unemployment of unskilled labour, we examine the effect of unskilled immigration on employment of natives and on native welfare. We show that an exogenous immigration of unskilled workers reduces the employment of unskilled natives. The overall effect of immigration on the welfare of natives is ambiguous: On the positive side, immigration reduces the wage payments to existing migrants (thereby generating an immigration surplus for the suppliers of domestic factors other than unskilled labour), but on the negative side the employment of unskilled native workers falls. We provide an easily estimable formula that can be used to determine whether or not immigration increases the welfare of natives. It shows that immigration increases the welfare of natives if the elasticity of the inverse labour demand exceeds a finite threshold.

1 Introduction

In models with full employment but without taxes and income transfers, the literature on international migration, when migrants possess only labour, has shown that marginal immigration has no welfare effects on natives in the host country while finite immigration increases their welfare (see Berry and Soligo, 1969). Welfare of natives increases since the inflow of new immigrants reduces the wage payments to the inframarginal migrants, resulting in the *immigration surplus*. There are many studies that have estimated the economic benefits of immigration. Borjas (1995), for example, using data for USA, estimated economic benefits from immigration between $7 and $25 billion, annually.[1]

Measuring the welfare effect of migration in the host country by the immigration surplus relies on a framework in which the employment of native workers remains unaffected, typically because it is assumed that they are fully employed. On the other hand, job displacement of native workers by immigrants is a possibility if unemployment in the host country exists. In this paper, we develop a simple model of a small open economy that features involuntary unemployment of unskilled workers and examine the effect of exogenous unskilled immigration on the welfare of natives. We find that in this case the welfare effect of immigration is ambiguous, as it is now jointly determined by the immigration surplus and the induced employment effect of natives. We derive an easily interpretable formula to determine the sign of the overall welfare effect.

2 The Model

Consider a small open economy producing a number of traded goods using unskilled labour l, skilled labour h and other factors of production. It is assumed that the number of factors exceeds the number of goods and thus changes in factor supplies affect factor rewards. Commodity trade is free so that domestic and world goods prices are equal. The supply

[1] An exogenous immigration, however, can reduce the welfare of natives in economies where income taxes and transfers exists (e.g., Michael (2003) or in large and technologically superior countries where immigration may cause a terms of trade deterioration (e.g., Davis and Weinstein (2002)).

side of the economy is described by a standard GDP function $G(l, h)$, where goods prices and factors other than labour are suppressed as arguments of $G(\cdot)$ as they are held constant throughout. In labour market equilibrium, the wage for both types of labour has to equal the respective value marginal product, i.e. $w = G_l$ and $r = G_h$.[2] Furthermore, we make the standard assumptions $G_{ll}, G_{hh} < 0$ (i.e. demand curves for both types of labour are downward sloping) and $G_{hl} > 0$ (both types of labour are complements in production).

Both types of workers are able to choose their effort at work. Following Akerlof and Yellen (1990) and Kreickemeier and Nelson (2006) we assume that the effort is determined according to $e^l = \min(w/w^*, 1)$ and $e^h = \min(r/r^*, 1)$, respectively, where a "*" denotes the respective *fair wage*, i.e. the standard of reference that workers use in order to assess whether they are paid fairly. For each of the two groups, the fair wage has two determinants: first the market wage of the respective other group, and second the remuneration they could expect outside their current job, taking into account that they might be unemployed with a probability that is equal to the factor-specific rate of unemployment:

$$w^* = \theta r + (1 - \theta)(1 - u_l)w \tag{1}$$

$$r^* = \theta w + (1 - \theta)(1 - u_h)r \tag{2}$$

where u_i is the unemployment rate for labour of type i. Firms are wage setters, but treat the fair wage, which is determined in general equilibrium, parametrically. As effort decreases proportionally if firms pay less than the fair wage, they have no incentive to do so, and hence $e^l = e^h = 1$ in equilibrium. Under the assumption that a competitive equilibrium would be characterized by $r > w$, eq. (2) is never binding and h is fully employed in equilibrium. On the other hand, there is unemployment of l. We therefore have to distinguish between (unskilled) labour endowment $\bar{l}$ and employment l, and the unemployment rate for unskilled labour is given by $u = (\bar{l} - l)/\bar{l}$. Setting $w^* = w$ in eq. (1) and solving for w yields

$$F(r, l, \bar{l}) \equiv w = \frac{\theta r \bar{l}}{\bar{l} - (1 - \theta)l} \tag{3}$$

[2]Indices are used throughout to denote partial derivatives.

with $F_r, F_l > 0$ and $F_{\bar{l}} < 0$. In analogy to Akerlof and Yellen (1990), eq. (3) is called the *fair wage constraint*.

We are now in a position to derive the effect of immigration of unskilled workers ($d\bar{l} > 0$) on aggregate employment (dl). Totally differentiating the equilibrium condition for the unskilled labour market $F(G_h(l,h), l, \bar{l}) = G_l(l,h)$, holding constant the endowment of skilled labour, gives

$$(F_l + F_r G_{hl} - G_{ll})\, dl + F_{\bar{l}} d\bar{l} = 0, \tag{4}$$

and hence

$$\frac{dl}{d\bar{l}} = -\left(F_l + F_r G_{hl} - G_{ll}\right)^{-1} F_{\bar{l}} \tag{5}$$

This results in:

Proposition 1. *With equal unemployment rates among migrants and natives, unskilled immigration reduces native employment.*

Proof. Differentiate the fair wage constraint to get $-(F_l)^{-1} F_{\bar{l}} = l/\bar{l} = 1 - u$. Using $F_r G_{hl} - G_{ll} > 0$, this implies $0 < dl/d\bar{l} < 1 - u$. Hence, employment increases less than proportionally with immigration and therefore the rate of unemployment increases. □

That is, immigration adds jobs to the economy, but not enough to keep the employment of natives constant.

We now turn to analysing the welfare effect of marginal immigration. To this end, suppose that in the initial equilibrium there are two types of unskilled workers, natives l^n and an existing stock of migrants l^m.[3] The expenditure function for a worker of type i is given by $E^i(u^i)$, which gives the minimum expenditure by a worker of type i to achieve utility u^i.[4] Ownership of the factors of production other than labour is distributed between

[3]Note that this setup generates the marginal variant of the standard immigration surplus. As in the case of finite immigration, the surplus stems from the induced wage effect of inframarginal migrants (l^m in the present model). See Felbermayr and Kohler (2007) for a discussion in the full employment case.

[4]Goods prices are constant throughout, and hence are suppressed as an argument of $E^i(\cdot)$. Furthermore, as shown above, all workers supply full effort in equilibrium, and hence individual effort can be ignored as an argument of $E^i(\cdot)$.

natives (skilled and unskilled). The budget constraint of the economy then becomes

$$l^n E^n(u^n) + hE^h(u^h) = G(h,l) - l^m E^m(u^m), \tag{6}$$

assuming for simplicity that unemployment benefits are zero. The expenditure of natives on the left hand side of (6) equals the difference between the value of production and the expenditure of the existing stock of migrants. Totally differentiating (6) and using $dl = dl^m + dl^n$ gives

$$dW = G_l(dl^m + dl^n) - l^m E^m_u du^m - E^m dl^m \tag{7}$$

where the change in the expenditure of natives $dW \equiv l^n E^n_u du^n + l^h E^h_u du^h + E^n dl^n$ is our welfare measure. For migrants supplying labour is the only source of income, and therefore $E^m = G_l$ and $E^m_u du^m = G_{ll} dl$. Substituting into (7) leads to our central equation for the welfare effect of immigration on natives:

$$dW = \left(G_l \frac{dl^n}{d\bar{l}} - l^m G_{ll} \frac{dl}{d\bar{l}} \right) d\bar{l} \tag{8}$$

The first term is the change in native income induced by a change in the employment of natives, while the second term is minus the change in income of the existing stock of migrants induced by a change in their wage rate. The first term is negative while the second term (including the minus) is positive.

In order to say something about the relative size of both effects, we write $Rdl^m = -dl^n$, where R is the *displacement ratio*, i.e. the number of natives who lose their job relative to the number of immigrants who find employment. From proposition 1, we know $0 < R < 1$ and hence in the fair wage model there is partial displacement of native workers by migrants. The relation between the change in aggregate employment and native employment can now be written as $dl^n = -[R/(1-R)]dl$. Substituting for dl in eq. (8) gives

$$\begin{aligned} dW = &\left(G_l + l^m G_{ll} \frac{1-R}{R} \right) \frac{dl^n}{d\bar{l}} d\bar{l} \\ &G_l \left(1 - \frac{\phi\varepsilon(1-R)}{R} \right) \frac{dl^n}{d\bar{l}} d\bar{l} \end{aligned} \tag{9}$$

where $\varepsilon \equiv -G_{ll}l/G_l > 0$ is the elasticity of the inverse labour demand curve (in absolute value), and $\phi \equiv l^m/l$ is the share of the existing stock of migrants in the unskilled working population. As we know $dl^n/d\bar{l} < 0$, the condition for immigration to be welfare improving is

$$\varepsilon > \bar{\varepsilon} = \frac{R}{\phi(1-R)} \tag{10}$$

This gives:

Proposition 2. *With an existing stock of migrants and partial job displacement of natives by foreigners, marginal immigration of unskilled workers increases native welfare if the elasticity of the inverse labour demand curve exceeds some strictly positive but finite threshold level $\bar{\varepsilon}$. This threshold depends positively on the displacement ratio R and negatively on ϕ, the share of the existing stock of migrants in the unskilled working population.*

Ceteris paribus, a higher elasticity of the inverse labour demand curve leads to a larger wage effect of immigration, and hence to a larger loss for migrants already in the country, thereby benefiting natives. The effects of ϕ and R are very intuitive as well. Ceteris paribus, $\bar{\varepsilon}$ is small if the share of existing immigrants is large (i.e. ϕ is large) and thus the gains to natives due to the wage decrease are larger. Similarly, $\bar{\varepsilon}$ is small if the displacement ratio is small and thus fewer native workers loose their job due to immigration. For example, if $R = 0.1$ and $\phi = 0.1$ immigration increases the welfare of natives if the elasticity of the inverse demand is higher than 1.11. In the extreme case of full displacement, ($R \to 1$, e.g. in the minimum wage model) the right hand side in (10) goes towards infinity, and hence the inequality can never hold. Without displacement ($R = 0$, e.g. in the full employment model), the inequality always holds as long as $\phi > 0$. This is the marginal variant of the standard immigration surplus, as described in Felbermayr and Kohler (2007).

3 Conclusion

In a small open economy framework that features unemployment of unskilled labour, we examine the effect of unskilled immigration on employment of natives and on native welfare. We show that an exogenous immigration of unskilled workers reduces the employment

of unskilled natives. Immigration affects positively the welfare of natives by reducing the wage payments to existing immigrants (immigration surplus) and negatively by decreasing employment of unskilled native workers, making the total effect on natives' welfare ambiguous. We provide, however, an easily estimable formula which can be used to examine whether or not immigration increases the welfare of natives. It shows that immigration increases the welfare of natives if the elasticity of the inverse labour demand exceeds a positive finite threshold.

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