Immigration and Public Spending

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Abstract

We develop a model to analyze the association between immigration and public spending, where we distinguish between public spending on rival (private) and on non-rival (public) goods. Low-skilled and high-skilled immigration will either increase or decrease public spending, depending on natives’ preferences for private versus public goods. In an extension of the model, we allow for immigration to change natives’ preferences for public spending on private and on public goods. We illustrate our theoretical hypotheses using OECD panel data for 1990 - 2001. We estimate a system of simultaneous equations and find evidence that high-skilled immigration is associated with more public spending, as suggested by our basic model. Low-skilled immigration is however associated with less public spending, which is consistent with a change of preferences, as suggested by our extended model.

JEL: F2, H4, H5.

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1. Introduction

How does immigration change a country’s spending policy? Conventional theory of tax competition argues that immigration constrains countries’ spending policies because workers have an incentive to migrate to benefit from inter-regional differentials in taxes and benefits. Mobile high-skilled workers will move to countries where taxes are lower, other things being equal. In the same way, mobile low-skilled workers will move to countries where transfers are higher. As a result, the initial extent of public spending becomes unsustainable. Cremer and Pestieau (2004) provide a survey of the theoretical literature on labor mobility and fiscal redistribution, which yields consistent results: under labor mobility, spending is generally lower than in autarky.

Other economic studies, apart from those on arbitrage and tax competition, also argue that public spending is lower with migration. Various strands of the political economy literature have shown that immigration might induce natives to choose to redistribute less. First, immigration may decrease spending, if it increases the dependency ratio in the destination country (e.g. when immigrants are primarily low-skilled and thus more likely to become more unemployed). Razin, Sadka and Swagel (2002), for example, use a median-voter model to show that low-skilled immigration may lead to a decrease in the ratio of mean to median pre-tax income and, consequently, to a lower amount of public spending. They also find empirical evidence for this effect that they call ‘fiscal leakage effect’.¹ It refers to the effect of immigration on spending via its effect on median voter utility derived from the public budget, and we will refer to such an effect as the ‘fiscal effect’ below.

The literature mentioned above does not consider spending on public goods and authors model public spending as private transfers only. In this paper, we model public spending on private (rival) goods and on public (non-rival) goods. In general, we expect a negative fiscal effect to arise only with spending on private goods, since natives do not experience a monetary disadvantage when immigrants use non-rival goods, the marginal cost of which is zero. Our results show that whether public spending increases or decreases with immigration depends upon natives’ preferences for private versus public goods. If natives value public goods more than private goods, spending should increase with immigration. If the opposite is true, spending should decrease. Using survey data, Luttmer (2001) finds empirical evidence for a ‘negative exposure effect’, where the taxpayers’ support for welfare decreases when the number of welfare recipients increases.

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goods more than private goods, spending increases. If they value private goods more than public goods, spending is likely to decrease.

A different branch of the political economy literature suggests that immigration may decrease public spending, if immigration increases the heterogeneity of the population. Many authors have documented a negative empirical relationship between the degree of racial composition of states and their levels of public spending.\(^2\) Alesina and Spolaore (1995), for example, develop a model where ethnic heterogeneity decreases the utility natives derive from spending on public goods. As a consequence, they opt for lower levels of spending on the public good. Alesina, Baqir and Easterly (1999) show that the more ethnically heterogeneous a US city was in 1990, the less was spent, for example, on public schooling or on roads.

We therefore also consider a model where immigration decreases the utility natives derive from spending on public goods relative to spending on private goods. In line with above literature, we assume that the median voter values public goods less in societies with large shares of immigrants, who are typically ethnically different from natives – that ‘diversity makes people anti-social’.\(^3\) If natives perceive immigrants to be different from them, they might derive lower utility from spending on public goods, since public goods are shared with immigrants – even if they do not encounter any monetary or otherwise observable disadvantage. Introducing such an effect on preferences in our model, we find that the results from the pure ‘fiscal effect’ model might be reversed. That is, if natives value public goods more than private goods, public spending may now decrease. If they value private goods more than public goods, public spending may increase.

In the first part of this paper, we present the theoretical framework from which we derive testable hypotheses on the fiscal effect and the preference effect of immigration on public spending. We illustrate these hypotheses using data on immigration and fiscal policies in 18 OECD countries for the years 1990 – 2001. We explicitly distinguish immigrants by skill,

\(^3\) See, for example, the article ‘The kindness of strangers?’ (The Economist, February 28, 2004), which cites a large ongoing survey of American communities that ‘seems to show…that levels of trust and co-operation are highest in the most homogeneous neighborhoods. People living in diverse areas…are not just more suspicious of people who don’t look like them; they are also more suspicious of their own kind.’
because in the ‘fiscal effect’ model spending is more likely to increase, the higher the skills of immigrants.

In our empirical results, we find that natives value public goods more than private goods and that low-skilled immigration decreases the amount of public spending. We therefore find evidence for a negative preference effect of low-skilled immigration. For high-skilled immigration, we find that spending increases, consistent with the fiscal effect in our basic model. We cannot rule out the existence of an effect of high-skilled immigrants on preferences that is dominated by the fiscal effect.

2. Theory

Consider a population which consists of both natives and immigrants, whose numbers are exogenously given. We do not look at the long-run dynamics of immigration. In the short run, the number of immigrants is assumed to be restricted by a binding quota. There are \( n \) natives and \( m \) immigrants, both are either high-skilled or low-skilled. The number of the high-skilled and low-skilled is \( n_h, m_h \) and \( n_l, m_l \), respectively. They earn some exogenous pre-tax incomes \( y_h \) and \( y_l \). High-skilled workers are more productive than low-skilled workers and, therefore, \( y_h > y_l \), for natives and immigrants alike. Natives choose the optimal size of public spending \( g \) by majority voting. Immigrants are not allowed to vote.\(^4\) The amount of public spending is limited by public revenue, which is levied by a flat-rate tax on labor income.\(^5\) A share \( \sigma \) of public spending \( g \) is spent on rival goods (for example health care or student grants), which we will simply call (social) transfers from now on. A share \( 1-\sigma \) is spent on non-rival goods (for example parks or roads), which we will call public goods. Natives also choose the share of public spending on social transfers and on public goods by majority voting.\(^6\) Natives and immigrants are treated alike fiscally.

\(^4\) Although EU citizens are allowed to vote on a local level if they are resident in a different member state, public spending is typically determined by the central government.

\(^5\) That is, the budget constraint needs to hold.

\(^6\) Voting campaigns provide ample evidence for the fact that what matters for voters is not only the total amount of public spending, but also what public spending is used for. For instance, liberals might prefer to use some given amount of public spending for public goods rather than for transfers, as opposed to conservatives.
\section*{2.1 The fiscal effect}

The utility function of a native individual $i$ is given by

$$U_i = z(1-\tau)y_i + \left(\frac{\sigma g}{m+n}\right)^\alpha + \left((1-\sigma)g\right)^\beta,$$

(1.1)

where $\tau$ is the flat-rate tax and $\alpha$ and $\beta$ are preference parameters for public spending on transfers and on public goods. $z$ is a parameter that enhances marginal utility derived from net income relative to that derived from public spending for numerical reasons.\footnote{By setting $z > 1$, we can avoid obtaining unrealistically high equilibrium values of $g$ in numerical simulations, which would require a tax rate of larger than 1.} Utility is the sum of net income and the individual’s share in total public spending. Because of non-rivalry, the size of the population does not diminish the utility derived from public goods. This is not true for transfers. We allow for transfers to be imperfect substitutes for individual income, as they can consist not only of cash transfers but also of in-kind transfers.\footnote{Besides, cash transfers are typically received under conditions different from receiving income, such as being ill in the case of health benefits or being a student in the case of student grants. It is easy to restrict the share of transfer recipients among natives and migrants by introducing a factor in the denominator of the second term on the right-hand side of (1.1). This would not qualitatively change results.} In the special case of $\alpha = 1$, government transfers and net income are perfect substitutes.

The budget constraint implies that total spending equals total revenue:

$$g = \tau \left[(m_h + n_h)y_h + (m_l + n_l)y_l\right].$$

(1.2)

Using (1.1) and (1.2), we can rewrite individual utility as follows:

$$U_i = zy_i + g^\alpha \left(\frac{\sigma}{m+n}\right)^\alpha + g^\beta (1-\sigma)^\beta - zs_i g, \quad i = h,l,$$

(1.3)

where $s_i = \frac{y_i}{\sum y_i}$ is the share of individual income in total income, equivalent to the individual share in the cost of public spending $g$.\footnote{Besides, cash transfers are typically received under conditions different from receiving income, such as being ill in the case of health benefits or being a student in the case of student grants. It is easy to restrict the share of transfer recipients among natives and migrants by introducing a factor in the denominator of the second term on the right-hand side of (1.1). This would not qualitatively change results.}
Natives choose the optimal size of total public spending \( g \) and the optimal share of public spending on transfers, \( \sigma \), by majority voting. Both variables depend on the number of high-skilled and low-skilled immigrants.

Individual \( i \)'s preferred size of public spending \( g_i^* \) is given by the maximization of the utility function (1.3) with respect to \( g \). The first-order condition is

\[
\beta g_i^{-1+\beta} (1-\sigma_i)^{\beta} + \alpha g_i^{-1+\alpha} \left( \frac{\sigma_i}{m+n} \right)^{\alpha} - z \sum y_i = 0.
\]  

(1.4)

Individual \( i \)'s preferred share of public spending on social transfers \( \sigma_i^* \) is given by the maximization of the utility function (1.3) with respect to \( \sigma \). The first-order condition is

\[
-\beta g_i^{\beta} (1-\sigma_i)^{-1+\beta} + \alpha \left( \frac{g_i}{m+n} \right)^{\alpha} \sigma_i^{-\alpha} = 0
\]  

(1.5)

which can be expressed as

\[
g = \left[ \frac{\alpha}{\beta} \frac{(1-\sigma_i)^{-1+\beta}}{\sigma_i^{-\alpha}} \frac{1}{(m+n)^{\alpha}} \right]^{\frac{1}{\beta-\alpha}}.
\]  

(1.6)

2.1.1 Equilibrium

Natives vote simultaneously on the amount and composition of public spending \( g \) and \( \sigma \) by majority voting. Since voting preferences are single-peaked (the utility function is concave in \( g \) and \( \sigma \)), the voting outcome will be the choice of the median voter: \( \sigma_{\text{med}}, g_{\text{med}} \). Our two first-order conditions (1.4) and (1.5) above give us two relations for the resulting amount and composition of public spending:

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9 We assume that the median voter is of the same skill (high-skilled or low-skilled) in both votes, in order to avoid transitivity problems of multi-dimensional voting.
\[
G: \quad \beta g_{\text{med}}^{-1+\beta} (1-\sigma_{\text{med}}) + \alpha g_{\text{med}}^{-1+\alpha} \left( \frac{\sigma_{\text{med}}}{m+n} \right)^\alpha - z \sum_{i} y_i = 0, \quad (1.7)
\]

\[
S: \quad -\beta g_{\text{med}}^\beta (1-\sigma_{\text{med}})^{-1+\beta} + \alpha \left( \frac{g_{\text{med}}}{m+n} \right)^\alpha \sigma_{\text{med}}^{-\alpha-1} = 0. \quad (1.8)
\]

The public spending equilibrium \((\sigma^*_{\text{med}}, g^*_{\text{med}})\) is characterized by the compatibility of both conditions \(G\) and \(S\). In the following, we will suppress the subscript and write \(\sigma^*\) and \(g^*\) for the optimal choice of the native median voter for simplicity.

**Proposition 1.** There exists at least one public spending equilibrium \((\sigma^*, g^*)\) characterized by \(G\) and \(S\). The equilibrium features positive spending on private and public goods.

**Proof.**

For a public spending equilibrium, \(G\) and \(S\) must cross in \((\sigma, g)\)-space. If both \(G\) and \(S\) are downward-sloping or upward-sloping in \((\sigma, g)\)-space, they cross at least once, if \(g\) is higher (lower) for \(\sigma=0\) according to \(S\) than according to \(G\), while it is lower (higher) for \(\sigma=1\).

The condition for \(G\) to be downward-sloping in \((\sigma, g)\)-space is:

\[
\frac{\partial g}{\partial \sigma} = -\frac{G_{\sigma}}{G_g} < 0. \quad (1.9)
\]

Implicit differentiation of (1.7) and rearranging yields from (1.9)

\[
g > \left[ \frac{\alpha^2 (1-\sigma)^{-1+\beta}}{\beta^2 \sigma^{-\alpha}} \right]^{\frac{1}{\beta-\alpha}} \frac{1}{(m+n)^{\alpha}} \quad (1.10)
\]

The condition for \(S\) to be downward-sloping in \((\sigma, g)\)-space is:
Implicit differentiation of (1.8) and rearranging yields from (1.11)

\[
\frac{\partial \sigma}{\partial g} = -\frac{S_g}{S_\sigma} < 0.
\]  

(1.11)

which is the same as (1.10). Therefore, if \(G\) is downward-sloping (upward-sloping) in \((\sigma, g)\)-space, \(S\) is downward-sloping (upward-sloping), as well. Moreover, comparing (1.6) with (1.10) and (1.12) shows that we can distinguish two cases: if \(\alpha < \beta\), \(G\) and \(S\) are downward-sloping, whereas if \(\alpha > \beta\), they are upward-sloping.

Further, according to \(G\), \(g\) is a positive finite number for \(\sigma = 0\) and \(\sigma = 1\), while according to \(S\), \(g\) is infinite (zero) for \(\sigma = 0\) and zero (infinite) for \(\sigma = 1\) in the case where \(\alpha < \beta\) \((\alpha > \beta)\). Q. E. D.

Next, we determine the effect of immigration on the public spending equilibrium.

2.1.2 Immigration

**Proposition 2.** Both high-skilled and low-skilled immigration increase public spending, if \(\alpha < \beta\) and condition (1.14) below is fulfilled.

**Proof.**

We determine the sign of the effect of immigration from the implicit derivatives of \(g\) in (1.7) and \(\sigma\) in (1.8) with respect to \(m_h\) and \(m_l\), for \(\alpha < \beta\).

First, we use (1.7) in order to derive the effects of high-skilled and low-skilled immigration on public spending \(g\) for any given \(\sigma\).

\[
\frac{\partial g}{\partial m_h} > 0, \text{ if and only if:}
\]
where \( \bar{y} = \sum_{i} y_i \) is mean income.

Analogously, \( \frac{\partial g}{\partial m_i} > 0 \), if and only if:

\[
\bar{y} \sum_{i} y_i > \sigma \left( \frac{\sigma}{m+n} \right)^{\alpha},
\]

(1.14)

Immigration affects median voter utility derived from public spending \( g \) in two ways. First, it decreases her marginal cost of public spending, \( \frac{y_{med}}{\sum y_i} \), proportional to the (marginal) immigrant’s share in the average financing cost, \( \frac{y_h}{y} \) or \( \frac{y_l}{y} \). Second, immigration decreases the median voter’s marginal utility of public spending on transfers, \( \alpha g^{-\alpha} \left( \frac{\sigma}{m+n} \right)^{\alpha} \), by lowering the amount available for the median voter.\(^{10}\)

Condition (1.13) [(1.14)] states that the increase in marginal utility caused by the decrease in the marginal cost of \( g \) due to high-skilled (low-skilled) immigrants is larger than the decrease in marginal utility caused by the co-using of public funds. Under this condition, immigration increases the optimal size of \( g \) for the median voter - for any given \( \sigma \). See Figure 1. We use numerical simulations that examine whether or not conditions (1.13) and (1.14) hold.

Second, we use (1.8) to derive the effect of high-skilled and low-skilled immigration on the spending on transfers \( \sigma \) for any given \( g \).

\[
\frac{\partial \sigma}{\partial m_h} < 0, \text{ if:}
\]

\[
0 < \alpha \leq 1 \text{ and } 0 < \beta < 1,
\]

(1.15)

which is true by assumption.

\(^{10}\) Note that, since we assume that migrants cannot vote, they cannot influence the optimal amount of public spending by changing the median voter, as for example in Razin et al. (2002). In many countries, migrants are exempt from voting until they have obtained citizenship (compare for example Bauer (2004)).
Analogously, $\frac{\partial \sigma}{\partial m_l} < 0$, if:

$$0 < \alpha \leq 1 \text{ and } 0 < \beta < 1.$$  

(1.16)

Figure 1. Effect of immigration on public spending, $g$, for any given share of spending on social transfers, $\sigma$, for $\alpha < \beta$.

Both high- and low-skilled immigrants decrease the optimal share of spending on transfers, because the marginal net gain from immigration is lower for spending on transfers than for spending on public goods. Immigrants increase the number of taxpayers, but they also diminish the utility of natives derived from spending on transfers, while they do not diminish utility derived from spending on public goods.

We know that high-skilled (low-skilled) immigration increases public spending $g$, if $\alpha < \beta$ and (1.13) [(1.14)] is fulfilled. If both $S$ and $G$ are downward-sloping in $(\sigma, g)$-space, a downward shift in $S$, together with a rightward shift in $G$, leads to an increase in $g$. See Figure 2. The median voter gains by increasing $g$ with immigration for any given share of private good spending $\sigma$. In addition, she gains by reducing the spending on transfers, with additional immigrants co-financing public goods. Since natives value public goods more than transfers ($\alpha < \beta$), the optimal response to immigration for natives is to increase public spending $g$. Note that, if (1.14) is fulfilled, (1.13) is, too, since $y_l < y_h$.

Q. E. D.
We have assumed that immigration does not affect the (gross) income of natives. The literature, however, often finds that low-skilled immigration may reduce native wages. (See, for example, Borjas (2003).) The median voter’s preferred $g^*$ is greater when $y_{med}$ is low (equation (1.7); the optimal value $\sigma^*$ does not depend on the median voter’s income (1.8). A lower median income brought on by immigration would therefore only strengthen our result.

Figure 2. Effect of immigration on equilibrium spending on transfers, $\sigma$, and on the amount of public spending, $g$, for $\alpha < \beta$.

Proposition 3. Both high-skilled and low-skilled immigration decrease public spending, if $\alpha > \beta$ and condition (1.13) above is not fulfilled.

Proof.
High-skilled (low-skilled) immigration decreases public spending $g$, if $\alpha > \beta$ and (1.13) [(1.14)] is not fulfilled. If both $S$ and $G$ are upward-sloping in $(\sigma, g)$-space, a downward shift in $S$, together with a leftward shift in $G$, leads to a decrease in $g$. See Figure 3. The median voter gains by decreasing $g$ with immigration for any given share of transfer spending $\sigma$. In addition, she gains by reducing the share of spending on transfers, with additional immigrants co-financing public goods. Since natives value transfers more than public goods ($\alpha > \beta$), the optimal response to immigration for natives is to decrease public spending $g$. Note that, if (1.13) is not fulfilled, (1.14) is neither, since $y_i < y_h$.

Q. E. D.
Figure 3. Effect of immigration on equilibrium spending on transfers, $\sigma$, and on the amount of public spending, $g$, for $\alpha > \beta$.

As in the case of $\alpha < \beta$ above, the result abstracts from wage effects of immigration. A positive effect of immigration on median voter income would strengthen our result (see (1.7)). In case of a negative effect of immigration on median income, the result depends on parameter values and holds as long as the wage effect of immigration is not too large.

2.2 The effect on preferences

Above, we have assumed that immigration affects public spending via the fiscal effect alone. We found that the effect of immigration depends not only on the ratio of (marginal) immigrant income to mean income, as derived in the literature so far\textsuperscript{11}, but also on the native median voter’s relative preference of transfer spending versus spending on public goods.

A natural extension to the model is the introduction of endogenous spending preferences. In the following, we analyze the effect of immigration on public spending when immigration changes the native median voter’s spending ‘tastes’. For example, a large and growing literature suggests that high levels of ethnic diversity lead to low levels of public goods provision due to common ethnic tastes (Becker 1957, Alesina et al. 1999, Vigdor 2004, \textsuperscript{11}Compare, for example, Razin et al. (2002) where public spending is entirely on transfers, which corresponds to the special case in our model when $\sigma = 1$.\textsuperscript{11}}
Alesina and LaFerrara 2005). In our model, this would correspond to a negative effect of high-skilled and low-skilled immigration on the parameter $\beta$ in our utility function (1.3):

$$U_i = z y_i + g^\alpha \left( \frac{\sigma}{m+n} \right)^\alpha + g^\beta (1-\sigma)^\beta - z s_i g,$$

where $\frac{\partial \beta}{\partial m_h} < 0$ and $\frac{\partial \beta}{\partial m_l} < 0$.

Let us assume that

$$\beta = \frac{\Lambda}{m_h + m_l}, \text{ where } 0 < \Lambda < m_h + m_l. \quad (1.17)$$

Note that in (1.17), we assume that the effect of immigration on the preference for the public good is the same for low-skilled and for high-skilled immigrants. Alternatively, we could assume that it is greater for the low-skilled or the high-skilled, and we address this issue below.

**Proposition 4.** In the presence of an effect on preferences as described in (1.17), (i) high-skilled and low-skilled immigration can decrease public spending, if $\alpha < \beta$ and condition (1.14) is fulfilled and (ii) high-skilled and low-skilled immigration can increase public spending, if $\alpha > \beta$ and condition (1.13) is not fulfilled.

**Proof.**

We use (1.17) to substitute for $\beta$ in (1.4) and, as before, derive the effects of high-skilled and low-skilled immigration on public spending $g$ for any given $\sigma$. We get

$$\frac{\partial g}{\partial m_h} > 0, \text{ if and only if:}$$

$$-\frac{G_{m_h}}{G_g} > 0. \quad (1.18)$$

Analogously, $\frac{\partial g}{\partial m_l} > 0$, if and only if:

$$-\frac{G_{m_l}}{G_g} > 0. \quad (1.19)$$
(1.18) and (1.19) do not indicate the sign for the effect of immigration on the optimal amount of public spending $g$. As natives value public goods less, immigration increases the marginal utility of public spending less than under a pure fiscal effect. Public spending $g$ is therefore more likely to decrease for any given $\sigma$ than before (compare (1.13) and (1.14)).

Next, we use (1.17) to substitute for $\beta$ in (1.5) to derive the effects of high-skilled and low-skilled immigration on the share of public spending on transfers $\sigma$ for any given $g$. We get

$$\frac{\partial \sigma}{\partial m_h} < 0, \text{ if and only if:} \quad -\frac{S_{m_h}}{S_{\sigma^*}} < 0.$$  \hspace{1cm} (1.20)

$$\frac{\partial \sigma}{\partial m_l} < 0, \text{ if and only if:} \quad -\frac{S_{m_l}}{S_{\sigma^*}} < 0.$$  \hspace{1cm} (1.21)

Again, (1.20) and (1.21) do not provide the sign for the effect of immigration on the optimal share of public spending on transfers $\sigma$. In the presence of a negative effect on the preference for public goods, immigration reduces the marginal utility of spending on public goods relative to that of spending on transfers. Immigration is therefore more likely to increase the share of spending on transfers $\sigma$ for any given $g$ than before (compare (1.15) and (1.16)).

Whether the total effect of immigration on public spending is positive or negative depends on parameter values and is ultimately an empirical issue. All that we say here is that, in the presence of an effect on preferences, our results from Proposition 2 and, analogously, the results from Proposition 3 can potentially be reversed. Q. E. D.

Of course, we could assume that the effect on preferences is relatively stronger for either low-skilled or for high-skilled immigrants. Maybe natives do not mind sharing public goods with high-skilled immigrants as much as sharing them with low-skilled immigrants, or vice versa. If high-skilled immigrants share certain characteristics of natives more than low-skilled immigrants do, the former case is more likely according to the literature on ethnic tastes.
Allowing for the effect of immigration on our preference parameter $\beta$ to be different for high- and low-skilled immigrants, we get

$$\beta = \frac{\Lambda_h}{m_h} + \frac{\Lambda_l}{m_l}, \text{ where } 0 < \frac{\Lambda_h}{m_h} + \frac{\Lambda_l}{m_l} < 1. \tag{1.22}$$

Now, a negative preference effect of immigration on public spending will be larger for the low-skilled (high-skilled), if $\Lambda_l > \Lambda_h$ ($\Lambda_h > \Lambda_l$). For example, given that $\Lambda_l > \Lambda_h$, if the preference effect of high-skilled immigration on public spending is negative, it will be even more negative for the low-skilled. Any positive fiscal effect of immigration on public spending is more likely to be reversed by a negative preference effect in the case of low-skilled immigration than in the case of high-skilled immigration. Our results from Proposition 4 remain unchanged.

### 2.3 Implications

We model two arguments of how immigration may influence the optimal size of public spending. The first argument states that immigration changes public spending via a fiscal effect alone. According to this argument, immigration increases spending, if natives value public goods more than transfers ($\alpha < \beta$) and condition (1.14) is fulfilled (Proposition 2). It decreases spending, if natives value public goods less than transfers ($\alpha > \beta$) and condition (1.13) is not fulfilled (Proposition 3).

The second argument states that immigration can also change public spending via an effect on preferences. If, for example, immigration decreases the preference for public goods, the predictions above can be reversed, that is, immigration may decrease spending under the conditions of Proposition 2 and it may increase spending under the conditions of Proposition 3 (Proposition 4).

We can test for the first condition on the size of $\alpha$ relatively easily: from (1.6) in connection with (1.10) and (1.12), we know that $G$ and $S$ are downward-sloping in $(\sigma, g)$-space, if $\alpha < \beta$. They are upward-sloping, if $\alpha > \beta$. Including the share of transfer spending in total spending $\sigma$ in an empirical estimation of public spending $g$, and determining the sign of the
coefficient tells us, whether \( \alpha < \beta \) (the coefficient is negative) or \( \alpha > \beta \) (the coefficient is positive).

Next, we have a closer look at conditions (1.13) and (1.14). When re-formulating (1.13) and (1.14), we get

\[
g > \left[ \alpha^2 \left( \frac{\sigma}{m+n} \right)^\alpha \frac{1}{z} \sum y_i \right]^{\frac{1}{1-\alpha}} \tag{1.23}
\]

and

\[
g > \left[ \alpha^2 \left( \frac{\sigma}{m+n} \right)^\alpha \frac{1}{z} \sum y_i \right]^{\frac{1}{1-\alpha}} \tag{1.24}
\]

Numerical simulations show that for values of \( \alpha \) smaller than 0.5, (1.24) [(1.14)] typically is fulfilled. If, in addition, \( \alpha < \beta \), we can conclude that the fiscal effect of immigration (both high- and low-skilled) is positive. For small values of \( \alpha \), the marginal loss in utility from sharing spending on transfers with immigrants is low relative to the marginal utility gain from immigrants’ co-financing. As a consequence, utility can be gained by increasing \( g \). If \( \alpha \) exceeds a certain threshold value, however, the reverse is true. (1.23) [(1.13)] will be invalidated, and we can conclude that the fiscal effect of immigration (both high- and low-skilled) on public spending is negative. The threshold value of \( \alpha \) depends on parameter values.

We can test between the fiscal effect and the preference effect of immigration by estimating the size of public spending and using (low- and high-skilled) immigration as estimators. If the relation between \( g \) and \( \sigma \) is negative (\( \alpha < \beta \)), we expect the coefficient on immigration to be positive in the absence of an effect on preferences – given that \( \alpha \) is small enough. A negative coefficient on immigration would suggest the presence of a negative effect on preferences. Analogously, if the relation between \( g \) and \( \sigma \) is positive (\( \alpha > \beta \)), we expect the coefficient on immigration to be negative in the absence of an effect on preferences – given that \( \alpha \) is large enough. A positive coefficient on immigration would suggest the presence of an effect on preferences. Since we cannot estimate the size of \( \alpha \) directly, we derive the following empirical results under the condition of \( \alpha \) being small (large) enough. Empirical
results therefore have to be interpreted carefully and seen primarily as a way of illustrating our theoretical findings.

In the following, we estimate a system of structural equations of the total amount of public spending and the share of public spending on transfers. We estimate the two equations using seemingly unrelated regressions (SURE) (Zellner, 1962), where the error-terms are possibly correlated.\footnote{Alternatively, one could consider estimating the two equations by three-stage least squares (3SLS) (Zellner and Theil, 1962), where the dependent variable in one equation appears as an explanatory variable in the other equation. Estimation by 3SLS requires for each equation at least one variable not included in the other equations (an instrument) for identification. We argue that the estimation by SURE is preferred to estimation by 3SLS as the median voter will use all information available to her in either decision and the choice of instrument is therefore not clear.} We distinguish between low- and high-skilled immigration because our model allows for the possibility of a different effect according to skill. Theoretically, (1.13) can be fulfilled, while (1.14) is not. High-skilled immigrants could therefore increase public spending, while low-skilled immigrants decrease public spending. Numerical simulations, however, practically rule out that possibility. More importantly, in the presence of an effect on preferences, the additional effect on public spending could be relatively larger for high-skilled or for low-skilled immigrants (see (1.22)) and produce different signs for the coefficients on immigration by skill.
3. Data

We use panel data for 18 OECD countries during 1990 – 2002. The data were compiled from various sources; a detailed description of the definitions and sources is in the Appendix.

The dependent variables in our system of equations are the total amount of public spending, \( g \), (general government total outlays in per cent of GDP) and the share of public spending on transfers, \( \sigma \). Our preferred indicator of the share of public spending on transfers in total spending is the share of total transfers received by households in per cent of total outlays. The distinction between spending on transfers and spending on non-transfers most closely corresponds to the distinction between spending on rival and non-rival goods in our model, given the restrictions by the availability of data. Thus, while we do not expect to perfectly map the model to the data, we do think that any empirical evidence for the two types of public spending to vary systematically with immigration can provide valuable insight regarding the validity of our theoretical hypotheses.

The scatter plot in Figure 4 below shows a negative correlation between public spending and the spending on transfers. This negative association is confirmed by a fixed-effects panel regression which is tabulated in Table 1, where we also control for immigration. According to our model, the median voter decides the optimal values of \( g \) and \( \sigma \) simultaneously. We estimate these decisions below, for the moment it is the negative association between \( g \) and \( \sigma \) which we want to stress as it indicates that \( \alpha < \beta \). As stated before, we assume that \( \alpha \) is also small enough for (1.14) to be fulfilled. (Of course, the exact values of \( \alpha \) and \( \beta \) ought to be determined by micro-econometric analysis, and possibly by experiments.)

The definition of immigrants for our empirical analysis is the foreign-born of working age, or, where data on the foreign-born were not available, foreigners. We collected data on

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13 The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Sweden, Switzerland, the United Kingdom and the USA.
14 Amongst others, the OECD Labour Force Statistics, the OECD International Migration Statistics, and the World Bank’s World Development Indicators.
15 We are more interested in the foreign-born as they comprise all the people who might be ethnically different from natives. This means that we may include (naturalized) immigrants who are allowed to vote in our empirical
immigrants by skill, where we use two categories of skill (low and high) derived from the International Standard Classiﬁcation of Education (ISCED) 1997.\textsuperscript{16} We deﬁne as the low-skilled immigrants those whose highest educational level is secondary education or less (ISCED level 4 or less). The high-skilled have attained the ﬁrst or second stage of tertiary education (ISCED level 5 or 6). Low- and high-skilled immigrants are expressed in percent of the total population. The summary statistics of our estimating sample are detailed in Table 2.

Control variables in the SURE regressions are GDP per capita (in constant 1995 US dollars), the age dependency rate (dependents to working age population), the unemployment rate (standardized, OECD deﬁnition), and trade openness (sum of exports and imports in percent of GDP). We also use an indicator to describe the skewness of the income distribution, the share of total income the top quintile of the population receives. For this variable, we have few observations and interpolate missing values linearly.

If variances of the ﬂows of low- and high-skilled immigrants within countries are small, they will not explain the levels of public spending or transfers. Column 3 in Table 2 details the within standard deviations and although the within-country variation is smaller than the between-country variation (which was expected), we argue that there is sufﬁcient variation in these data to support an empirical analysis.

\textsuperscript{16} The ISCED was designed and approved by UNESCO as an instrument suitable for presenting statistics of education both within and between countries. (UNESCO, 1997). Razin et al. (2002) also introduce the share of medium- and high-skilled immigrants in total population as an additional variable in their policy equations. However, they use only one year’s (1995) information on skills as representative for their whole period.
Figure 4: Public spending on transfers (σ, % of total spending) and total public spending (g, % of GDP), N=235.

4. Results

The results of our estimates of total public spending g and the share of public spending on transfers σ are presented in Table 3. The estimations are made by seemingly unrelated regressions which allow for a simultaneous estimation of the two equations. In addition, the error-terms of the two equations are possibly correlated. Our preferred model is Model 3, because we either lose many observations when we also include the top quintile’s share of income or need to interpolate these missing variables (Model 5). Note that Model 4 uses a different variable for transfer spending than the other models (the sample size is thus slightly smaller).

The main result from our estimations is the clear negative association between public spending and low-skilled immigration. Low-skilled immigration is estimated to lower the
total amount of public spending and spending on transfers. High-skilled immigration, in contrast, is estimated to increase public spending and spending on transfers. The precision of these estimates however depends on the specification of the equations. In columns 1 and 2 of Table 4 we present the estimated coefficients if we include only the number of low-skilled or high-skilled immigrants, the results change little and we maintain our main conclusion.

We interpret these results as evidence for a negative effect of low-skilled immigration on preferences. The negative correlation between public spending and the spending share on transfers documented in Table 1 and Figure 4 suggests that the median voter prefers public goods over social transfers. In this case, our theoretical model predicts a positive fiscal effect of immigration. The fact that low-skilled immigration is estimated to decrease public spending can be explained by a preference effect. High-skilled immigration is estimated to increase public spending, which is predicted by the fiscal effect.

While this does not rule out a preference effect in the case of high-skilled immigration, the findings show that the effect from any negative preference effect does not dominate the positive fiscal effect. Yet, in the absence of a preference effect, we expect the share of spending on transfers to decrease with immigration (compare (1.15) and (1.16)), which it does not for the high-skilled immigrants. Because of the positive association between high-skilled immigration and the spending share on transfers, we conclude that there is evidence for an effect on preferences for the high-skilled immigrants, too. This effect is strong enough to reverse the expected positive fiscal effect on public spending in the case of low-skilled immigration, but not in the case of high-skilled immigration.

The other estimation results show that richer countries spend less on public spending than poorer countries. In addition, high unemployment increases total public spending, the association between unemployment and spending on transfers is not precisely estimated, but the results suggest that transfers are lower when unemployment is high. Openness of trade decreases both public spending and spending on transfers. There is thus no evidence for an insurance function of the welfare state against external shocks as proposed by Rodrik (1998). We also estimate that total public spending is lower when the age dependency ratio is higher and find no association between the age dependency ratio and public spending on private transfers. All of these findings are similar to those of Razin et al. (2002), who use a smaller data set to estimate the effect of immigration on transfers per capita. Regarding the negative
coefficient on the dependency ratio, they argue that population aging represents a net cost to the median voter who gains by reducing the amount of public spending in response.\(^{17}\)

In an alternative specification, Model 4, we have used all public spending on social expenditure (from the OECD) to gauge the sensitivity of our results to the choice of variable for spending on transfers. This alternative choice is less preferred to that above because it may include public expenditure on goods which are non-rival. The results however change little; our main implications from Model 3 are confirmed.

In a further specification, Model 5, we have included the ratio of the top quintile’s income to the income received by the three middle quintiles to control for the skewness of the income distribution. Our model, in line with standard political economy models of redistribution, predicts that public spending increases with income skewness as expressed by the ratio of mean over median income (compare (1.7)). We estimate that the larger the top quintile’s income share, the more public spending occurs, both in terms of total spending and in the share of social transfers. The empirical association between the variables is as implied by theory. In Model 6 we include country-specific trends which proxy unobserved influences on the dependent variable. The association between low-skilled and high-skilled migration with our variables of interest differ little.\(^{18}\)

The estimates may suffer from reverse causality, as immigration might not be independent from public spending (compare the welfare-magnet effect in Borjas (1999)). Allowing for such a welfare magnet effect would amount to estimating a system of equations where immigration is not only an exogenous variable (as it is in these equations) but also a dependent variable. This empirical implementation, however, is difficult at best, because of data limitations and because of a lack of instruments. Razin et al. (2002) mention the difference in GDP growth between the emigration and the immigration countries as a potential instrument for benefits. Even if these data were available, they are not, the (positive) correlation between GDP and the welfare system makes such use problematic. Theoretically speaking, the effect of taxes or benefits on immigration are likely to strengthen our results, with low taxes (and low benefits) attracting relatively more high-skilled workers and high taxes (and high benefits) attracting relatively more low-skilled workers.

\(^{17}\) Compare Razin et al. (2000) for a theoretical model on that effect.

\(^{18}\) The results are robust to the inclusion of a quadratic or cubic trend.
While the estimation of this model is not possible, the estimation of current government spending on lagged migration variables may indicate whether or not such a welfare magnet effect severely distorts the obtained pattern. We have estimated a number of specifications, detailed in Table 4, where we have included lags of past immigration to see how past immigration influences current spending decisions. Controlling for current and past immigration, column 6 in Table 4, indicates that lagged immigration has a statistically significant association with the total amount of public spending and that the current levels are associated statistically significantly with the amount of transfer payments. Again, low-skilled immigration is associated with lower total spending and with lower transfers, whereas high-skilled immigration is again estimated to be associated with higher levels of total spending and transfers.\textsuperscript{19}

5. Conclusion

In this paper, we examine the effect of immigration on public spending. We model the size of total public spending as a function of the share of spending on transfers and also of high-skilled and low-skilled immigration. Our model predicts that, in the absence of an effect of immigration on preferences, if the median voter prefers public goods over social transfers, low-skilled and high-skilled immigration unambiguously increases the size of total public spending. High-skilled and low-skilled immigration will lower total public spending, if the median voter strongly prefers transfers over public goods.

We extend our model to allow for an effect of immigration on preferences, where immigration causes the native median voter to value public goods less than without immigration. Such disutility from immigration may offset any positive or negative fiscal effect and, in effect, may lower (raise) the size of total public spending, if preferences are pro (anti) public goods. We illustrate that the empirical association, without controlling for other variables, between total public spending and the share spent on transfers is negative, which supports the view that preferences are pro-public goods.

\textsuperscript{19} We have also aggregated our data to five year averages and obtained fairly similar results, the estimate for low-skilled immigration on total public spending is -0.735 [3.08] and it is -0.702 [3.66] for transfers. The estimates for high-skilled immigration are 0.912 [1.34] and 2.15 [3.93].
Our estimates of the empirical association between low-skilled and high-skilled immigration and total public spending and public spending on transfers by seemingly unrelated regressions consistently show that more low-skilled immigration is associated with less total public spending, while more high-skilled immigration is associated with more public spending. While there is evidence for an effect on preferences with regard to both low- and high-skilled immigrants, we find that it is large enough to dominate the expected positive fiscal effect on public spending in case of the low-skilled, but not in case of the high-skilled.

Immigration policies that are designed to select high-skilled immigrants, as they are in place for example in the U.S. of America, and currently much discussed in Europe, should therefore be more likely to prevent a run down of welfare state provisions. We believe it intuitively appealing that in societies which prefer spending on public goods to spending on social transfers, immigration should enhance total public spending, while the opposite should be true in societies which prefer public spending on transfers.

Of course, immigration itself might change relative preferences for public goods and transfers. This is also consistent with the observation that the U.S., which are relatively ethnically diverse, seem to choose to distribute fewer resources in public goods and fewer resources in total than the more homogeneous European societies. A reversal of redistribution policies in Europe could be brought about if immigration increases to a point at which it reduces spending preferences for public goods in European societies sufficiently for the fiscal effect of immigration to become negative.

While our empirical illustration does not establish a causal relationship, and we are not aware of data that would allow such inference, we consider our results to be innovative evidence for the association between immigration and public spending, and the possible existence of an effect of immigration on spending preferences. As more data will become available, rigorous testing of the hypothesized relations will be possible.
References


### Tables

**Table 1: Fixed-effects panel regression of total public spending.**

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of spending on transfers</td>
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</tr>
<tr>
<td>Low-skilled immigration</td>
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<td>[0.39]</td>
</tr>
<tr>
<td>High-skilled immigration</td>
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<td>[1.63]</td>
</tr>
<tr>
<td>Constant</td>
<td>55.364</td>
<td>[14.55]</td>
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</table>

*Note: N=235.*

**Table 2: Summary statistics of estimating sample, N=235.**

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<th>S.D.</th>
<th>Within-country S.D.</th>
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<tr>
<td>Total public spending (% of GDP), g</td>
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<td>8.79</td>
<td>3.17</td>
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<tr>
<td>Public spending on transfers (% total public spending), σ</td>
<td>39.94</td>
<td>9.18</td>
<td>2.64</td>
</tr>
<tr>
<td>Low-skilled Immigrants (% total population)</td>
<td>3.47</td>
<td>3.75</td>
<td>1.19</td>
</tr>
<tr>
<td>High-skilled Immigrants (% total population)</td>
<td>1.62</td>
<td>2.33</td>
<td>0.34</td>
</tr>
<tr>
<td>GDP/capita (in 1,000 constant 1995 US dollars)</td>
<td>27.92</td>
<td>8.47</td>
<td>2.51</td>
</tr>
<tr>
<td>Age dependency rate</td>
<td>50.05</td>
<td>3.57</td>
<td>1.39</td>
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<tr>
<td>Unemployment rate (OECD definition)</td>
<td>7.14</td>
<td>3.08</td>
<td>1.94</td>
</tr>
<tr>
<td>Openness (% of GDP)</td>
<td>68.91</td>
<td>34.64</td>
<td>9.39</td>
</tr>
<tr>
<td>Top quintile income share (relative to the income share received by the three middle quintiles)*</td>
<td>0.76</td>
<td>0.13</td>
<td>0.07</td>
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</table>

*Note: * Includes 171 interpolated values.
Table 3: Estimation results for public spending and the share of spending on social transfers (seemingly unrelated regressions).

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
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<th>Model 2</th>
<th></th>
<th>Model 3</th>
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<th>Model 4</th>
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<th>Model 5</th>
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<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
<td>t-stat</td>
<td>Coefficient</td>
<td>t-stat</td>
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<tr>
<td>Low-skilled immigrants</td>
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<td>-0.457</td>
<td>-0.363</td>
<td>-0.538</td>
<td>-0.413</td>
<td>-0.550</td>
<td>-0.431</td>
<td>-0.373</td>
<td>-0.321</td>
<td>-0.616</td>
<td>-0.347</td>
<td>-0.535</td>
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<td></td>
<td>[2.24]</td>
<td>[3.705]</td>
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<td>[3.374]</td>
<td>[4.222]</td>
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Note: All models control for country and year fixed-effects. Model 4 uses a different definition of spending on transfers (public social expenditure, as per cent of GDP) than the other models (spending on cash transfers, in per cent of total public spending). Sample sizes differ because of missing observations: Models
2, 3 and 5 have one observation less than Model 1 for Austria, Belgium, Denmark, Finland, France, Germany, Norway, Sweden, Switzerland, the United Kingdom and two less than Ireland and Portugal. Model 4 has two observations less than Model 1 for Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Norway, Portugal, Sweden, Switzerland, the United Kingdom and one less for the Netherlands and the USA. Model 6 as Model 3, but with an country-specific time trend.

* Includes interpolated values.
Table 4: Estimation results for public spending and the share of spending on social transfers (seemingly unrelated regressions)—different specifications.

<table>
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<th>Model 3d</th>
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<td>[3.523]</td>
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<td>[2.008]</td>
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<tr>
<td>Coefficient</td>
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<td>Low-skilled immigrants, t-1</td>
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*Note: All regressions control for the same set of explanatory variables as Model 3 in Table 3.*
Appendix: Variable description and source.

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Source</th>
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<tbody>
<tr>
<td><strong>Fiscal policy</strong></td>
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<tr>
<td><strong>Immigration</strong></td>
<td></td>
</tr>
<tr>
<td>High-skilled immigrants Number of foreign-born or foreign of working age with tertiary education (in percent of total population).</td>
<td>See above.</td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
</tr>
<tr>
<td>Age dependency rate Dependents to working age population.</td>
<td>World Bank (2004), World Development Indicators.</td>
</tr>
<tr>
<td>Openness Sum of merchandise exports and imports (in percent of GDP).</td>
<td>World Bank (2004), World Development Indicators.</td>
</tr>
<tr>
<td>Top quintile income share The ratio of total income received by the 20% of the population with the highest income (top quintile) to that received by the three middle quintiles.</td>
<td>Deininger and Squire (1996), updated version. UNU/WIDER (2004) World Income Inequality Database, Version 2.0 beta. World Bank (2004), World Development Indicators.</td>
</tr>
</tbody>
</table>