Chapter 5: Intratemporal Social Insurance: The Interaction Between
Migration and the Size of the Welfare State

Introduction

The preceding chapter analyzed the attitude of the native-born towards migration. We examined the effects of migration on the aggregate income of the native-born people and its distribution among them. The scope of the welfare state itself was not the focus of analysis as the tax-transfer parameters were assumed exogenous (though, of course, constrained by the government budget constraint).

In this chapter we examine how the redistribution policy is determined in a political economy equilibrium. We then address in this setup the following issues: Does migration necessarily tilt the political power balance in favor of heavier taxation and more intensive redistribution? Relatedly, how does migration affect income inequality among the native-born? This chapter provides an analytical framework in which these issues are studied. The next chapter provides an empirical framework and evidence.

The extent of taxation and redistribution policy in our analytical framework is determined by a direct democracy voting. The political economy equilibrium is then determined by a balance between those who gain and those who lose from a more extensive tax-transfer policy. The model captures two conflicting effects of migration on taxation and redistribution. On the one hand, the low-skill, low-income migrants who are net beneficiaries from the tax-transfer system will join forces with the native-born low-income voters in favor of higher taxes and transfers. On the other hand, redistribution becomes more costly to the
native-born population, as the migrants share some of the benefits at their expense. In this chapter we elaborate on how the aforementioned balance is shaped in the presence of migration.

**Redistribution Policy in a Direct Democracy**

We continue to employ the basic intratemporal model of an economy with migration and redistribution which is described in the preceding chapter with two modifications. As explained in the preceding chapter, the tax-transfer policy is not distortionary in the absence of migration. With no migration, there is also no “leakage” of tax revenues to migrants (through the demogrant) and, as a result, there need not be an interior solution for the equilibrium tax rate: It may go all the way either to zero or to 100%. We therefore reinstate a positive pecuniary cost of acquiring skill which is not tax deductible; thus, \( e^* \) is now determined as in equation (3.2'):

\[
e^* = 1 - q - \frac{\gamma}{(1 - \tau)w}.
\]

(5.1)

The second modification is done for the sake of simplicity: We consider the case where migration is restricted by quotas. Formally, it means that \( m \) is exogenously given, so that equation (4.8) which specifies the equilibrium level of free migration is dropped out. It turns out that in this case of exogenous \( m \), one can analytically derive the results when
factor prices are not variable. Thus, for analytical tractability in this chapter we assume a linear production function:

\[ Y = wL + (1 + r)K, \]  

(5.2)

where the marginal productivity conditions for setting up factor prices (namely, equations (4.5)-(4.6)) were already substituted into the production function. Also, we assume that \( e \) is distributed uniformly over \([0, 1]\), so that the labor supply equation (4.4) becomes:

\[ L = e^* - \frac{1}{2}(e^*)^2 + (1 - e^* + m)q. \]  

(5.3)

Finally, the government’s budget constraint (4.7) implies that:

\[ b = \frac{\tau(wL + rK)}{1 + m}. \]  

(5.4)

For any tax rate \( \tau \), and exogenously given migration quota \( m \), equations (5.1), (5.3) and (5.4) determine \( e^*, L \) and \( b \) as functions of \( \tau \) and \( m : e^* = e^*(\tau, m), \ L = L(\tau, m) \) and \( b = b(\tau, m) \). The number of migrants \( (m) \) is exogenous, but we nevertheless write \( e^*, L \) and \( b \) as functions also of \( m \), because we wish to explore in this chapter the effect of \( m \) on these variables. Recall that consumption is a strictly decreasing function of the innate ability parameter \( (e) \) for the native-born skilled; then constant for the native-born unskilled. It is
also constant for the migrants, but at a lower level than for the native-born unskilled since the migrants do not own any capital. This function is given by:

\[
\begin{align*}
 c(e, \tau, m) &= \begin{cases} 
 (1 - \tau)w(1 - e) - \gamma + [1 + (1 - \tau)r]K + b(\tau, m) & \text{for} \ 0 \leq e < e^*(\tau, m) \\
 (1 - \tau)wq + [1 + (1 - \tau)r]K + b(\tau, m) & \text{for} \ e = e^*(\tau, m) \\
 (1 - \tau)wq + b(\tau, m) & \text{for} \ 1 + m \leq e \leq 1 + m,
\end{cases}
\end{align*}
\]

(5.5)

where for ease of exposition we artificially attribute a parameter \( e \) between 1 and \( 1 + m \) to the migrants, simply in order to indicate that their consumption is below that of native-born unskilled. For a given tax rate \( (\tau_0) \), consumption as a function of \( e \) is depicted in Figure 5.1. by the curve \( ABCDEF \) (\( m \) is suppressed).

The political economy \( \tau \) is then determined by majority voting. By twice differentiating \( c(e, \tau, m) \) with respect to \( e \) and to \( \tau \) we find that:

\[
\frac{\partial^2 c(e, \tau, m)}{\partial e \partial \tau} = \begin{cases} 
 w & \text{for} \ 0 \leq e < e^*(\tau) \\
 0 & \text{for} \ e^*(\tau) < e \leq 1 \\
 0 & \text{for} \ 1 + m = e > 1.
\end{cases}
\]

(5.6)

Thus, \( \partial^2 c / \partial e \partial \tau = 0 \). Therefore, if \( \partial c / \partial \tau > 0 \) for some \( e_o \), then \( \partial c / \partial \tau > 0 \) for all \( e \geq e_o \). Similarly, if \( \partial c / \partial \tau < 0 \) for some \( e_o \), then \( \partial c / \partial \tau < 0 \) for all \( e \leq e_o \). This implies that if an increase in the income tax rate \( (\tau) \) benefits a certain individual (because the higher tax
rate can support a higher transfer $b$), then all individuals who are less able (that is, those who have a higher innate ability parameter $e$), including the migrants, must also gain from this tax increase. Similarly, if an income tax increase hurts a certain individual (because the increased transfer does not fully compensate her for the tax hike), then it must also hurt all individuals who are more able (that is, those who have a lower innate ability parameter $e$). These considerations imply that the median voter is a pivot in determining the outcome of majority voting. That is, the political equilibrium tax rate maximizes the consumption of the median voter.

Denote the innate ability parameter of the median voter by $e_M$. Assuming that migrants are allowed to vote, then:

$$e_M(m) = \frac{(1 + m)}{2}. \quad (5.7)$$

(Recall that the size of the native-born population was normalized to one and the ability parameter is uniformly distributed.) Diagrammatically, suppose that $\tau_o$ in Figure 5.1. is a political equilibrium tax rate. Suppose further for the sake of concreteness that the median voter is skilled, that is $(1 + m)/2 < e^*(\tau_o)$. An increase of $\Delta \tau > 0$ in the tax rate must tilt the income distribution curve from $ABCDEF$ to $A'B'C'D'E'F'$, so that all individuals who are more able than the median voter lose and all the rest gain. Similarly, if the tax rate is lowered to $\tau_o - \Delta \tau$, then the income distribution curve tilts from $ABCDEF$ to $A''B''C''D''E''F''$, so that all individuals who are more able than the median voter gain and all the rest lose.
As noted, the political equilibrium $\tau$ (denoted by $\tau_0(m)$) maximizes the consumption of the median voter, that is:

$$\tau_0(m) = \arg \max_{\{\tau\}} c(e_M(m), \tau, m).$$  \hspace{1cm} (5.8)

Therefore, $\tau_0(m)$ is implicitly defined by:

$$\frac{\partial c(e_M(m), \tau, m)}{\partial \tau} \equiv B(\tau, m) = 0,$$  \hspace{1cm} (5.9)

where, by (5):^2

$$B(\tau, m) = \begin{cases} 
-w(1-m)/2 - rK + b_r(\tau, m) & \text{if } 0 < e_M(m) < e^*(\tau, m) \\
-wq - rK + b_r(\tau, m) & \text{if } e^*(\tau, m) < e_M(m) < 1 \\
-wq + b_r(\tau, m) & \text{if } e_M(m) > 1.
\end{cases}$$  \hspace{1cm} (5.10)

As a second-order condition for maximization we have:

$$\frac{\partial^2 c(e_M(m), \tau_0(m), m)}{\partial \tau^2} = B_\tau(\tau_0(m), m) \equiv 0,$$  \hspace{1cm} (5.11)

where subscripts stand for partial derivatives.

Note that the equation $B(m, \tau) = 0$ which determines the political equilibrium tax
rate \( (\tau_o(m)) \) depends, among other things, on the median income versus the average income. For instance, consider the case where the median voter is an unskilled native-born person, that is: \( e^*(\tau, m) < e_M(m) < 1 \). Since equation (5.4) implies that \( b \) is equal to \( (wL + rK)/(1 + m) \), it follows that the equation \( B(\tau, m) = 0 \) implies that:

\[
I_M = \frac{\partial(\bar{\tau}I)}{\partial \tau},
\]

where \( I_M = wq + rK \) is pre-tax median income (net of depreciation) and \( \bar{I} = (wL + rK)/(1 + m) \) is pre-tax mean income.

The Effects of Migration on Redistribution

Having described the political economy equilibrium, we now turn to the question of how this equilibrium is affected by migration.

Total differentiation of (5.9) with respect to \( m \) implies that:

\[
\frac{d\tau_o(m)}{dm} = \frac{B_m(\tau_o(m), m)}{B_r(\tau_o(m), m)}.
\]  

(5.12)

Since \( B_r > 0 \) (see (5.11), it follows that the direction of the effect of migration \( (m) \) on the equilibrium tax rate \( (\tau_o) \) is determined by the sign of \( B_m(\tau_o(m), m) \).

By differentiating equation (5.10) with respect to \( m \) and evaluating it at \( \tau = \tau_o(m) \), we conclude that:
\begin{align*}
B_m(\tau_o(m), m) &= \begin{cases}
\frac{w(q + m)}{1 + m} - \frac{rK}{1 + m} & \text{if } e_M < e^* \\
-\frac{rK}{1 + m} & \text{if } e^* < e_M < 1 \\
0 & \text{if } e_M > 1.
\end{cases}
\end{align*}

See Appendix 5.1 for the derivation of the latter equation.

As noted, if the sign of $B_m(\tau_o(m), m)$ is negative, then an increase in the number of migrants lowers the political equilibrium tax rate ($\tau_o$) and, consequently, the demogrant ($b$). Whether this is what actually happens depends on whether the median voter is skilled or unskilled. Consider first, the case where the median voter is skilled, that is, $e_M > e^*$. As can be seen from equation (5.13), the sign of $B_m$ is a priori not determined. In this case, an increase in the number of migrants can either raise or lower the political equilibrium tax rate and demogrant. Consider next the case where the median voter is a native-born unskilled individual, that is $e^* < e_M < 1$. In this case, an increase in the number of migrants unambiguously lowers the political equilibrium tax rate and demogrant. In the extreme case where the median voter is an (unskilled) migrant, an increase in the number of migrants has no effect on the tax rate and the demogrant.

The rationale for this result is as follows. It is most instructive to begin with the case where the median voter is a native-born unskilled individual (that is, $e^* < e_M < 1$). In this case, the majority of the voters are unskilled and they are certainly pro-tax. This majority has already pushed upward the tax rate to the limit (constrained by the efficiency loss of taxation). A further increase in the number of migrants who join the pro-tax group does
not change the political power balance which is already dominated by the pro-tax group. However, the median voter who is a native-born member of this group (and, in fact, all the unskilled native-born individuals) would now lose from the “last” (marginal) percentage point of the tax rate because a larger share of the revenues generated by it would “leak” to the migrants whose number has increased. (Recall that before more migrants arrived, this median voter was indifferent with respect to the marginal percentage point of the tax rate.) Therefore, the median voter and all unskilled native-born individuals support now a lower tax rate. Indeed, $B_m$ which is equal to $-rK/(1+m)$ in this case reflects the marginal increase in tax revenues that are collected from the median voters (but not the migrants who own no capital) and “leak” to the migrants. This is also why $B_m = 0$ in the case in which the median voter is an unskilled migrant (that is, $e_M > 1$) because the “leakage” element does not exist. In this case, an increase in the number of migrants does not change the political equilibrium tax rate and demogrant.

Turn now to the case where the median voter is a native-born skilled individual. The “leakage” elements, as in the case where the median voter was a native-born unskilled individual, works for lowering the tax rate when $m$ increases. However, now an increase in $m$ tilts the political power balance towards a median-voter who is less able and has a lower income; she benefits more from a tax hike than the original median voter. Thus, an increase in $m$ generates two conflicting effects on the political equilibrium tax rate. Therefore, one cannot unambiguously determine the effect of $m$ on $\tau$ and $b$.

A further insight into these conflicting effects can be gained when the second effect (that is, the shift in the political power balance) is eliminated by assuming that migrants are not entitled (or choose not) to vote. In this case (see Appendix 5.2) one can show that:
\[ B_m(\tau_o(m), m) = \begin{cases} 
\frac{w}{1+m} \left(-\frac{1}{2} + q\right) - \frac{rK}{1+m} & \text{if } e_M < e^* \\
-\frac{rK}{1+m} & \text{if } e^* < e_M < 1 \\
0 & \text{if } e_M > 1.
\end{cases} \tag{5.13'} \]

As noted before, when the median voter is either a native-born unskilled individual or an unskilled migrant, then even if the migrants were to exercise their voting rights, they do not effectively tilt the political balance power; and indeed equations (5.13) and (5.13') are identical when \( e_M > e^* \). However, when the median voter is a native-born skilled individual, it does matter whether the migrants do or do not vote. If they do not vote, then \( B_m \) is unambiguously negative (see Appendix 5.2 for the proof). When migrants do not vote, the tilting power-balance effect vanishes and only the “leakage” effect is at play and an increase in \( m \) lowers \( \tau \) and \( b \).

The effect of \( m \) on \( \tau \) and \( b \) has an interesting implication for the income distribution among the native-born. Recall that we showed that more migration leads or can lead to lower taxation and redistribution. For instance, this is always the case when migrants do not participate in the political process (namely, they do not vote), or when the median voter is an unskilled native-born individual. Then more migration which leads the native-born to vote for a lower tax rate and a lower demogrant has the unintended consequence of a greater inequality of the income distribution among the native-born.

Conclusion

This chapter addressed the issue of how migration affects the power balance between
the pro-redistribution and anti-redistribution coalitions. When low-skill migrants do not take part in the political process, then migration unambiguously lowers the extent of taxation and redistribution, thereby increasing the degree of inequality among the native-born population. For analogous reasons, if the non-voting migrants were all skilled and brought with them the same amount of wealth as each native-born individual possesses, then the political-economy equilibrium degree of redistribution increases. This is because these migrants are net contributors to the welfare state. When migrants actively participate in the political process, still migration reduces the scope of redistribution, if the median voter is a low-skill, pro-redistribution individual. However, if the median voter is a high-skill, anti-redistribution individual, then migration may tilt the political power balance in favor of more taxation and redistribution. The next chapter confronts these propositions with data from a set of typical European welfare states.
Appendix 5.1: Migrant Vote

In this appendix we prove equation (5.13).

Differentiating equation (5.10) with respect to $m$ implies that:

$$B_m(\tau, m) = \begin{cases} \frac{w}{2} + b_{rm}(\tau, m) & \text{if } e_M < e^* \\ b_{rm}(\tau, m) & \text{if } e^* < e_M < 1 \\ b_{rm}(\tau, m) & \text{if } e_M > 1. \end{cases} \quad (A5.1)$$

Using equation (5.4), we conclude that:

$$b_\tau(\tau, m) = wL + rK \frac{\tau w}{1 + m} + \frac{\tau w}{1 + m} \frac{\partial L}{\partial \tau}. \quad (A5.2)$$

Differentiating equation (5.3) with respect to $\tau$ implies that:

$$\frac{\partial L}{\partial \tau} = (1 - e^* - q) \frac{\partial e^*}{\partial \tau}, \quad (A5.3)$$

where $\frac{\partial e^*}{\partial \tau}$ is derived from equation (5.1).

Substituting equation (A5.3) into equation (A5.2) yields:

$$b_\tau(\tau, m) = \frac{wL + rK}{1 + m} - \frac{\gamma \tau (1 - e^* - q)}{(1 + m)(1 - \tau)^2}. \quad (A5.4)$$
Differentiate $b_r$ in equation (A5.4) with respect to $m$ to obtain:

\[
    b_{rm}(\tau, m) = -\frac{b_r(\tau, m)}{1+m} + \frac{wq}{1+m}, \tag{A5.5}
\]

where use is made of equation (5.3) in order to obtain $\partial L/\partial m = q$.

Since $B(\tau_o(m), m) = 0$, we conclude from equation (5.10) that:

\[
    b_r(\tau_o(m), m) = \begin{cases} 
    \frac{w(1-m)}{2} + rK & \text{if } e_M < e^* \\
    wq + rK & \text{if } e^* < e_M < 1 \\
    wq & \text{if } e_M > 1.
    \end{cases} \tag{A5.6}
\]

Substituting equation (A5.6) into equation (A5.5) yields:

\[
    b_{rm}(\tau_o(m), m) = \begin{cases} 
    \frac{w}{1+m}(-\frac{1-m}{2} + q) - \frac{rK}{1+m} & \text{if } e_m < e^* \\
    -\frac{rK}{1+m} & \text{if } e^* < e_M < 1 \\
    0 & \text{if } e_M > 1.
    \end{cases} \tag{A5.7}
\]

Finally, combining equation (A5.7) with equation (A5.1), we conclude that:
This completes the derivation of (5.13).

**Appendix 5.2: Migrants Do Not Vote**

Consider now the case where migrants are not entitled (or choose not) to vote. Then the ability index of the median voter is $e_M = \frac{1}{2}$, independently of $m$. In this case, a straightforward application of the same procedure yields:

$$B_m(\tau_o(m), m) = \begin{cases} 
\frac{w(q + m)}{1 + m} - \frac{rK}{1 + m} & \text{if } e_M < e^* \\
-\frac{rK}{1 + m} & \text{if } e^* < e_M < 1 \\
0 & \text{if } e_M > 1.
\end{cases} \tag{A5.9}$$

This completes the derivation of (5.13').

Note also that when $e_M = \frac{1}{2} < e^*$, then $q < \frac{1}{2}$ (see equation (5.1)), which implies that $B_m < 0$ in this case.