Migration With Second Best Redistribution

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This draft March 2000.

Summary. We explore the dificulties to extend the Diamond–Mirrlees compensatory mechanism to show Pareto gains from freeing migration. The main problem is that second best redistribution is a kind of congestionable local public good and a kind of second best finance for that good has to be considered.

Acknowledgements: The comments of Subir Chattopadhyay and Dragan Filipovich are gratefully acknowledged.

1 Introduction

Freeing migration, like other supply-side policies that improve production efficiency, does not in itself assure a Pareto improvement. Such reform can make some people better off (for instance, owners of firms that hire the type of labour whose wage is depressed by the inflow of immigrants), and some others worse off (like those workers competing with the immigrants for the same jobs). Thus, obtaining a Pareto gain from freeing migration requires the design of an appropriate redistribution mechanism.

Hammond and Sempere (1999) showed that obtaining Pareto gains from freeing migration in a general equilibrium model of a competitive economy, is very similar to showing Pareto gains from reforms leading to free trade. The main differences are that when migration decisions are modeled, one has to consider the non-convexities implied by this decision, and also the existence of local public goods subject to congestion.

In proving gains from either trade or migration in a first best setting, a redistribution mechanism based on lump sum transfers has to be used (in order to redistribute the efficiency gains.) This mechanism is very similar to the mechanism used by Grandmont and McFadden (1972) to show gains from trade. In either case, the transfers require the knowledge of what would have been the behavior of the individual in the absence of trade reforms, that is, what would have been the labour supply plans, consumption plans, etc., in absence of the reform. This type of mechanism uses individual information about the agents in the economy and, therefore, is not incentive compatible (see Hammond, 1979).

Diamond and Mirrlees (1971) devised a *second best* incentive compatible mechanism based on movements in commodity taxes to distribute aggregate gains from increasing production efficiency. They assumed that the government had enough tax instruments to freeze consumer prices at their pre-reform levels, that firms did not have positive profits, and that there was some positive direction of reform in commodity taxes — for example, the existence of a commodity either purchased, or sold, by every consumer. By movements in the price of this commodity they could obtain a Pareto gain. In order to achieve an equilibrium, they needed the government to buy any excess supply and to be able to dispose of it freely.

Also, in this vein Weymark (1979) shows how small tax changes on groups of commodities may suffice to generate Pareto improvements. (See also the closely related work of Dixit, 1987, and Diewert, Turunen-Red, and Woodland, 1989.) Dixit and Norman (1980 and 1986) used this argument to show Pareto gains from freeing trade without the need of lump sum compensation.

Hammond and Sempere (1995) extended those mechanisms. They assume explicitly that the government could freeze consumer prices and dividends, and use a uniform subsidy to distribute the gains, without requiring the knowledge of a favourable direction of commodity tax reform. Here we want to study whether this type of compensatory mechanism could also be used to achieve Pareto gains from freeing migration.

The difficulties in extending this compensatory mechanism to an economy with migration were first pointed out by Brecher and Choudhri (1990). They show the impossibility of obtaining Pareto gains from freeing factor trade in a small country if its government is constrained to use a location based Diamond–Mirrlees type of compensation. Also, Wildasin (1994) presents a model in which income redistribution distorts migration and results in a income distribution frontier partially dominated by the income distribution frontier without migration. (See Wildasin, 1998, and also Wellisch and Wildasin, 1996, and Myers and Papageorgiou, 2000, for closely related topics.)

Thus second best redistribution distorts the regional allocation of labour in the world under consideration. This means that the presence of subsidies in wages can attract more migrants than it is efficient. These additional migrants represent a cost for the fiscal system and the per-head cost of provision of redistribution increases whenever the proportion of those receiving net subsidies increases in the population. For certain levels and types of migration, the increase in the per-head cost of making the redistribution and the distortion in the allocation of workers in the world can make it impossible to obtain Pareto gains from freeing migration. Furthermore, we will show in our examples that migration not only may increase the fiscal cost of redistribution in the host country, but also may increase that cost in the origin country.

In the previous paragraph second best income redistribution is a kind of local public good subject to congestion. Hammond and Sempere (1999) anal-

ized the gains from migration in economies with local public goods subject to congestion. The variations in the proportion of certain types of population could change the average cost of provision of those goods. Then free migration could imply distributions of population in the world implying costs of provision of the local public goods (or reductions in the quality of these) that could exceed the efficiency gains from migration. The solution there was to set residence charges that were function of the congestion characteristics[1] of each individual and their migration plan. Those charges regulated the demographic characteristics in each region in an appropriate way. In fact, Hammond and Sempere (1999) show the existence of residence charges that made the status quo demographic distribution of population a competitive equilibrium in the free migration economy. This does not imply the absence of any migration. This only implies that exchanges of population are such that inflows of individuals of a certain type are balanced by outflows of the same type so that the demographic distribution of population remains as it was in the status quo. The fiscal revenue obtained from those charges would be world-wide redistributed so that the status quo migration plan remained feasible for each consumer.

In the examples that follow, these residence charges will actually work as Pigou taxes on migration. They will be devices to make migrants internalize the higher cost of redistribution caused by their presence in the host country and their absence in the origin country. With these taxes, migrants will bear the cost of the fiscal externality caused on the origin and host countries by the marginal migrant. We show that the internalization of the fiscal externality by migrants is enough to make Pareto gains from freeing migration feasible again. Therefore these type of taxes are the appropriate remedy for the internalization of the fiscal externalities analyzed in Brecher and Choudhri (1990) and Wildasin (1994).

We finally show an example in which governments cannot use the *first best* Pigouvian scheme and has to face all different kinds of migrants with the same taxes on migration. If those taxes are fixed so that migrants bear the average fiscal redistributive cost caused by the average marginal migrant, achieving a Pareto gain in that economy is feasible despite the distortion caused in the

[1]Congestion characteristics are those relevant for the determination of the needs for consuming certain public goods. Thus they determine the consumption (and so the level of congestion induced) of those goods

allocation of workers among countries. The only information required for obtaining a Pareto gain is aggregate information regarding prices, wages and profits, and also whether a person is a migrant or not. This does not need the knowledge of the type of migrant, as would be required by the system of residence charges in the first best analysis in Hammond and Sempere (1999).

The paper is organized as follows: Section 2 presents an example where Pareto gains from freeing migration are possible with lump sum redistribution. Section 3 shows the impossibility for obtaining Pareto gains in the same example when Diamond–Mirrlees redistribution is used. Section 4 shows how a system of Pigouvian taxes on migration can make, together with the Diamond–Mirrlees scheme, Pareto gains feasible again. Section 5 analyzes the same issue but with more than one type of migrant when non-discriminatory taxation of migrants has to be used. Section 6 concludes the paper with some final remarks.

2 A simple example with Pareto gains from migration with lump sum transfers

Given that we are going to focus our discussion on the problems in using the Diamond-Mirrlees compensatory mechanism, we are going to present a simple example (based on Wildasin, 1994) in which the only issue is the redistribution of the efficiency gains from freeing migration. This means, for instance, that the non–convexities caused by migration, discussed in Hammond and Sempere (1999), will not appear and nor will the feature of general local public goods subject to congestion.

Assume that there are two regions, 1 and 2. In each region there is a status quo population of mobile workers P_1 and P_2, respectively. We assume that each worker supplies inelastically a unit of labour. Let $P_1 + P_2 = P$ be the world population. We assume that $P_1 < P_2$ so region 2 is more populated than 1 in the status quo. We also assume the absence of any kind of migration costs. Once migration is liberalized, population in each region will be denoted by l_1 and l_2 respectively.

There is a single firm in each region producing an homogeneous commodity using labour as the only input. We assume that both regions share

the same technology. For simplicity, we assume that each regional firm is owned by the status quo set of workers in its region but they cannot physically transport their part of the firm with them if they migrate. However, they would receive their share of the profits (net of taxes) wherever they live. We also assume that the number of shares in a regional firm owned by each worker is not the same for all its owners.[2] We assume that the technology is represented by the production function $f(l) = 2l^{\frac{1}{2}}$.

We assume perfect competition so that wages equal marginal productivity of labour. Our assumption on the population sizes in the status quo implies that

$$\bar{w}_1 = f'(P_1) = P_1^{-\frac{1}{2}} > P_2^{-\frac{1}{2}} = f'(P_2) = \bar{w}_2.$$

Thus, if we free migration, region 1 will receive an inflow of immigrants from region 2. This inflow will stop when wages are equalized between regions. Given the structure of our model, this inflow will stop when both regions have the same number of workers. Thus $(P_2 - P_1)/2$ workers will migrate from region 2 to region 1. The new equilibrium is an efficient allocation in which marginal productivity of labour is equalized among regions.

Given that increasing the size of the labour force will decrease wages in region 1, status quo workers in region 1 have losses equal to

$$\bar{w}_1 - w_1 = P_1^{-\frac{1}{2}} - (\frac{(P_2 + P_1)}{2})^{-\frac{1}{2}}.$$

That is, the difference between status quo wages and market wages with free migration.

However, as owners, they gain because

$$2(\frac{(P_2 + P_1)}{2})^{\frac{1}{2}} - (\frac{(P_2 + P_1)}{2})(\frac{(P_2 + P_1)}{2})^{-\frac{1}{2}} > 2P_1^{\frac{1}{2}} - P_1 P_1^{-\frac{1}{2}}.$$

Where the sum of the left hand side of the inequality represents profits (production less wages paid) with free migration and the sum of the right hand side terms represents profits in the status quo.

[2] Assuming that all status quo workers in each region own the same number of shares of the regional firm would eliminate the problem of redistribution within regions.

This is equivalent to

$$(\frac{(P_2 + P_1)}{2})^{\frac{1}{2}} > P_1^{\frac{1}{2}}$$

So, given that $(P_2 + P_1)/2 > P_1$, profits are larger after the reform than in the status quo.

It can be shown that the gains in profits are larger than the amount of losses in wages $P_1(\bar{w}_1 - w_1)$ for the status quo workers in region 1. There would be a Pareto gain in region 1 if all its status quo workers owned the same share of the firm. However, if they own different proportions of the firm, and we look for a Pareto gain a system of lump sum transfers would be required to redistribute the gains from migration. This system must tax workers with larger shares in the regional firm, and subsidize workers with no shares or few enough shares as the increase in their dividends is not enough to compensate the decrease in their wage income.

In region 2 the situation would be opposite as wages would increase and profits decrease. By symmetry with the situation in region 1, the wage increase would not be enough to compensate the decrease in profits. However, it is easy to show that the gains in region 1 are large enough to compensate the losses in region 2. The intuition is that the free migration equilibrium is first best optimal, and without any distortion, the Pareto frontier with free migration must dominate the Pareto frontier without free migration.

Achieving the Pareto gain would require knowledge of the shares of the firms owned by each worker. Feasibility of the lump sum transfers system would also require interregional transfers from region 1 to region 2. This transfers can take two forms. The first is pure intergovernmental transfers that make feasible the compensation of losers in region 2 by the government in that region. The second is the possibility that region 2 can tax all its status quo inhabitants, independently of where are they working in the new equilibrium. This could make region 2 gain from freeing migration by sharing with all its actual inhabitants the gains in wages obtained by its migrants.

In this simple economy this is the only information that the government has to have in order to design the transfers needed to achieve a Pareto gain. In a more complex model (see Hammond and Sempere, 1999) however, a detailed knowledge of the status quo labour supply, and consumption plans would be required. Attempting to obtain this information by asking directly

the agents about such plans would clearly generate incentives to manipulate this mechanism to increase the transfers received. This makes the type of lump sum redistribution that is used in this section unfeasible in practice.

3 Equilibrium with Diamond-Mirrlees compensation

This section analyzes the possibility of using a mechanism based on taxes on prices and on profits. Clearly, this is informationally less demanding than the mechanism used in the last section because it uses only aggregate information about the economy instead of individual information.

We now assume that the government in region 1 subsidizes free migration wages received by workers so that they remain as in the status quo. Also assume that profits (dividends) in escess to the status quo level are taxed away in that region. Assume, to start with, that government 2 does not do so. Then the equilibrium migration condition is

$$\bar{w_1} = P_1^{-\frac{1}{2}} = (P_2 - n)^{-\frac{1}{2}} = w_2$$

The equilibrium level of migration is in this case $n = P_2 - P_1$. It is twice the first best level of migration. The population living and working in region 1 is $P_1 + P_2 - P_1 = P_2$. The difference between this and the first best level of migration is the fiscally induced migration. The total subsidy in wages amounts to

$$P_2(P_1^{-\frac{1}{2}} - P_2^{-\frac{1}{2}})$$

That is, the unit subsidy in wages times the workers receiving it. The increase in profits due to migration (that would be taxed away and used to subsidize wages and a uniform subsidy) is

$$2(P_2)^{\frac{1}{2}} - P_2(P_2)^{-\frac{1}{2}} - (2P_1^{\frac{1}{2}} - P_1 P_1^{-\frac{1}{2}})$$

Where the sum of the first two terms are profits (production less wages paid) in the free migration equilibrium, and the sum of the last two are profits in the status quo. Notice that the firm in region 1 is paying the market wage

(when there are P_2 workers) whereas workers receive subsidized wages. The previous expression can be rewritten as

$$P_2^{\frac{1}{2}} - P_1^{\frac{1}{2}}$$

Thus the net revenue of the public sector is

$$P_2^{\frac{1}{2}} - P_1^{\frac{1}{2}} - (P_2(P_1)^{-\frac{1}{2}} - P_2^{\frac{1}{2}})$$

It is straightforward to show that it is negative. The subsidy in wages grows more than the increase in profits because of the fiscally induced migration. This coincides with the results obtained in Wildasin (1994) (in fact this is an example of Wildasin's model) and with the results of Brecher and Choudhri (1990) for a small country. With a similar argument it could be shown that it is not feasible for region 2 to freeze wages at status quo levels (and so obtain a positive revenue out of commodity taxation as market wages rise in that region) and profits (in this case, by using the positive revenue in commodity taxation to subsidize the negative profits), and give a positive uniform subsidy.

If both regions freeze wages at their status quo levels the result is even worse. Given that, independently of migration, the difference in wages will persist (and given that there are no migration costs) all mobile workers will try to move to region 1. All production will inefficiently be made in region 1 and the production level in region 2 will equal zero. With no other policy action, there is an impossibility of obtaining Pareto gains with our redistribution mechanism. In a more complex model migration costs and specific locational preferences would set a bound to the migration flow. However unless migration costs are high enough to prevent any migration at all, the problems caused by fiscally induced migration would persist.

4 A Pigou tax on the fiscal externality

It seems that this fiscally induced migration imposes a negative externality on each region that prevents the realization of gains from free migration. Our interpretation will be that second best redistribution of the gains from

migration is a congestionable local public good. This means that the existence of this public good is something that inhabitants take into account, and that increasing the proportion of the inhabitants receiving the subsidy can increase the per-head cost of provision. This increase can be large enough to transform the gains from migration into losses.

Hammond and Sempere (1999) analized the gains from migration in economies with local public goods subject to congestion. The solution there was to set residence charges function of the congestion characteristics of each individual and their migration plan. The fiscal revenue obtained from those charges was also world-wide redistributed so that the status quo migration plan was always feasible for each consumer.

In our example, the only relevant congestion characteristic is to perceive subsidized wages. Assume that each regional government is setting a residence charge on that characteristic, and assuring that all those wishing to stay in their status quo locations can afford that. The procedure to follow would consist on charging a tax on all actual workers in a given region and paying back this tax to those that were in that region in the status quo. Obviously, this would be equivalent to a system of taxes on migrants who are the ones that are not refunded their taxes. Thus, in the remainder of the paper we will refer to them as migration taxes. Those could be interpreted as the Pigouvian solution to the fiscal externality that appeared in the previous section.

The taxes on migration that would correct for the fiscal externality in region 1 are trivially those that charge all migrants the fiscal externality caused by the marginal migrant. That is, the subsidy on the wage of the marginal migrant, $t_1 = \bar{w}_1 - (P_1 + n)^{-\frac{1}{2}}$. To start with, we assume that only country 1 sets corrective taxes. Then, the equilibrium migration condition is

$$\bar{w}_1 - t_1 = \bar{w}_2$$

Substitution of t_1 gives

$$(P_1 + n)^{-\frac{1}{2}} = \bar{w}_2$$

Which implies that migrants to region 1 are financing the fiscal externality caused by them. However there are still too many migrants with respect to the optimal allocation. This is because the redistributive policy of region 2 is distorting the migration decision. Notice that the migration equilibrium

condition means that regions are simply exchanging population but migrants are contributing to finance the compensatory policies in region 1. In this inefficient allocation the fiscal cost of freezing wages in region 1 is

$$P_1(\bar{w}_1 - w_1) = P_1 P_2^{-\frac{1}{2}} - P_1^{\frac{1}{2}}$$

and the fiscal revenue from freezing profits is

$$P_2^{\frac{1}{2}} - P_1^{\frac{1}{2}}$$

It is easy to show that the balance is positive.

In the absence of further policy measures, the government in region 2 obtains a positive revenue out of freezing wages

$$P_1(w_2 - \bar{w}_2) = P_1^{\frac{1}{2}} - P_1 P_2^{-\frac{1}{2}}$$

and a negative revenue from freezing profits

$$P_1^{\frac{1}{2}} - P_2^{\frac{1}{2}}.$$

It is easy to show that the balance is negative. Furthermore, in our simple and symmetric model (and given that the compensatory policy implies that regions only exchange populations) the fiscal surplus in region 1 just equals the deficit of region 2. A system of interregional lump sum transfers would make the status quo allocation feasible for both regions. In fact, it would suffice if migrants wages could be taxed by their original region. Then this taxation would make that the status quo allocation is still feasible in region 2. However, strict Pareto gains are not feasible.

To achieve a Pareto gain additional policy measures have to be taken. The required policy has to compensate for the excessive migration that the redistributive policy in region 2 causes. This is equivalent to a tax on migrants charging them for the fiscal externality in region 2. The tax amounts to the contribution to the tax on wages in region 2 by a marginal non-migrant, $t_2 = (P_2 - n)^{-\frac{1}{2}} - \bar{w}_2$. Then the migration equilibrium condition is

$$\bar{w}_1 - t_1 - t_2 = \bar{w}_2$$

or equivalently

$$(P_1 + n)^{-\frac{1}{2}} = (P_2 - n)^{-\frac{1}{2}}$$

which implies an efficient distribution of population.

5 The more than one type case

In the simple economy with just one type of worker of the previous sections, achieving an efficient allocation of population is simple and amounts to establishing a system of taxation by nationality. We are indirectly excluding migrants from the subsidy in wages in region 1 and making them participate in the tax on wages in region 2. There are no problems of incentive compatibility other than the possible ilegal migration that could be induced if the taxes on migrants in both regions are high enough. This solution could be based on the conclusions of Brecher and Choudhri (1990) that Pareto gains are possible with a nationality based Diamond–Mirrlees compensatory mechanism. In fact, in this model in which labour supply is fixed for each worker, the Diamond–Mirrlees conpensatory mechanism (with the taxes on migration) works exactly as a system of non-distortionary lump sum transfers. In fact, the only possible distortion was the one on the migration decision and this is corrected by the tax system.

In a more sophisticated model where the fiscal externality depends on the type of migrant that we are considering, differential taxation of migration would be needed to fully internalize the fiscal externality. The contribution of this section is to analyze whether aggregate information about wages and profits (necessary to implement the Diamond–Mirrlees compensatory mechanism), and information about who are the migrants, suffices to achieve a Pareto gain from freeing migration.

If the relevant characteristics are not easily observed, incentive constraints would force to use non-discriminatory taxation of migrants. Then migration decisions will be distorted and different kind of inefficiencies will appear. However, in the following example we will show that despite of this additional inefficiency, a Pareto gain could be achieved.

Consider now a slightly more complicated example where there are two types of mobile workers in each region, 1 and 2. For simplicity of notation we assume that there are the same number of workers of each type in each region. As before P_i will denote the number of workers of each type in region i, for $i = 1, 2$. We assume that $P_2 > P_1$ so region 2 has more workers of each type than region 1. As before, this will determine the direction of the migration flows. Assume also that each worker will supply inelasticaly a unit of labour. The production function in region 2 will be very similar to the

one before

$$f(l^1, l^2) = 2(l^1)^{\frac{1}{2}} + 2(l^2)^{\frac{1}{2}}$$

so both labour types obtain the same wage. Assume instead that the production function in region 1 has the form

$$f(l^1, l^2) = 2(2l^1)^{\frac{1}{2}} + 2(l^2)^{\frac{1}{2}}$$

so labour of type 1 is twice as productive as labour of type 2 in region 1. This could happen because of differences in infrastruture between the regions.

In the status quo allocation, wages are larger in region 1 than in region 2 for both types of labour. If there is the possibility of free migration, then the migration equilibrium condition without public intervention implies

$$(\frac{P_1 + n_1}{2})^{-\frac{1}{2}} = (P_2 - n_1)^{-\frac{1}{2}}$$

for type 1. And

$$(P_1 + n_2)^{-\frac{1}{2}} = (P_2 - n_2)^{-\frac{1}{2}}$$

for type 2. Solving this equations implies that $n_1 > n_2$ so there is more migration of type 1 workers. As before, this is an efficient allocation and we could show Pareto gains from freeing migration if appropriate lump sum transfers were available.

Assume now that government 1 wants to use a Diamond–Mirrlees kind of redistribution mechanism together with corrective migration taxes, as those discussed in section 4, but cannot distinguish among the types of worker, so that it charges the same tax for all of them. Also assume that the tax charges the fiscal externality caused by the average marginal migrant so

$$t = \frac{n_1(\bar{w}_1 - (\frac{P_1+n_1}{2})^{-\frac{1}{2}}) + n_2(\bar{w}_1 - (P_1 + n_2)^{-\frac{1}{2}}}{n_1 + n_2}$$

This, together with the migration equilibrium conditions

$$(\frac{P_1 + n_1}{2})^{-\frac{1}{2}} - t = (P_2 - n_1)^{-\frac{1}{2}}$$

and

$$(P_1 + n_2)^{-\frac{1}{2}} - t = (P_2 - n_2)^{-\frac{1}{2}}$$

determine the new equilibrium.

The first observation one makes is that the presence of the same tax for both types induces too much migration of type 2 and too little of type 1 with respect to the efficient allocation. Therefore the new allocation is not efficient. However, notice that all migrants are financing the tax externality caused by them (and in average they are obtaining the wages they would without public intervention.) Therefore, following straightforwardly the argument in section 4, in the new equilibrium all the status quo workers in region 1 have their wages frozen at the status quo level, and profits plus immigration taxes are at least enough to finance the necessary subsidy in wages. This implies that the first region is obtaining a Pareto gain from freeing migration. This is possible without nationality based Diamond–Mirrlees compensation. A similar argument as in section 4 could be used to analyze the case of region 2.

6 Final remarks

We have presented a simple example in which Pareto gains from freeing migration are possible when governments can use lump sum taxation. When this type of non-distortionary taxation is not feasible, a Diamond–Mirrlees compensatory mechanism based on freezing wages and dividends could be used. However, without other policy measures, this type of mechanism distorts migration flows, and the distortion can be such that the gains from migration turn out to be losses because of the resulting increase in the fiscal cost of implementing the compensatory policies.

Efficient allocation of workers among regions requires a kind of Pigou taxes on migration that make migrants internalize the fiscal externalities. These type of taxes are, in fact, equivalent to a system of nationality based Diamond–Mirrlees compensatory mechanism. However, apart from information about prices and profits, its feasibility requires the knowledge of the type of migrant. This could be unfeasible in practice because of incentive constraints.

If governments cannot use migration taxes that discriminate for different types of migrants, the required policy consists of single tax on all migrants that makes, on average, bear migrants the cost of the fiscal externality caused

by them. This does not lead to an efficient allocation of labour among regions. However, Pareto gains from freeing migration flows are possible in our example if a Diamond–Mirrlees compensatory mechanism, complemented with this tax, is used to redistribute the aggregate efficiency gains.

The only distortions that appear in our example are those on migration decisions. A more general model in which commodity and wage taxes distort consumption and labour supply, and with migration decisions properly modelled should be the object of future research.

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