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ABSTRACT

When Migrants Overstay Their Legal Welcome: A Proposed Solution to the Guest-Worker Program*

A number of developed countries have implemented guest-worker programs in recent decades. Its basic feature is the temporary presence of the foreign guest-workers. The problem with such programs is that there is little to prevent these guest-workers from entering the illegal job market and overstay their legal welcome, which is the reason why these programs became unpopular over time. This paper argues that a well-designed guest-worker program could be acceptable to host countries and could be beneficial for all parties concerned. It presents a host country immigration policy that tries to achieve these objectives by raising the likelihood that guest-workers return to their home country when the permissible time period elapses, and that reduces the number of immigrants entering the country illegally. The policy has three components and is based on legal responsibility by the guest-workers, new insurance markets, and cooperation with the sending country or countries.

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When Migrants Overstay their Legal Welcome:
A Proposed Solution to the Guest-worker Program

1. Introduction

A number of developed countries have implemented guest-worker programs in recent decades. A basic feature of these programs is the temporary presence of the foreign guest-workers. The idea underlying these programs is to obtain a permanent increase in the labor force by rotating guest-workers, thereby avoiding an increase in the number of permanent residents in the host countries.[1]

This issue is also relevant in the case of trade in services because one mode of supply--Mode IV--is through the temporary cross-border movement of service suppliers. Negotiations on Mode IV have been undertaken in the WTO as part of the talks on services (GATS). Issues related to Mode IV have been examined, among others, by Walmsley and Winters (2002), Winters et al. (2002, 2003) and by a number of authors in Mattoo and Carzaniga (2003) and in Hoekman, Mattoo and English (2002). The papers co-authored by Winters find very large gains from Mode IV liberalization.[2]

Guest-workers' contracts entail a basic condition that they are to return to their home country once the period stipulated in their contract has elapsed. As is well known, the problem with guest-worker programs is that this condition is very hard to enforce. Once guest-workers have entered the host country legally, there is little to prevent them from entering the illegal job market and overstay their legal welcome.

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[1] Another reason for such a program is to restrict the employment of migrant workers to certain sectors or occupations, which is not possible to do with permanent migrants.

[2] For instance, referring to the US labor market and the shortage of workers in the service industries, an article in the September 5, 2004 *Washington Post* states that "Employers are unable to find enough nurses, engineers, information technology workers, auto mechanics or machinists to fill positions available."

Guest-worker programs are less prevalent today, in part because many guest-workers did not return to their home country at the end of the permissible period.[3] In the case of Germany, Ruhs (2004) reports that " … the extension of unemployment benefits was a major reason why so many of the laid-off *Gastarbeiter* remained in Germany after recruitment was officially stopped in 1973."

Various proposals related to guest-worker programs are the subject of ongoing debates. These discussions include proposals for a new guest-worker program for Mexican farm labor in the US, for a radical reform of Germany's policies for both temporary and permanent migration, and debates about admitting high-tech foreign workers in many high-income countries (Ruhs and Chang, 2004).

Though less prevalent than in the past, guest-worker programs that are suitably reformed in order to make them more attractive to host countries can play an important role as part of a sustainable migration strategy in the future. This paper examines several reforms designed to achieve this objective.

The problem of illegality is likely to be more prevalent for people at the lower end of the skills distribution, including in agriculture, construction, hospitality industry and domestic services. Individuals at the higher end of the skills distribution are likely to have fewer opportunities in the illegal job market—i.e., they are likely to have to take a larger cut in income—and to have a better chance to extend their legal stay or become permanent residents.

Economic migrants who live in a host country illegally are there either because they entered the country illegally or because they came in legally as temporary guest-

[3] Moreover, migrants have recently been entering the EU-15 more for humanitarian reasons (e.g., asylum, co-ethnic return migration and family unification) than for economic reasons, especially in the Northern and North-Western member countries (Holzmann and Munz).

workers or as non-working visa holders (such as student or tourists) and stayed in the host country after their contract elapsed or visa expired. The large number of illegal migrants has resulted in social and political tensions and has changed attitudes towards immigration in a number of host countries. Surveys in these countries indicate that attitudes toward migrants have worsened over time and support for reducing migrant flows has increased.[4] Resolving the problem of overstaying guest-workers might be viewed as one element in a policy designed to help improve attitudes towards immigrants.[5]

Source countries also benefit from guest-worker programs (see Section 2 for details) and have an interest in their continuation. However, the larger the share of guest-workers who overstay their welcome, the greater the likelihood that these programs will be terminated or curtailed. Consequently, source countries also have an interest in resolving the problem of overstaying guest-workers.

In a number of countries, the government or the employer take part of the guest-workers' income and return it with interest if the guest-workers leave at the end of the contract period. Otherwise, guest-workers forfeit the income that was taken. This is done in Taiwan by companies recruiting foreign workers. Similar programs also exist in the UK for migrants from the Baltics who work on three-month contracts in the hotel industry and whose salary is deposited in their home bank accounts, and in the US where the same takes place with Jamaican workers. It also took place in the past with the

[4] Note also that before 1973, immigration was associated with labor shortages and the need for foreign workers. With a decline in growth rates and increased unemployment in the post-1973 era, immigration has become associated with social problems and a burden on the welfare system.

[5] Regarding the UK, Black (2004) states: "For those who oppose immigration, temporary worker schemes represent a way in which permanent immigration is opened through the back door, since those who arrive temporarily often find ways to stay longer." Thus, policies that succeed in resolving the problem of overstaying temporary workers should help diffuse one of the arguments of those opposed to immigration.

Bracero Program where US employers were required to withhold 10 percent of Mexican workers' earnings and to deposit them in a Mexican fund and payable to these workers upon their return to Mexico.

Some countries—including Greece and Israel—have obliged employers to buy a bond from the authorities which they forfeit if their guest-worker employees overstay the permissible time period and do not return to their home country at the end of the work contract (Epstein, Hillman and Weiss, 1999). Singapore has a similar program but with many restrictions on who can be admitted, and with strong penalties—including imprisonment and other punishment in addition to fines—for overstaying guest-workers and for their employers.

Where penalties are severe and enforcement is serious, such as in Singapore, preventing guest workers from becoming illegal may be possible. The question is whether liberal democracies need such draconian and illiberal policy measures to make a guest-worker program work. The answer this paper provides is no. It shows that in Western democracies where such penalties are unacceptable and where controls on guest-workers' switch to illegality are weaker, policy measures can be used to affect guest-workers' incentives and make it in their interest not to become illegal.[6]

One problem with having employers buy a bond from the authorities is that they have no means to enforce the policy and force guest-workers to return home at the end of the contract. Thus, employers are penalized if guest-workers become illegal even though

[6] We do consider fines on guest-workers who become illegal. Given that once they become illegal, guest-workers are harder to find, the instrument used to fine such guest-workers—and which is described earlier--is to take part of their income during their legal contract period and return (not return) it if they leave (become illegal) at the end of that period.

they have little or no influence on the guest-workers' decision of whether to become illegal or return home.[7]

This paper presents a host country immigration policy designed, first, to raise the likelihood that guest-workers respect the terms of their contract and return to their home country when the permissible time period elapses, and second, to reduce the number of migrants entering the country illegally. The policy has three components and is based on legal responsibility by the guest-workers, new insurance markets, and cooperation with the sending country or countries.

The paper is organized as follows. Section 2 describes the policy and its underlying logic. Section 3 provides the model. Implications of the model are provided in Section 4. Section 5 examines the issue of circular migration and Section 6 concludes.

2. The Policy

As mentioned in Section 1, some countries have obliged employers to buy a bond from the authorities which they forfeit if their guest-worker employee does not return to his/her home country at the end of the work contract, an issue examined in Epstein et al. (1999). However, employers have no means to enforce such a policy. One component of the policy proposed here is to provide a partial enforcement mechanism.

In the US, individuals who have to post bail in order to avoid incarceration while awaiting their trial can appeal to a bondsman or agency who will put up the bail money

[7] Pritchett (2004) suggests a number of measures to enhance the development impact of international migration of unskilled labor, including penalties on sending countries and host country employers for temporary workers who overstay. However, as mentioned above, it is not clear why employers of legal temporary workers should be penalized if they have no control over the latter's decisions. The penalty might be imposed on employers of illegal workers, but the reality is that such a policy has typically failed, in part because these employers (in agriculture, construction, hospitality industries and domestic services) represent powerful interest groups. This paper suggests a penalty on employers of legal temporary workers if the latter overstay but with an additional measure to make it effective (see Sections 2 and 3).

for a fee. If they do not show up for trial, the agency will try to apprehend them in order to recover the bail money.

Citizens of a host country are expected to obey the law and may be punished if they don't. The same should apply to guest-workers. They sign a legal work contract before entering the country, thereby agreeing to the conditions stipulated in the contract, and they should be held legally responsible if they violate the terms of the contract.

The way this would work is as follows. The authorities would oblige the employer to buy a bond. An agency (e.g., an insurance company) would provide an insurance service to the employer by buying the bond and charging an insurance premium or fee. If the guest-worker returns home at the end of the period stipulated in the contract, the agency redeems the bond, with interest. If the guest-worker becomes illegal, the agency will try to apprehend him/her in order to recover the bond's money. The agency forfeits the bond's money if the illegal migrant is not found. The authorities would accredit such agencies, contingent on their compliance with certain norms and rules of conduct, including those related to the way illegal guest-workers can be apprehended.

Such a private insurance policy is likely to be feasible for guest-workers because their identity (including their name, age, nationality, looks, (previous) address, family members in source and/or host country, etc.) is known. It is unlikely to succeed for migrants who entered the host country illegally given that their identity (or even their existence) is generally not known, which is why they are also referred to as "undocumented."[8] [9]

[8] In fact, the number or share of illegal immigrants deported by developed host countries is negligible. This is due to the fact that a number of industries (see footnote 7) benefit from their presence, and because deporting them in large numbers may be unacceptable for a democracy. According to US Homeland Security Undersecretary Hutchinson, it is unrealistic to believe that the authorities will reduce the number

Two issues related to this policy should be noted. First, the policy may be unappealing to some. However, the policy should be compared *not* with the alternative of not having the policy because it is likely that the guest-worker program will not take place in that case or will not last. The policy should be compared to the alternative of potential guest-workers remaining in their home country, where their situation is likely to be worse. The guest-workers always have the choice of behaving legally and returning to their home country at the end of the permissible period.

The second issue is why the apprehension function should be carried out by the private sector rather than by some public authority. The are several possible reasons for that. First, private agencies, which are subject to market forces, are likely to be more efficient than the public sector. For instance, the public agency in the US that would be most likely to be tasked with carrying out such a function is the Immigration and Naturalization Service (INS), which is notoriously inefficient.

Second, allowing bonds to be traded will improve the system's efficiency. For instance, a private firm that obtains information on an illegal guest-worker whose bond it does not hold could take advantage of that information and buy the bond from the firm that holds it. Also, as is the case in the US, a bail-bond agency might sell the bond to an agency with a comparative advantage in the apprehension function. Apprehension would be much more uncertain if the government were in charge of it (the goverment would have little or no incentive to catch overstayers and would probably have more important

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of illegal immigrants and that the public has the will to uproot them (Washington Times, September 10, 2004). And the number of US employers of illegal immigrants who were fined declined between 1992 and 2002 from 1063 to 13 or by about 99% (Time Magazine, September 20, 2004).

[9] Some countries (e.g., France) have subsidized the return of immigrants to their home country. This policy has had little impact on most migrants' decision to return, and it is not examined here.

crimes to deal with), thereby forcing the bond agencies to charge a higher fee and reducing the number of beneficial transactions or possibly eliminating them altogether.

Third, the government may not want to be perceived as "big brother" and may prefer the function to be carried out in a more decentralized and less visible way. Fourth, the issue is likely to be more political if a public agency is involved, and pressure groups that benefit from the illegal job market (see footnote 5) may hamper the implementation of the policy. This is less likely if the policy is carried out by private firms, both because of the reduced visibility and because these firms may help counter the pressure groups benefiting from the illegal job market.

Finally, some governments may want to reduce their activity in the area of domestic security. For instance, the management of prisons has been partially privatized in some countries (e.g., the US and the UK), and the same approach or philosophy might apply to the apprehension of illegal guest-workers.

The fact that a private agency will try to apprehend the illegal guest-worker, and has a positive probability of success, reduces the expected net present value of becoming illegal. However, as long as the net present value is positive, the guest-worker will gain from becoming illegal until he/she is caught.

Thus, in order to increase its effectiveness, we add a second component to the policy, whereby the government takes a share of the guest-worker's income and returns it with interest if the guest-worker returns home when the permissible time period elapses. Otherwise, the guest-worker forfeits the income share taken by the government.[10]

[10] Winters et al. (2002, p. 53) argue that deferring part of workers' wages would make it more likely that they would only stay temporarily in the host countries and would raise these countries' acceptance of liberalizing unskilled worker migration in the context of trade in services (Mode IV).

As described in Section 1, such mandatory savings schemes do exist, e.g., by companies recruiting foreign workers in Taiwan. They also exists in the UK for migrants from the Baltics who work on three-month contracts in the hotel industry; they receive board and lodging and the rest of their salary is paid in their home bank account in local currency (Black, 2004).

Note that guest-workers usually pay social security and are typically not reimbursed, whether they return home at the end of the permissible period or not. Reimbursing guest-workers for social security payments if they return home at the end of the permissible period—as suggested by some US politicians—would reduce the likelihood that he/she became illegal. Note however that the amount reimbursed is unlikely to be optimal.

Note also that this instrument may not be effective by itself. For instance, assume the difference between the wage rate in the illegal job market and that in the home country is large, and the formal contract's length is small relative to the time the guest-worker can work in the illegal market. In that case, the present value of the benefit of working in the illegal job market is likely to be greater than the loss of income earned as a guest-worker, even if the government were to take the guest-worker's entire income away. If so, this component of the policy cannot by itself stop the guest-worker from joining the illegal job market.

Thus, neither the first nor the second component of the proposed policy would be effective in preventing the guest-worker from joining the illegal job market. Implementing both components would increase the policy's effectiveness.

Some countries have obliged employers to buy a bond when employing a guest-worker while others have opted for taking part of a guest-worker's wage (with either one being refunded if the guest-worker leaves at the end of the permissible period). Martin (2003, p. 28) claims that no country has used both components, namely the purchase of a bond by the employer and the mandatory savings scheme for the guest-worker. The policy described here recommends the use of both components, with the involvement of bond agencies to increase the effectiveness of the first component, as well as the use of a third component described below.

Illegal immigrants—whether they enter the country illegally or enter legally as guest-workers and become illegal—generate a social cost for the host country.[11] [12] The source country benefits from having guest-workers migrate to the host country because of the remittances they send back home, because their experience as guest-workers is likely to make them more productive, because the program may help reduce unemployment in the source country, and because the experience of a better institutional environment is likely to make guest-workers better citizens when they return.[13]

Thus, the host country should be able to convince the source country to cooperate in controlling the flow of illegal migrants entering the host country.[14] The reason is the

[11] Gibney (2000) claims that in the UK, an island with quite effective border controls, the illegal worker population is dominated by guest-workers who became illegal rather than by immigrants who came in illegally.

[12] The social cost of immigration for the host society is examined in Schiff (2002) and in Manole and Schiff (2004) in models of migration, trade and social capital.

[13] Another advantage of guest-worker programs is that they are likely to generate more remittances per migrant than permanent immigration programs.

[14] Some source countries may be eager for cooperation on migration, as in the case of President Vicente Fox of Mexico who expressed a strong interest in cooperation with the Bush administration on the rights of Mexican immigrants in the US and on the control of illegal immigration, though it all came to naught—at least temporarily--after September 11, 2001.

implicit threat that the guest-worker program may be curtailed if the sending country refuses to cooperate. Given the past performance with illegal immigration to major host countries, cooperation between source and host countries is likely to be indispensable in order to control the influx of illegal immigrants. This cooperation is the third component of the policy.[15] [16]

Rather than threatening to curtail the guest-worker program, host countries might offer to expand it in exchange for source country cooperation on illegal migration. This is apparently the case of Italy and Spain who in the 1990s developed guest-worker programs in part to elicit cooperation in reducing illegal migration from countries like Albania and Morocco (Martin, 2003). This view is shared by the International Organization for Migration (IOM, 2004, p. 11) which notes that "… bilateral labour agreements can act as an incentive for labour-sending countries to assume more responsibility to counter irregular migration." [17]

[15] A fourth dimension (to be examined in the future) might be for the host country to help to reinsert the guest-worker in the home country job market and to convince the home country to cooperate in that matter. For instance, the IOM operates an assisted return program in the UK (Black, 2004). There is also anecdotal evidence that South African nurses who have worked in the UK cannot go back to their old positions (or better ones, given their UK experience) when they return. A program to help reinsert the nurses in their home country job market would raise the incentive for them to return home, though it might not help in those countries where conditions are extremely unfavorable.

[16] Such cooperation may be accompanied by the provision of technical assistance. For instance, the EU has established the ENEAS program, with funding of some 200 million euros, to provide Mediterranean developing (source) countries with additional means to control illegal migration to the EU. This issue is not examined here.

[17] One issue is that employers might prefer hiring illegal workers than legal guest-workers. This might be resolved by imposing sanctions on those employers who hire illegal workers. However, this has not worked well in practice. On the other hand, the market for legal and illegal workers might be segmented, with large corporations using legal workers (because the risk of being caught and damaging their reputation and goodwill is likely to be more costly than the savings from hiring illegal workers), and smaller companies or employers (e.g., in the service industry such as restaurants, employers of domestic help, etc.) hiring illegal workers.

Given that existing migrants who entered illegally are hard to find and expel,[18] an additional possibility might be for the host country's government to commit to the legalization of existing illegal migrants if the source country accepts to cooperate in the control of future illegal immigration, assuming the source country sees existing illegal migrants as its continuing responsibility. Such legalization might be gradual and might be made contingent on effective cooperation by the sending country for a reasonable period of time. This would add another incentive for the source country to cooperate, and is a topic for future study.

A few implications of such a policy can already be derived.

- First, the share of guest-workers becoming illegal is likely to fall.
- Second, the longer the guest-worker contract, the smaller the likelihood that the guest-worker will become illegal because the longer contract implies a larger amount of money taken by the government as well as a shorter work period in the illegal job market.
- Third, the likelihood of a guest-worker becoming illegal falls with his/her age because of the shorter expected work period in the illegal market.
- Fourth, the likelihood of a guest-worker becoming illegal is lower if not accompanied by his/her family because this raises the benefit of returning home and also makes it harder to go into hiding.
- Finally, the policy should lower the number of migrants who enter the country illegally.

[18] They are hard to expel because a number of industries (see footnote 5) benefit from their presence, and because deporting them in large numbers may be unacceptable for a democracy.

3. The Model

As mentioned in Section 2, there are three components to the guest-worker policy:

i) the employer of the guest-worker must purchase a government bond, with an agency posting money for the bond and charging a fee. If the guest-worker returns home at the end of the permissible period, the agency is reimbursed for the bond, with interest accumulated during the duration of the contract. If the guest-worker becomes illegal, the agency is reimbursed for the bond when it apprehends the guest-worker, with interest accumulated until that time, or the bond is forfeited if the guest-worker is not found;

ii) the government takes part of the guest-worker's income and returns it with interest when the contract period is over if the guest-worker leaves at that time; otherwise, the government keeps the money; and

iii) the host country's government cooperates with its counterpart in the sending country in order to control the inflow of illegal migrants.

The guest-worker decides whether to return home at the end of the permissible period or become illegal, taking as given the probability of being apprehended, the income share taken by the government, and the wage differential between the illegal job market in the host country and the home country job market. Given the behavior of the guest-worker, the agency posting the bond for the employer maximizes profits from its activity by charging a fee for its services, taking as given the value of the bond and the technology for apprehending the guest-worker who became illegal. Finally, taking the guest-worker and the agency's behavior into account, the government decides on the

share of income taken from the guest-worker, the value of the bond, and the number of guest-workers, in order to maximize welfare. [19]

To simplify the analysis, risk-neutrality is assumed throughout. This assumption seems reasonable for the bond agency, especially if it is part of a large (insurance) company and its return is uncorrelated with those of the company's other activities. Risk aversion for the guest-worker might be more realistic but is unlikely to change the qualitative results.

3.1. The guest-worker's problem

Assume guest-workers live and work for two periods. Their contract is for one period and they are paid a wage rate W. At the end of the first period, guest-workers decide whether to return to their home country or work in the illegal job market during the second period. The illegal job market pays a second-period wage rate of W^I, which guest-workers who enter the illegal job market earn (unless they are apprehended). The income gain from becoming illegal is $X = W^I - W^S$, where W^S is the second-period wage rate in the guest-worker's home country.

With $W > W^I$, a question is why employers would be interested in hiring guest-workers rather than illegal ones.[20] Illegal workers are more likely to be found in smaller

[19] For purpose of tractability, the length of the guest-worker contract is set at 1 period. In reality, the length of that contract would also be a policy variable. A general specification with a guest-worker contract of L periods and illegal work of T-L periods was examined, with the government determining the optimal contract length L. However, no explicit solutions were obtained for the policy variables. The same problem occurred with a three-period model where the government decides the optimal length of the guest-worker contract (one or two periods).

[20] The contract's wage rate is assumed to be higher than the wage rate in the illegal job market (even though, as shown in Section 3.2, guest-workers may have to pay a fee) because employers of illegal workers do not have to comply with minimum wage laws (given that illegal workers have no legal protection against such practice), do not have to pay health insurance or social security, and may lose the worker if apprehended. The latter may be costly to employers if there is a replacement cost and/or if they

businesses, such as restaurants and other small-scale services (including house cleaning) because these businesses have little reputation to lose. On the other hand, large companies or corporations are less likely to employ illegal workers because their reputation—which has often been built over many years—is likely to suffer if found out, which may be prohibitively costly. Moreover, at least in the US, the authorities often go after large companies when looking for illegal workers for demonstration effects. Thus, we assume that there are two separable labor markets, one of large companies that only hire legal workers and one of small businesses hiring illegal workers.

For simplicity, assume $r = \rho = 0$, where ρ is the guest-worker's subjective discount rate. The ex-ante probability (at the end of period 1) of being caught in the second period is $p > 0$. The guest-worker's expected benefit EB of becoming illegal at the end of the first period is $EB = (1 - p)X$. At the end of period 1, the guest-worker knows EB but does not know the ex-post probability of apprehension, i.e., whether the ex-post realization is $p = 1$ or $p = 0$.

The cost of becoming illegal is the sum of two components: (i) the cost CG of forfeiting the share α of the income W earned by the guest-worker and which has been taken by the government, and (ii) the second-period psychic cost v of not living at home (and of being on the run from the law). Thus, the cost is $CG + v = \alpha W + v$.

The guest-worker returns home (becomes illegal) if $EB <$ (>) $CG + v$. Assume guest-workers i ($i = 1, \ldots, N$) differ according to the cost v_i of living away from home,

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are penalized for their illegal activity. For instance, Rivera-Batiz (1999) finds that male (female) Mexican legal immigrants in the US earn 41.8% (40.8%) more than undocumented workers, and that the difference in characteristics explains less than half of that wage gap. He also finds that undocumented immigrants who were legalized after the 1986 US immigration policy reform showed rapid wage growth in 1986-90, with the gains due mostly to the change in legal status and not to changes in migrant characteristics over time. Note that in their analysis, Epstein et al. (1999) assume $W < W^1$.

with those with $v_i < v_\Psi$ becoming illegal and those with $v_i > v_\Psi$ returning home, and where v_Ψ is the solution of $EB = CG + v_\Psi$, or

$$(1 - p)X = \alpha W + v_\Psi . \qquad (1)$$

The cumulative density function is $F(v_i)$. Thus, a share $F(v_\Psi)$ becomes illegal at the end of the permissible period and a share $1 - F(v_\Psi)$ returns home. v_i is not observable, though $F(v_i)$ is known. For simplicity, assume that the density function $f(v_i)$ is uniform, with $f(v_i) = 1/v_0, \forall\ v_i$, and where v_0 is the highest psychic cost. Without loss of generality, set $v_0 = 1$, i.e., $f(v_i) = 1$. Then, $F(v_i) = v_i$ and $F(v_\Psi) = v_\Psi$. Thus, a share v_Ψ becomes illegal and a share $1 - v_\Psi$ returns home at the end of period 1.[21]

3.2. The bond agency's problem

The government charges the guest-worker's employer an amount B in exchange for a bond which the employer redeems (with interest) if the guest-worker returns home and forfeits if the guest-worker joins the host country's illegal job market. Assume the government allows insurance or bond agencies to assume the risk by buying the bond for a fee. This section determines the value of that fee and the apprehension probability.

The apprehension technology of the bond agency is

$$p = p(c) = c^\phi,\ \phi < 1,\ p \le 1, p' > 0,\ p'' < 0, \qquad (2')$$

[21] We assume that the optimal value of α is such that $(1 - \alpha)W > (1 - p)W^I$. Otherwise, it would be worth moving to the illegal job market as soon as possible because the expected income would be higher there than the net income as a legal guest-worker. In other words, if $(1 - \alpha)W < (1 - p)W^I$, the policy would result in accelerating the guest-worker's move to the illegal job market rather than in reducing the share of guest-workers moving to the illegal job market.

where c (p) is the agency's expenditure on (probability of) apprehension of a guest-worker.

For the agency, the (present) value--at the start of period 1 when the agency buys the bond--of the expected benefit of apprehending an illegal guest-worker in period 2 is B. The expected (present) value C of the apprehension cost per illegal worker is the sum of two components. The first component C_1 is the expenditure c spent on apprehension of guest-workers who become illegal (and zero expenditure for those who return home at the end of the permissible time period). The second component C_2 is the expected cost associated with the probability (1 - p) that the illegal guest-worker is never apprehended. Thus, $C_1 = v_\Psi c$, $C_2 = v_\Psi (1 - p)B$, and the total cost $C = v_\Psi [c + (1 - p)B]$. From equation (2'):

$$C = v_\Psi [c + (1 - c^\phi)B]. \qquad (3')$$

Changes in c affect p, which affect v_Ψ. Thus, an increase in the apprehension expenditure c has two effects: it raises the probability p of apprehension, and it reduces the share of guest-workers v_Ψ who become illegal.

Assume free entry and competition in the bond agency industry. This implies cost C minimization and zero profits. Cost minimization with respect to c, i.e., $\partial C / \partial c = 0$, determines the optimal values of c*, p* and C*.[22] Zero profits means that bond agencies

[22] In a multi-period model, as long as the illegal guest-worker has not been apprehended, c* increases over time (after apprehension, c* = 0). This result makes sense. As periods go by without apprehension, fewer periods are left to recover the bond, i.e., the remaining periods become scarcer and thus more valuable, so that it is optimal for the bond agency to increase c*. The proof is available from the author upon request. Note that c* is a function of the bond's value B, which is taken as given by the agency.

charge *C** as a fee to guest-worker employers. The employers in turn charge *C** to guest-workers by taking it out of their salary.[23] [24]

From (3'), the optimal expenditure *c** is the solution to the equality $\partial C / \partial c = \partial\{v_\Psi [c + (1 - c^\phi)B]\} / \partial c = 0$. From this derivative we obtain, after some manipulations, the following equality: $Xc^\phi - Xc^{2\phi-1} + B(v_\psi + X)c^{\phi-1} - v_\psi = 0.$

Note that explicit solutions can only be obtained for polynomials of degree four or less. The only polynomial that can be derived from the equation above is a quadratic one for $\phi = .5$.[25]

Thus, equation (2') becomes

$$p = p(c) = c^{.5},\ p \le 1, \text{ with } p' > 0 \text{ and } p'' < 0, \tag{2}$$

and equation (3') becomes

$$C = v_\Psi [c + (1 - c^{.5})B]. \tag{3}$$

The solution to $\partial C / \partial c = 0$, taking equation (1) into account, is

$$c^* = \frac{1}{X}\left[\left(\frac{X}{2} + v_\psi\right) - \sqrt{\left(\frac{X}{2} + v_\psi\right)^2 - BX\left(X + v_\psi\right)}\right], \tag{4}$$

[23] The government could also oblige the guest-worker to buy the bond. However, the guest-worker may not have the resources to pay the fee to the bond agency upfront and may not have access to credit. Thus, the employer pays the fee and takes it out of the guest-worker's wages.

[24] We assume that $W - v_i > W_s$, $\forall\ v_i$, with W defined net of C*. This implies that the guest-worker quota set by the host country is always filled, a plausible assumption. (Assuming $W - v_i < W_s$ for people with high values of v_i would imply that they would not be interested in becoming guest-workers).

[25] With $\phi = .5$, $Xc^\phi - Xc^{2\phi-1} + B(v_\psi + X)c^{\phi-1} - v_\psi = Xc^{.5} + B(v_\psi + X)c^{-.5} - (v_\psi + X) = 0$, i.e., $X(c^{.5})^2 + B(v_\psi + X) - (v_\psi + X)c^{.5} = 0$, which is a quadratic equation in $c^{.5}$.

with p^* and C^* obtained by substituting c^* in equations (2) and (3), respectively.[26] [27] C^* is the fee the bond agency charges the guest-workers' employers who pass it on to the guest-workers.

Note that c^*, C^* and p^* are all a function of B and we still need to solve for B^*. Solving for B^*, as well as for N^* and α^*, is done in the next section.

3.3. The government's problem

In order to maximize welfare, the host country's government needs to determine three policy variables, namely, the value B of the bond that employers must purchase, the share α of the guest-worker's income it takes away, and the number N of guest-workers.[28]

The total number I of illegal workers—including both illegal entrants (*IE*) and guest-workers who become illegal—is assumed to generate social tensions which are represented by the social cost $S(I)$, $S' > 0$, $S'' > 0$, expressed in monetary terms. The value of $S(I)$ in period 1 is denoted by $S_1(I_1)$ and in period 2 by $S_2(I_2)$.

Assume that legal entry as guest-workers is a (partial) substitute for illegal entry. In other words, an increase in the guest-workers' quota N results in a reduction in the number of illegal entrants, with the latter equal to $a - bN \geq 0$, and $b \geq 0$.[29]

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[26] A necessary and sufficient condition for C^* to be a minimum at c^* is: $B > p[1 - \frac{v_\psi + X}{v_\psi + X(1+p)}]$.

[27] The other real solution for c^* does not provide a minimum for C^*. We ignore the virtual solutions for c^*.

[28] An alternative view of immigration policy is provided by Ruhs and Chang (2004) who argue that it should also include the interests of migrants and sending countries.

[29] One might expect that $b < 1$, i.e., that a one-unit increase in N would reduce *IE* by less than one unit. However, given that guest-workers are better paid that illegal entrants, they are likely to send more

Assume further that, given the benefits of the guest-worker program for the source country, it agrees to cooperate in controlling illegal entry into the host country, with the number of illegal entrants being $IE = \beta^*(a - bN) \geq 0$, $0 < \beta \leq 1$. The degree of cooperation increases as β falls and is nil for $\beta = 1$.

Finally, assume that the degree of cooperation rises with the size N of the guest-worker program, with $\beta = 1 - \beta_1 N \geq 0$. This implies that the degree of cooperation falls to zero ($\beta = 1$) when the size N of the guest-worker program falls to zero. Thus,

$$IE = \beta^*(a - bN) = (1 - \beta_1 N)(a - bN). \quad (5)$$

The number of illegal workers in period 1 is equal to $I_1 = IE_1 = \beta^*(a - bN)$ since no guest-worker has an incentive to become illegal in that period. Since the guest-worker program only takes place in period 1 (with $N = 0$ in period 2), the source country has no incentive to cooperate in controlling illegal entry in period 2, i.e., $\beta = 1$ in period 2, and the number of illegal entrants in period 2 is $IE = a$. The number of guest-workers who decide to enter the illegal job market in period 2 *and who are not caught* is $v_\psi N(1 - p)$. Thus, the total number of illegal workers in period 2 is $I_2 = a + v_\psi N(1 - p)$. Consequently, the social cost in periods 1 and 2 (in monetary equivalent) is:

$$S_1 = S_1[\beta(a - bN)],\ S_2 = S_2[a + v_\psi N(1 - p)]. \quad (6)$$

Second, illegal employers benefit from the employment of illegal migrants because they have monopsony power and pay illegal employees--whether they immigrated illegally or entered as guest-workers and became illegal--less than the value of their marginal product *VMP*, with the per-worker benefit equal to $g = VMP - W^I$. The

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remittances home, which may lower the number of illegal entrants. In other words, *IE* could decrease by more than one unit.

benefit *BI* to employers of illegal guest-workers over the two periods is $BI = g * \{\beta(a - bN) + [a + v_{\psi} N(1 - p)]\}$.

Society is likely to value *BI* less than employers of illegal workers do, because illegal labor market activities weaken the legal system, because these benefits may help finance other illicit activities, because exploitation of workers--even if illegal--goes against society's values, or a combination of these. Assume that the per-worker value of the benefit *g* has a value to society of λg, $\lambda < 1$. Then, society's benefit is:

$$SBI = \lambda g * \{\beta(a - bN) + [a + v_{\psi} N(1 - p)]\}. \quad (7)$$

In a number of countries, guest-workers are paid less than native workers. Assume that guest-worker employers earn in period 1 a rent *R* per-guest-worker which is equal to the wage difference between a native worker and a guest-worker (over and above the annual fee charged to the guest-workers). Thus, the legal employers' benefit *BL* from the guest-worker program is

$$BL = R*N. \quad (8)$$

Finally, the government benefits from keeping part of the guest-workers' income αW from those who became illegal, and benefits from the bonds *B* that are not reimbursed because a proportion (1 - *p*) of the guest-workers who became illegal are never caught. So, government benefits *GB* are

$$GB = v_{\psi} N[\alpha W + B(1 - p)]. \quad (9)$$

Thus, the net social cost *SC* is:[30]

[30] The calculation of *SC* assumes that the guest-worker's contract wage *W* and the illegal wage W^I are exogenously given parameters. If changes in *N*, the number of guest-workers, affects *W* or W^I, then the welfare effects should be included in the calculation of *SC*.

$$SC = S_1 + S_2 - SBI - BL - GB = S_1\left[\beta(a-bN)\right] + S_2\left[a + v_\psi N(1-p)\right] \\ -\lambda g^*\left[\beta(a-bN) + \left(a + v_\psi N(1-p)\right)\right] - R^* N - v_\psi N\left[\alpha W + B(1-p)\right]. \quad (10)$$

The government chooses α, B and N in order to minimize SC. The solution to $\partial SC/\partial\alpha = 0$, $\partial SC/\partial B = 0$, $\partial SC/\partial N = 0$ is:

$$N^* = \frac{v_\psi^2 + S_1'(a\beta_1 + b) + R}{2b\beta_1\left(S_1' - \lambda g\right)}; \quad N^* > 0 \Rightarrow S_1' - \lambda g > 0, \quad (11)$$

$$B^* = \frac{S_2' - \lambda g - \dfrac{X}{\left(v_\psi + X\right)^{1/2}}}{1 + (1-p)\dfrac{X}{2}\left(v_\psi + X\right)^{-1}}; \; B^* \geq 0 \Rightarrow S_2' - \lambda g > 0, \quad (12)$$

and

$$\alpha^* = \frac{1-p}{W}\left[S_2' - \lambda g + v_\psi - B^*\right] = \frac{1-p}{W}\left[S_2' - \lambda g + v_\psi - \frac{S_2' - \lambda g - \dfrac{X}{\left(v_\psi + X\right)^{1/2}}}{1 + (1-p)\dfrac{X}{2}\left(v_\psi + X\right)^{-1}}\right]. \quad (13)$$

The values of N^*, B^* and α^* which are obtained by setting $\partial SC/\partial\alpha = \partial SC/\partial B = \partial SC/\partial N = 0$ provide a *local* minimum. The fact that SC is smaller with the policy rather than in its absence (derivation not shown) implies that the solution also provides a *global* minimum.[31]

4. Comparative Statics

This section derives several implications from the analysis provided in Section 3. We first present the results (see points i)-v) below), and the interpretation of the results is provided next. Equations (11)-(13) imply the following results:

[31] We have abstracted here from the cost of publicly provided social services by the migrants, from externalities they may cause (e.g., congestion), and from beneficial complementarities.

i) $\frac{\partial N^*}{\partial W} = \frac{\partial B^*}{\partial W} = 0, \frac{\partial \alpha^*}{\partial W} < 0$;

ii) $\frac{\partial N^*}{\partial R} > 0, \frac{\partial B^*}{\partial R} = \frac{\partial \alpha^*}{\partial R} = 0$ (the same results apply to changes in *a*);

iii) $\frac{\partial N^*}{\partial \beta_1} < 0, \frac{\partial B^*}{\partial \beta_1} = \frac{\partial \alpha^*}{\partial \beta_1} = 0$ (the same results apply to changes in *b*);

iv) $\frac{\partial N^*}{\partial \lambda g} > 0, \frac{\partial B^*}{\partial \lambda g} < 0, \frac{\partial \alpha^*}{\partial \lambda g} < 0$; and

v) $\frac{\partial N^*}{\partial X} = 0, \frac{\partial B^*}{\partial X} > 0, \frac{\partial \alpha^*}{\partial X} > 0$.

These results are depicted in Figures 1 - 5.[32] We now interpret the results provided above. An increase in the guest-worker wage rate *W* has no impact on the guest-worker's decision as to whether to become illegal at the end of the contract period or not. Thus, it has no impact on *B**, nor does it have an impact on the amount of money taken from the guest-worker by the government, i.e., $(\alpha^*)W$ remains unchanged and α^* (see equation 13). *N** does not change either because the increase in *W* has no impact on the rent *R* per guest-worker obtained by their employers. That *N** does not change assumes that the native workers' wage rate rises by the same amount as that of the guest-workers, so that the rent *R* remains unchanged. If the rent *R* fell as *W* increased, *N** would fall.

An increase in the wage gap *R* between natives and guest-workers raises the guest-workers' attractiveness to the host country and leads to an increase in *N**. On the

[32] The results provided in this section assume internal solutions. There might be constraints on the values of *B* and α set by the government or society. For instance, there is a maximum level B_{MAX} over which bond agencies are unlikely to provide insurance. And the host society's values may require a minimum standard of living for legal guest-workers (possibly the minimum wage) and which determines a maximum value for α denoted by α_{MAX}. Then, if the solutions are B_{MAX} and/or α_{MAX}, some of the results derived above will not hold.

other hand, it has no impact on guest-worker's decision (as to whether to become illegal at the end of the contract period or not) and has thus no impact on B^* or α^*.

The same results hold for an increase in a [in $IE = \beta(a - bN)$], which raises the number of illegal entrants. From equation (10), the increase in a has a marginal cost $\beta S_1' + S_2'$ and a marginal benefit $\lambda g(\beta + 1)$. N^* rises (falls) in order to lower (raise) IE if the *net* marginal cost $(\beta S_1' + S_2') - \lambda g(\beta + 1) = \beta(S_1' - \lambda g) + (S_2' - \lambda g)$ is positive (negative). From equations (12) and (13), $S_1' - \lambda g > 0, S_2' - \lambda g > 0$, so that the net marginal cost is positive and N^* increases. Second, an increase in a has no impact on B^* or α^* because it does not affect guest-workers' decisions.

An increase in β_1 (an increase in the degree of cooperation by the source country in reducing illegal entry to the host country, i.e. a reduction in $\beta = 1 - \beta_1$) lowers N^* (same argument as above). The increase in β_1 has no impact on guest-workers' decisions, so that B^* and α^* remain unchanged. The same results hold for an increase in b [in $IE = \beta(a - bN)$]. Note that changes in a and b have opposite effects.

An increase in λg (an increase in profits g per illegal worker, or a decrease in society's dislike λ for such profits) makes the total amount of illegal workers over the two periods $\beta(a - bN) + (a + v_\psi N(1 - p))$ more attractive (see equation 10) and raises the demand for them. What is the impact on N^*? An increase in N^* has two opposite effects: it reduces illegal entrants $\beta(a - bN)$ but raises the number of guest-workers $v_\psi N(1 - p)$ who become illegal. It can easily be shown that, at its optimum value, the second effect of N^* is larger than the first one (in absolute value), so that N^* increases. And since illegal workers are more attractive, α^* and B^* fall.

Finally, an increase in $X = W^I - W_S$, the difference between the wage rate in the illegal job market in the host country and the wage rate in the source country, raises the share v_ψ of guest-workers who overstay and become illegal ($v_\psi = X(1-p) - \alpha W$, so that $\partial v_\psi / \partial X = 1 - p > 0$), resulting in an increase in α^* and B^*. The increase in v_ψ has no impact on the value of guest-workers for the host country so that N^* remains unchanged (unless the increase in X is due to an increase in W^I and that the latter lowers the benefit g per illegal worker, in which case N^* would fall).

5. Circular Migration

Circular migration implies that guest-workers can return to the host country as guest-workers in the future as long as they return to their home country at the end of the permissible period. Assume that guest-workers can return to the host country only once in the future. The first two periods we have examined so far are denoted 'first era' and the two periods in the future are denoted 'second era.' We have four periods now, two in each era. Assume the 'second era' starts j periods after the 'first era.' Given that $r = \rho = 0$, guest-workers do not care what the value of j is. Thus, j is not a policy variable in this case and we do not need to solve for it.

Assume that the source country's willingness to cooperate $\beta = 1 - \beta_1 N$, whether the guest-worker program of size N occurs in the present or in future. Note that if N is the number of guest-workers in the first period of the first era, with $v_\psi^1 N$ becoming illegal in the second period of the first era, then the number of guest-workers admitted in the second era is $(1 - v_\psi^1)N$. The social cost function SC is:

$$
\begin{aligned}
SC &= S_1\left[\beta(a-bN)\right]+S_2\left[\beta\left(a+v_\psi^1 N(1-p^1)\right)\right] \\
&+S_3\left[\beta\left(a-b(1-v_\psi^1)N\right)\right]+S_4\left[a+v_\psi^2(1-v_\psi^1)N(1-p^2)\right] \\
&-\lambda g\left[a+3\beta a-\beta bN(2-v_\psi^1)+N\left(v_\psi^1(1-p^1)+v_\psi^2(1-v_\psi^1)(1-p^2)\right)\right] \\
&-RN(2-v_\psi^1)-v_\psi^1 N\left[\alpha^1 W+B^1\left(1-p^1\right)\right]-v_\psi^2 N(1-v_\psi^1)\left[\alpha^2 W+B^2\left(1-p^2\right)\right]
\end{aligned}
\tag{14}
$$

where subscripts refer to the four periods and superscripts refer to the two eras.

The fact that becoming illegal in the first era has an additional cost in the second era reduces the incentive to stay illegally in the host country in the first era, i.e., v_ψ^1 falls. This raises the value of having guest-workers and raises N*, and it lowers the values of α^1* and B^1*. In the second era, the solution is the same as the one derived from equation (10), with N being replaced by $N\left(1-v_\psi^1\right)$.

6. Conclusion

Guest-worker programs are not as popular as they once were. This paper presents a policy proposal designed to make guest-worker programs more attractive for host countries, so that they would be willing to pursue such programs, and so that the programs would result in "win-win-win" outcomes for host countries, source countries and guest-workers.

Specifically, the policy proposal provided in this paper is designed to reduce the share of guest-workers who become illegal as well as the share of migrants who enter the host country illegally. There are three components to the proposal:

i) the employer of the guest-worker must purchase a government bond, with an agency posting the money for the bond. If the guest-worker returns home at the end of the permissible period, the agency is reimbursed for the bond, with

interest accumulated during the duration of the contract. If the guest-worker becomes illegal, either the agency is reimbursed for the bond when it apprehends the guest-worker, with interest accumulated until that time, or the bond is forfeited if the guest-worker is not found;

ii) the government takes part of the guest-worker's income and returns it with interest when the contract period is over if the guest-worker leaves at that time; otherwise, the government keeps the money; and

iii) the host country's government cooperates with its counterpart in the sending country in order to control the inflow of illegal migrants.

The host country government has to determine the value of the bond B that the guest-worker's employer must buy, the share α of the guest-worker's income that it takes, and the number N of guest-workers allowed, in order to maximize its objective function. The paper derives the optimal values of these three policy variables, as well as the impact on these optimal values of parametric changes in the exogenous variables.

The analysis can be extended in several ways. First, because the analysis is essentially static, cooperation by the source country in controlling illegal immigration only occurs in the first period, and this may not be very appealing. A useful extension would be to introduce some dynamics in the analysis. An overlapping generations model, whereby each generation lives two periods and is followed by the next cohort with a one-period lag, should provide a more realistic and richer description of the phenomenon.

Second, guest-workers might obtain firm-specific human capital which might make them attractive for re-employment by the same firm. It is also possible that guest-

worker circulation might help firms in outsourcing industries remain in the host countries.[33]

Third, guest-workers could be employed by a source-country firm which provided services to host-country companies (Mode IV), with the host-country authorities only allowing source-country firms to sell their services if *all* their employees behave legally. The latter element would provide an incentive for each employee and for the firm's management to ensure that all guest-workers leave at the end of their contract.

Fourth, complying guest-workers might be given priority in their application to become long-term immigrants, with the possible option of applying to becoming citizens. Giving priority for student visas to the children of complying guest-workers might also be an option.

Fifth, host-country governments might cooperate with source countries in providing some kind of job placement facilities for returning guest-workers or with some assistance in starting as self-employed.

[33] However, this need not be desirable in the case of import-competing firms that benefit from protection.

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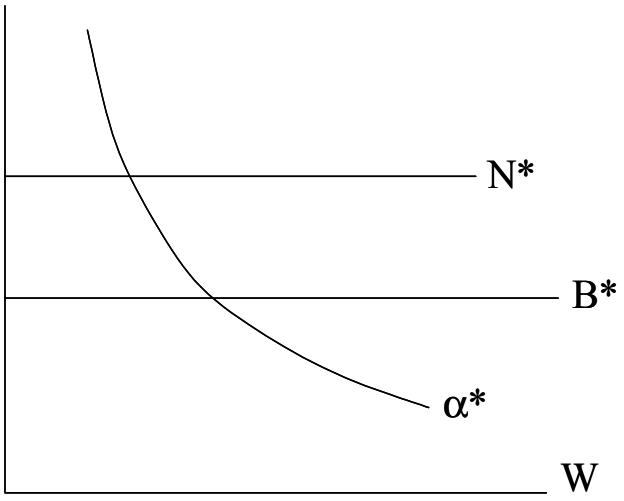

Fig. 1

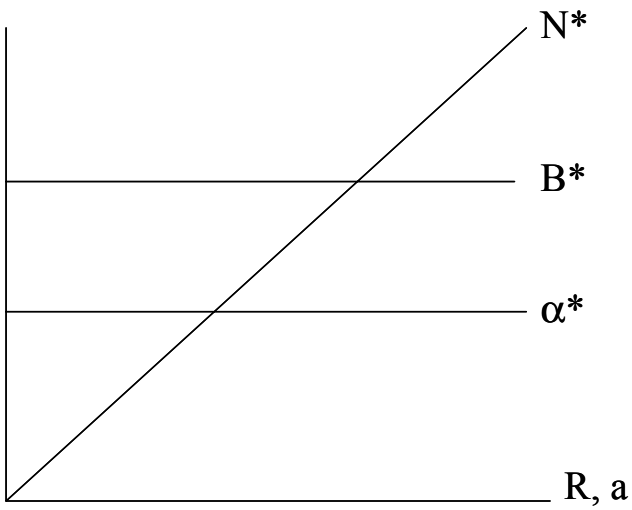

Fig. 2, 3

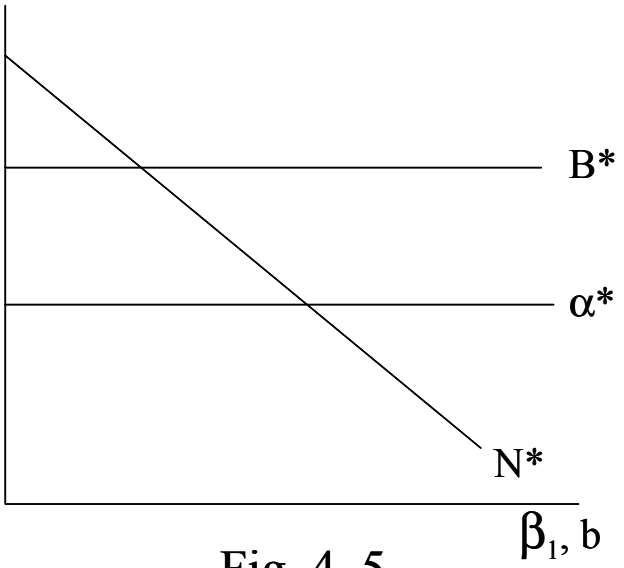

Fig. 4, 5

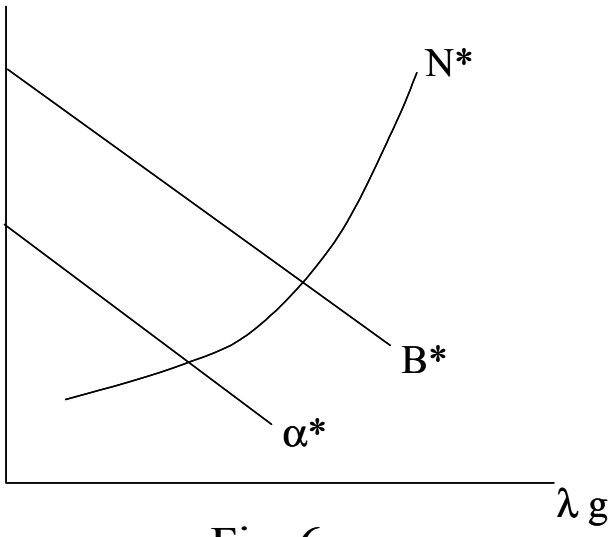

Fig. 6

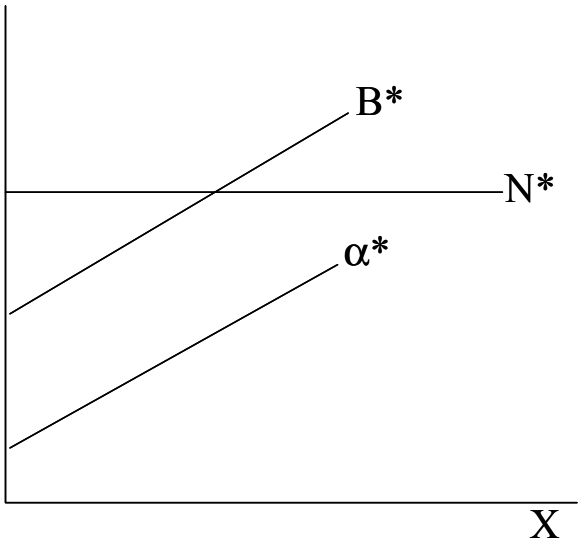

Fig. 7