Workers Without Borders?

Culture and the Political Economy of Temporary versus Permanent Immigration*

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Abstract

This paper examines the role of cultural factors in driving the politics, size and nature (temporary versus permanent migration) of migration policy. We demonstrate the existence of a broad *political* failure: policies that place inefficiently high barriers to restrict the import of temporary foreign workers, while admitting an inefficiently large number of permanent migrants. Strikingly, we show that countries that are poor at cultural assimilation may be better positioned to take advantage of temporary foreign worker programs than more culturally diverse and tolerant countries. Furthermore, relaxing restrictions on the mobility of migrant workers across employers has the potential to raise host country welfare, even though it increases migrant wages and lowers individual firms' profits. We also demonstrate the existence of multiple equilibria: some countries have mostly temporary migration programs and see a low degree of cultural assimilation by migrants, while other countries rely more on permanent migrants and see much more assimilation.

Keywords: International migration, political economy, political failure, culture, assimilation, multiple equilibria.

JEL Classification Codes: D72; F22; J61.

1 Introduction

The single international policy reform that will, arguably, yield the largest welfare gains, is an easing of restrictions on international worker mobility.[1] Nevertheless, despite these potentially large gains, high barriers to international labor mobility remain in place, due to political resistance arising from a potent brew of cultural and economic factors. Indeed, given this political resistance to (especially) permanent migration, Kremer and Watt (2009), Rodrik (2002), Pritchett (2006) and Freeman (2006) have advocated programs that encourage temporary migration. Accordingly, in this paper we take a first step in analyzing the role of cultural factors in influencing the politics of temporary versus permanent worker migration.

Our contributions are three-fold. First, we develop a simple conceptual framework that assigns cultural factors a central role in driving the politics of migration policy. This allows us to examine the impact of culture on the political trade-off between temporary *and* permanent migration. In doing so we demonstrate the existence of a broad political failure with regard to migration policy. In particular, we show that this inefficiency manifests itself very differently across temporary and permanent migration – there is too little temporary migration and possibly inefficiently high permanent migration for filling any labor shortage. Second, our framework throws light on the optimal design of politically feasible migration policies. For instance, many temporary migration programs require the tying of the migrant worker to a specific employer. Our framework suggests that a simple relaxation in the ability of temporary migrant workers to move across employers can help increase the politically feasible level of temporary migration programs and can be Pareto-improving. Finally, the paper helps account for the diversity of experience with migration and cultural assimilation. For instance, cultural assimilation is high and most of the migration in the U.S. is permanent, in contrast with Europe (Huntington, 2004; Waters and Jiminez, 2005). Once the migrant's cultural assimilation decisions are endogenized and linked with migration policy, we demonstrate that such multiple equilibria can easily arise.

Our focus on the cultural underpinnings of the political resistance to migration is deliberate. Much of the migration literature has focused on its economic and distributional consequences (see Ottaviano and Peri (2008), Facchini and Mayda (2009) and Hanson (2010) for a survey).However, such distributional effects are not unique to labor: they also occur with the increased movement

[1] For instance, Walmsley and Winters (2003) estimate that a 3% increase in labor migration would result in half the gains associated with complete trade liberalization, and Klein and Ventura (2006) suggest that the removal of all barriers to migration between OECD and non-OECD countries would boost world output between 92 and 172%.

of goods and capital. Accordingly, we emphasize the distinctive aspect of the politics of migration – namely that it has the potential to affect a country's *culture* and identity. The importance of culture has been emphasized by a nascent empirical literature. For instance, Pritchett (2006) argues that "Of all the ideas that limit migration perhaps the most important is the idea that there is a national 'culture' and that increased labor mobility threatens that culture".[2] Similarly, Card, Dustmann and Preston (2009) provide evidence to argue that cultural factors are far more important than economic factors in driving the hostility towards migrants.[3] Accordingly, we give voters' concerns about culture and national identity, a central place in our framework.

We incorporate these cultural concerns in a simple dynamic political economy framework where this tension between the income gain from greater migration and the associated cultural cost is explored.[4] Our framework possesses two key features. First, the objectives of employers/firms and the country's citizens are only partially aligned. While both firms and citizens benefit from having temporary workers fill any shortage in labor, the firms would prefer to retain the more productive, experienced workers for the long run, even if by doing so they become permanent residents. In contrast, citizens worry about the costs of having culturally very dissimilar migrants, especially if there is the prospect of them becoming permanent citizens. Second, government policymaking in our framework can be influenced both by firms (through lobbying) and by citizens (via elections).[5] Under these conditions we demonstrate that there exists a broad *political* failure with regard to migration policy. In particular, countries let in not only an inefficiently *small* number of *temporary* migrants but also an inefficiently *large* number of *permanent* migrants to fill the labor shortage.

So why this political failure? It arises from the citizen-voter's recognition of a lack of inter-temporal control over the elected government's future migration policy. Citizens recognize that, once these (ostensibly) temporary workers are admitted, firms which employ such workers will have an incentive to lobby to retain them and make them permanent. Citizen-voters are well aware of the government's vulnerability to the lobbying efforts of the firms, and also realize that the larger the size of the temporary migrant workforce, the more vigorous the lobbying efforts are likely to

[2] Similarly, according to Freeman (2006), "...public opinion and national policies toward immigration seem to rest on issues well beyond gains and losses in the labor market. Some natives worry that immigrants will present a cultural threat to their way of life and reduce social cohesion"

[3] They argue that hostility towards immigration is driven by 'compositional externalities' (i.e. culture, religion and ethnicity) associated with immigration, and suggest that such cultural factors are three to five times more important than economic factors in driving hostility towards immigration.

[4] The dynamic structure of the model shares many features with Coate and Morris (1999).

[5] In a common agency framework Facchini and Willmann (2005) examine how government policymaking with respect to factor mobility is affected by citizens' concerns as well as campaign contributions.

be. Accordingly, an endogenous *threshold* emerges, with citizen-voters restricting the number of temporary migrants to a level such that these efforts at lobbying remain ineffective. It is worth observing that these inefficiencies have little to do with the distributional impact of immigration, nor any administrative costs of admitting or repatriating temporary workers. Rather, the failure to implement immigration policies that are 'potentially Pareto improving', in the terminology of Besley and Coate (1997, 1998), is solely due to the competing political interests of firms and citizens.

Our analysis provides insights into the nature of practical policy design. In particular, our framework suggests a simple welfare improving policy innovation that is also politically feasible. Temporary worker migration programs in most countries typically require the 'tying' of guest workers with specific employers (see Table 1 for details on such programs). The question of practical policy interest is whether this employer-guest worker 'tying' is in the interest of the *host* country. At first glance the answer seems a straightforward yes – after all, when the mobility of the migrant worker is limited, the domestic firm can pay lower wages to that worker and thus extract a higher profit. Nevertheless, our analysis shows that once firms' lobbying incentives are accounted for, such an inference would be misleading. This is because while greater mobility across firms results in higher wages for the worker and lower rents for the firm, it consequently also reduces the firms' incentives to lobby. Thus it makes a higher level of temporary migration to fill in the labor shortage politically sustainable. As we show in the paper, the benefit from this "incentive effect" can outweigh the effect of higher wages, especially when the productivity gains from permanent migrants are not too high as compared to temporary ones. In this situation, weakening the extent of worker-firm 'tying', by strengthening the foreign migrant's bargaining position, somewhat paradoxically also benefits the host country's overall welfare.

Our second comparative static result demonstrates a surprising result. It suggests that countries which are particularly averse to migrants, or where socio-cultural assimilation of foreign workers is difficult, may find it easier to sustain high levels of temporary migration. The reason is that it is politically very costly for the government to let temporary migrants stay on in such countries. This raises the politically sustainable level of temporary labor migration, thereby reducing overall inefficiency. From a policy perspective, this suggests that it may be easier to politically sustain a temporary migration program involving foreign workers who find it harder to assimilate. Indeed, this finding resonates with the experience of some of the largest guest-worker programs in the world, those in the Arabian Gulf states. In addition to a large increase in the size of their migrant workforce, there has been a dramatic shift in the source countries, with relatively easy-

to-assimilate Arab workers from Jordan and Egypt being replaced by culturally very dissimilar migrant workers from India and the Philippines (Jureidini, 2006).

Countries differ in their ability to culturally assimilate foreign migrants. For instance, countries such as the U.S. have arguably been more successful in assimilating their migrants than many countries in Europe. Are these differences simply an accident of history, or are they due to differences in fundamentals, such as the degree of xenophobia? Furthermore, can the nature of migration policy itself influence (and be linked with) the migrants' incentives to culturally assimilate? These questions have been contentious and remain the subject of considerable debate.[6] A natural extension of our framework, where we endogenize the migrant's cultural assimilation decision, allows us to explore these issues. We show that there may be multiple equilibria, with countries having similar fundamentals being stuck in very different migration regimes, and being more or less successful with cultural assimilation by their migrants. Some countries rely mainly on temporary migration programs (with the scope for being made permanent being very low), and see a relatively poor degree of assimilation by the migrants. In contrast, other countries are good at assimilation, and have temporary migration programs that are a stepping-stone towards (largely) permanent migration. This multiplicity is generated by the impact of migration regimes on the migrants' assimilation decision on the one hand, and the influence of assimilation by migrants in the native culture on the natives' choice of migration policy on the other. The precise equilibrium that a country finds itself in could be a result of its history with migrants in the past.

Related Literature: As mentioned above, most of the large literature on the politics of international migration policy has focused on its distributional consequences (see Hanson (2010) for a survey). Typically, using either the framework of a median voter or of competing pressure groups, the focus has been on analyzing political forces stemming from a heterogeneity in the population. Such heterogeneity could be with respect to various economic factors such as skill levels, age (affecting productivity), capital ownership etc. The implications of such politics on migration policies have been studied in several important dimensions such as the number of migrants admitted (e.g. Epstein and Nitzan, 2006), the enforcement of policies against illegal immigration (e.g. Facchini and Testa, 2011), the relation with the pension system (e.g. Scholten and Thum, 1996) etc.[7]

[6] On the one hand, scholars such as Huntington (2004) have raised concerns about the scale of permanent migration, worried that "the single most immediate and serious challenge to America's traditional identity comes from the immense and continuing immigration from Latin America". In contrast, others such as Rodriguez (2007) believe that temporary migration programs "compromise our ability to integrate immigrants effectively into the American body politic".

[7] For a systematic analysis of the political economy of immigration, also see Facchini and Mayda (2009), Razin,

However, there has been virtually no formal analysis of the implications of cultural concerns as a determinant of migration policy. Our framework (using the structure of Coate and Morris, 1999) brings together the political pressures exerted both by voters (who are concerned about the cultural impact of migrants) and by firm-lobbies (who are not) in the determination of immigration policy.

Card, Dustmann and Preston (2009) (mentioned previously) and O'Rourke and Sinnott (2006) find in surveys of attitudes towards immigrants, non-economic factors such as the perceived crime and cultural impact of migrants play a strong role in determining these attitudes. As our framework shows, the explicit consideration of cultural issues is also related to the issue of temporary versus permanent migration, an important aspect of migration policy that has not received much attention in the previous literature.

The importance of accounting for issues of cultural assimilation in deciding the cultural composition of the immigration pool was systematically made first by Lazear (1999). In addition to papers cited earlier, Ottaviano and Peri (2006), Epstein and Gang (2010) and Konya (2007) have explored aspects of culture in the process of immigration such as cultural assimilation by migrants, its interaction with the decision to migrate in the first place etc. However all of these papers take immigration policy as given. Our focus is on the analysis of how the immigration regime (governing temporary versus permanent migration) itself may be shaped by the extent of the migrants' cultural assimilation.

The rest of the paper is organized as follows. We describe the model in Section 2 and analyze the equilibrium in Section 3. Other implications of the model are discussed in Section 4 and Section 5 concludes.

2 The Benchmark Model

Labor migration affects the domestic labor market, the host country culture and its politics. The framework that we develop aims to capture these interactions in a dynamic framework. However, having all of these features necessitates that we include them in the most parsimonious way, and eliminate all that is not essential. With this caveat, we now describe the model.

Production and the Labor Market: Consider an infinite period economy with f production opportunities at the beginning of the game, the implementation of each of which requires one worker. For simplicity, we think of each of these production opportunities as occurring in separate firms.

Sadka and Suwankiri (2009), Facchini and Willmann (2005) and Dolmas and Huffman (2004).

The country has a population comprised of i_N (native) citizen-workers, with the crucial assumption that $i_N < f$ i.e. there is a shortage of qualified native workers. Thus the employment of foreign workers is necessary to prevent some productive opportunities being wasted. Given this shortage of labor, economic output would be maximized if the country were to admit $v = f - i_N$ migrant workers to fill up the unutilized production opportunities. These migrant workers can be brought in on a temporary or permanent basis. We describe the productivity and cultural differences between these two types of migrant workers below.

The first key distinction between the two sets of workers is that temporary workers are to be repatriated at the end of their stint (assumed to be one period), while permanent workers can stay indefinitely. This has implications for their relative productivity and wages, that we now describe. In particular, given that foreign workers come from a dissimilar working environment, there are likely to be gains in productivity as foreign workers spend more time at their new jobs and adjust to their new environment. So the catch-up of native worker productivity with that of foreign workers will take time and may require a transition period - for simplicity, we assume that this takes one period. Accordingly, we assume that the productivity of a foreign worker is y in their first period in the country, and that they are paid a 'world wage' w_0, which is much smaller than their productivity y. From the next period onwards, their productivity increases to $y(1+\Delta)$, part of which is firm-specific, while the remaining is general. We denote the *firm-specific* increase in productivity by s and the *general* component by g so that $\Delta = s + g$. This results in the "immigration surplus" equalling vy or $vy(1+\Delta)$, minus the corresponding wage, for the new and experienced foreign workers, respectively.[8]

While migrant productivity increases over time, there may well be legal or communication barriers that limit the inter-firm mobility of these migrant workers. We model this mobility barrier that migrant workers may face in a simple way. In particular, we assume that the cost for a migrant worker to move to another firm is γy, where a higher γ reflects an environment where mobility across firms is relatively costly. The magnitude of this mobility cost can depend, inter alia, on immigration policies 'tying' migrant workers to a specific firm. As described in Table 1, such restrictions are common to some of the largest temporary migration programs across the world. γ can also depend on the nature of the country's labor market, and offers a simple way to capture differences in mobility between labor markets, for example, in the US and Europe.[9] It is

[8] Since it suffices for our purposes, we have chosen a particularly simple way to depict the labor market and the 'immigration surplus'. For a more elaborate general-equilibrium model of the labor market that shares many qualitative features of our simpler structure, see Helpman, Itskhoki and Redding (2008).

[9] See Blanchard (2005) for an overview. Many commentators have argued that both geographic and inter-firm

important to note that if the mobility costs are high, then the parent firm can retain a *larger* part of the surplus generated by the increased productivity of the migrant worker.

Thus, if the worker is allowed to stay on for a second period, then the value of his outside option is $y(1+g-\gamma)$, while the value of his (increased) productivity is $y(1+\Delta)$. In this case, the worker and his employing firm bargain over the potential surplus $y(1+\Delta) - y(1+g-\gamma)$. Since the worker and the firm are in a situation of bilateral monopoly, as is common in labor-market models with such specificity, we model the interaction between the firm and the worker using Nash bargaining. Denoting the firm's relative bargaining strength by β, the share of the surplus enjoyed by the firm from retaining the worker is $\beta[y(1+\Delta) - y(1+g-\gamma)] = \beta y(s+\gamma)$. We assume that the intertemporal gain in productivity is high enough that firms gain a higher surplus from experienced workers than from temporary migrant workers:

Assumption 1: $y - w_0 < \beta y(s+\gamma)$

This assumption implies that firms would prefer to retain their migrant workers and make them permanent rather than repatriating them and recruiting a fresh batch of migrant workers.

Natives, Migrants and Sociocultural Heterogeneity: We describe the preferences of the native citizen-worker, U_N, in every period by:

$$U_N = \text{wage-income} + \text{share of firm profits} - \lambda^*\text{cultural costs} \tag{1}$$

Here native citizens gain from increases in firms' profits due to the filling of productive opportunities by migrant workers, but suffer cultural costs from having foreign migrant workers (we discuss this in detail below). λ is a parameter that denotes the importance of economic gains relative to the cultural costs in the utility function. There are two features that deserve to be emphasized. First, we assume all natives are identical in the sense that each inelastically supplies a unit of labor, *and* also owns an equal share of all firms in the economy. This ensures that distributional effects are ruled out and hence by assumption, cannot be behind any political backlash against immigration. As discussed earlier, this allows us to focus more closely on the implications of culture and heterogeneity for the politics of immigration policy, rather than on the distributional consequences of migration, which have been analyzed extensively in the existing literature. Second, natives are also assumed to be identical in terms of preferences with respect to foreigners.

mobility costs are much lower in the U.S. than in Europe (Nickell, 1997; Beffy et. al. (2006), Buchinsky et. al. (2006) and Jolivet et. al. (2004) provide some estimates of labor mobility in France and the U.S.).

Given this symmetry across the i_N native citizens, if w denotes the wage for each native worker and R the total revenues of all the firms in the economy *net* of wages to migrant workers,

$$U_N = w + \frac{1}{i_N}(R - wi_N) - \lambda\frac{C_c}{i_N} = \frac{1}{i_N}(R - \lambda C_c)$$

where C_c is the total cultural costs imposed by foreign migrant workers, discussed further below. Thus all citizens care identically about $R - \lambda C_c$.

While higher levels of migrant labor boost national income by allowing the implementation of productive opportunities which would have otherwise gone abegging due to a shortage of labor, migration levels also matter because they may change the country's sociocultural makeup. As forcefully argued by Alesina and La Ferrara (2005) and Huntington (2004) among others, citizens of a country care not just about their income but also the degree of sociocultural heterogeneity in society.[10] Greater ethnic and cultural diversity can adversely affect a native citizen through its impact on the nature of local public goods provided (see Alesina and Spolaore, 1997) - for example, natives may dislike the fact that the nature of public education might change with greater Hispanic immigration, with resources being diverted away from, say, music and towards teaching Spanish. Alternatively, greater cultural heterogeneity may have a direct (and adverse) impact on an individual's utility through social interaction, as in Alesina and La Ferrara (2005).[11]

We model this disutility by assuming that migrants impose a cultural cost C_c on native citizens (section 4.2 develops a model that provides some microfoundations for this cost). This cost is c_0 for every worker during the first (temporary) period which he spends in the country. However, if a migrant worker stays longer, then from the second period onwards this cultural cost is $c(\frac{n}{1+a})$ where n is the number of migrants present beyond their first period in the country, with $c', c'' > 0$. The parameter a captures the ease with which the migrant becomes culturally assimilated. Greater assimilation (i.e. higher a) lowers the adverse cultural impact of migration. This parameter can also be used to examine the differences in the cultural impact of temporary versus permanent migrants; when a is small, this difference is larger.

The above formulation captures, in a parsimonious way, several aspects of the cultural trade-offs between having temporary versus permanent migrants (i.e. those staying beyond the first period). Unlike short-term workers, permanent migrants acquire voting rights and may thereby

[10] For instance, Freeman (2006) suggests that "some natives worry that immigrants will present a cultural threat to their way of life and reduce social cohesion. This view is reflected in the attitudes of some Europeans toward immigrants from developing countries, particularly those from Moslem countries."

[11] See the pioneering work on social psychology by Tajfel et al (1971) that accords with this, and Leyens et al (2003) for a more recent discussion.

influence the allocation of scarce resources across local public goods in ways that adversely affect native welfare (e.g. by directing resources towards bilingual education).[12] Permanent migrants are also more likely to be accompanied by family, which further increases their cultural 'burden'. Thus overall, permanent migrants may impose higher cultural costs because they arguably threaten the nation's "identity" and ethnic composition, in ways that temporary migrants do not. Furthermore, their influence on society and the cultural burden they impose on the native citizens is likely to be greater as they increase in number. Accordingly, we assume that the marginal cultural cost being imposed by these permanent migrants is increasing in n. For simplicity in analysis, we however assume that the cultural cost c_0 imposed by temporary migrants is linear in their numbers; allowing some convexity in these costs as well does not qualitatively change the results. While in our benchmark model we assume that the marginal cultural costs $\frac{1}{1+a}c'(\frac{n}{1+a})$ associated with permanent migration are higher than c_0 (the precise assumption is made in the next section), we relax this assumption in section 4.1, where we endogenize the migrant's assimilation decision. We do this because under some conditions it can be argued that temporary migrants have a lower incentive to invest in cultural assimilation than permanent migrants and these costs are endogenous.[13]

The Migration Protocol: Given the existing policy on the number of temporary and permanent migrants that can be brought in, firms with vacant posts are randomly matched with migrants upto the limit imposed by immigration policy. To model the difference between temporary and permanent migrants in a relatively simple and tractable way, we assume that if a migrant worker stays for two periods or longer, then he becomes a permanent resident or citizen and cannot be repatriated. Thus the crucial decision comes at the end of the first period, when the government must decide whether to repatriate the existing group of temporary migrants or make them permanent. We neglect any technological constraints in the repatriation of temporary migrants by assuming that the government faces zero administrative costs in enforcing their repatriation. We also assume that all foreign workers are treated symmetrically. This implies that the government can neither selectively tax nor repatriate a subset of these workers. Relaxing these latter assumptions does not alter the qualitative nature of our results. While citizens may prefer the repatriation

[12] Freeman (2006) again: "Another factor that determines attitudes toward immigration is that immigrants *eventually become citizens and affect politics*". [Emphasis added].

[13] There may be positive cultural benefits as well from having migrants – for example, in the form of increased diversity. Including this (e.g. in the form of negative costs over a certain range) does not change the qualitative nature of our results. We explicitly incorporate such benefits in our analysis of cultural assimilation in section 4.

of temporary migrants, and their replacement with a new batch due to their lower cultural costs, firms are solely interested in retaining them for their productivity gains. This conflict in the interests of citizens and the firms works through the political process, which we detail next.

The Political Structure and Immigration Policy: For the political structure, we adapt a model of moral hazard and political accountability, originally formulated by Barro (1973) and Ferejohn (1986) and widely used in various contexts (see Persson and Tabellini (2000)). Elections are held at the end of each period, in which citizen-candidates stand for election. They are all identical and care both about the citizens' aggregate lifetime utility V_N from government policy, as well any rents they acquire, which consist of the ego rents R from holding office as well as any bribes B paid to them to influence their choice of policies. A politician's payoff each period is given by

$$U_{POL} = \theta(R + B) + U_N \tag{2}$$

where θ is the relative weight that he puts on his rents. As in the standard Barro-Ferejohn set-up, government policy is chosen by the incumbent after elections, and there is no commitment to electoral promises. Given the politician's preference function, both the citizens and the firms are in a position to influence (using different instruments) government policymaking. Firms can lobby the government by offering it a bribe to allow firms with experienced workers to retain them (thereby making them permanent workers, who are immune to future repatriation). In contrast, citizen-workers exercise control on government policy by threatening to replace the incumbent government with a randomly-chosen challenger in the upcoming elections. This particular political framework, which involves a dynamic game between the politician, the citizen-workers and also the firm lobby, is similar to the structure in Coate and Morris (1999), who use it to study the adoption and persistence of policies.

The strategies and timing of the game are as follows. At the beginning of the game, citizens observe the degree of labor shortage v in the economy, and decide on a migration policy P^*, which specifies the number of temporary and permanent migrants, (n_T, n_P) to be admitted in that period and every subsequent period.[14] At the start of any period, if the migration policy P^* is still in

[14] In a previous working paper version (Jain, Majumdar and Mukand, 2010), we considered instead a formulation of the model where at the beginning of each period, citizens chose the number of migrants to bring in. The qualitative results are the same as in the present version. The current formulation has the (more realistic perhaps) assumption that a referendum on the form of migration policy takes place at the beginning of the labor shortage and then every period people vote only on whether to continue with the policy or scrap it, rather than have a new referendum on the number of migrant workers every election.

operation in that period, firms hire the corresponding number of workers from foreign countries at the world wage rate of w_0.

Then, citizen-voters choose a decision rule Ψ_t that has two components: (i) an election rule $\psi_t^v(\rho_t)$ defined as the probability of re-election of the incumbent politician, and (ii) a policy continuation rule $\psi_t^p(\rho_t)$, defined as the probability of whether to continue with P^* or scrap it altogether in subsequent periods. Both are defined as a function of the incumbent's action ρ_t, where $\rho_t = 0$ if the government repatriates the temporary workers in period t and $\rho_t = 1$ if the government makes them permanent. Firms that receive the n_T temporary migrant workers observe the voting rule and form a lobby to choose a bribing strategy η_t which determines the bribe B_t to offer the politician in exchange for preventing repatriation and retaining their experienced temporary migrant workers.[15] The incumbent politician observes the citizens' voting rule and the bribe offered by the lobby, and decides on immigration policy. The politician can choose either to reject the bribe and implement the policy $\rho_t = 0$ of repatriating the temporary workers, or accept the bribe and implement $\rho_t = 1$ i.e. allow the firms to retain their experienced migrant workers, which effectively gives these workers permanent residence. The politician's decision on whether or not to allow firms to retain their experienced migrant workers is observed by citizen-voters, who then implement their voting rule Ψ_t which determines (i) whether or not the incumbent politician is re-elected, and (ii) whether or not the migration policy P^* is to be continued in the next period, or scrapped. An aspect of this particular formulation involves citizens choosing in every period whether to continue with the current migration policy or scrapping the policy completely. While in general, one can consider the optimal updated continuation policy in each case, in reality coordinating on such complicated voting decisions may be difficult. Thus we adopt the simple possibility of only voting on continuing with the current policy or not. As we point out in our analysis below, incorporating such general continuation policies would unduly complicate the analysis without adding much to the basic intuition. The timing of the game is depicted in figure 1 below.

Formally, this defines a dynamic game between the politicians, the firms and the representative citizen. An equilibrium strategy profile (Ψ_t, η_t, ρ_t) requires that each player's strategy constitute a

[15] The total number of firms is assumed to be large relative to the vacant productive opportunites that occur. Thus, *ex ante*, the chance that any particular firm will have a vacancy for which it will need a migrant worker is small. Hence it has little ex-ante incentive to join a lobby to press the government to expand the temporary migration program. However ex-post, once a firm has an experienced worker on its payroll, its incentive in trying to retain this worker permanently is much stronger.

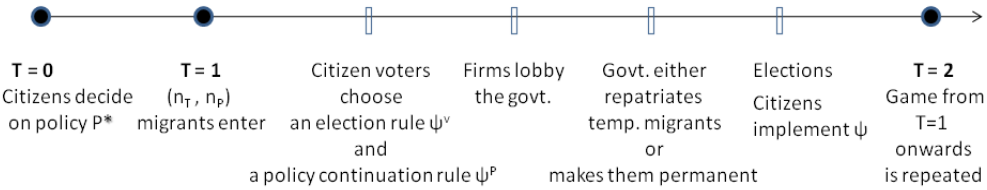

Figure 1: Timing of the game

best response to the other players' equilibrium strategies. Next period, the same cycle is repeated, with either the re-elected politician, or the newly elected government that replaces him.

3 Equilibrium Analysis

We begin by briefly delineating key features of the social planner's problem by describing the optimal migrant mix in the *absence* of any political considerations on the part of the government. Having established the social optimum as a benchmark, we then analyze the equilibrium with political factors at work in section 3.2.

3.1 The Socially Optimal Mix: Temporary versus Permanent Migrant Workers

A social planner maximizes the representative citizen's discounted stream of utility, by choosing the socially optimal number of temporary migrant workers m_T and permanent immigrants m_P which solve the following problem:

$$\max_{m_T, m_P} (y - w_0 - \lambda c_0)(m_T + m_P) + \frac{\delta}{1-\delta}[(y - w_0 - \lambda c_0)m_T + \{y(1+\Delta) - w_P\}m_P - \lambda c(\frac{m_P}{1+a})]$$

subject to the constraint that $m_T + m_P \leq v$, where w_P denotes the wage that migrants earn once they become permanent. Here $(y - w_0 - \lambda c_0)$ is the contribution by a migrant worker in the *first* period, to national welfare net of cultural costs (recollect that temporary and permanent migrants are identical in their first period). The second term is the discounted payoff from having both a rotating pool of m_T temporary migrants as well as m_P permanent migrants in the country. The following assumption ensures that the surplus from temporary migrant workers, net of their cultural costs, is positive.

Assumption 2: $y - w_0 - \lambda c_0 > 0$

Otherwise, temporary migrants would never be brought in.

As discussed earlier, the firm and an experienced worker bargain over the surplus $y(1+\Delta) - y(1+g-\gamma)$. The share of the surplus enjoyed by the firm from having such a worker is $\beta[y(1+\Delta) - y(1+g-\gamma)] = \beta y(s+\gamma)$, while the wage paid to permanent workers, w_P, is given by $y(1+\Delta) - \beta y(s+\gamma)$.

Incorporating this in the expression above, the first-order condition with respect to m_P yields three possibilities:

$$\begin{aligned} \text{If } \beta y(s+\gamma) - \frac{\lambda}{1+a}c'(0) \leq y - w_0 - \lambda c_0, \text{ then } m_P = 0, \\ \text{if } \beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{v}{1+a}) \geq y - w_0 - \lambda c_0, \text{ then } m_P = v, \\ \text{otherwise } \beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{m_P}{1+a}) = y - w_0 - \lambda c_0 \end{aligned} \tag{3}$$

and the solution for m_T is that temporary migrants fill up the rest of the shortage i.e. $m_T = v - m_P$.

Our framework emphasizes two factors that determine the socially optimal mix of temporary and permanent migrants. The first is the inter-temporal change in productivity of the migrant worker, and its impact on the income of the host economy; the gain to native-citizens' incomes from a permanent migrant equals $\beta y(s+\gamma)$, versus $y - w_0$ from a temporary migrant. The other driving force is the preference that natives have for temporary versus permanent migrant workers in terms of their cultural impact – the inter-temporal "cultural assimilation" effect as captured by $\frac{\lambda}{1+a}c'(\frac{m_P}{1+a})$ versus c_0.[16] Given these effects, two main possibilities arise.

(i) Corner Solutions: Permanent Immigration versus Temporary Migration: The social planner's optimization problem may result in a corner solution where only temporary migrants are admitted to fill all available posts, i.e. $m_T = v$ and $m_P = 0$. This is the case when the cultural costs of permanent immigration are so high that it is not worth the increase in productivity, i.e. when $\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(0) < y - w_0 - \lambda c_0$. The reverse case, i.e. $m_T = 0$, is also possible, where only permanent migrants are used. This will be the case when either the surplus from a temporary worker $y - w_0 - \lambda c_0$ is negative, i.e, Assumption 2 does not hold, or when the enhanced productivity of permanent migrants is enough to outweigh the cultural cost from even filling all v slots with permanent migrants i.e. if $\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{v}{1+a}) > y - w_0 - \lambda c_0$.

[16] Of course, a country's ability to assimilate foreign migrants is likely to be a function of the ethnicity of the migrant workers and the ability of the country's society to absorb and integrate migrants into the national fabric, and may differ widely across countries. In section 4.1 we endogenize the migrant's cultural assimilation decision and make it a function of his perceived length of migrant tenure in the host country.

(ii) Interior Solution: Both Temporary Migrants and Permanent Immigration: Alternatively, for a wide set of parameters we may have an interior solution with both temporary and permanent migrants i.e. $m_T, m_P > 0$. Such an outcome is possible if the cultural costs of the temporary migrants do not outweigh their productivity benefits i.e. $y - w_0 - \lambda c_0 > 0$, and at the same time, the cultural impact of filling all v slots with permanent migrants is too high relative to temporary ones i.e. $\beta y(s+\gamma) - \frac{\lambda}{1+a} c'(\frac{v}{1+a}) < y - w_0 - \lambda c_0$. In this case, the social optimum will consist of bringing in permanent migrants till the point where their productivity surplus, offset by their rising cultural cost, just equals the surplus from temporary migrants, and then filling the rest of the worker shortage using temporary migrants.

3.2 Politics and Barriers to Entry: Equilibrium Analysis

We turn next to incorporating political considerations in the migration decision. As mentioned earlier, this now involves a dynamic interaction between the decisions of the citizen-voters, the firms and the government. We proceed below in a series of steps. For expositional simplicity, we begin by considering the case where permanent migration does not take place. By 'freezing' permanent migration, we are able to focus on the level of temporary migration and to develop some insight for the sorts of policies that might sustain welfare-improving (higher) levels of temporary migration. In the subsection 3.2.2 that follows, we open up the parameter space to consider migration regimes that entail permanent migration as well.

3.2.1 Only temporary migrants

To understand the impact of political constraints on immigration, we first study the case where the only decision is on how many *temporary* migrants to let in every period. This will be the case when the marginal cultural cost of even a single permanent migrant is so high as to outweigh their economic gain. Thus in this section, we make the following assumption:

Assumption 3: $\beta y(s+\gamma) < \frac{\lambda}{1+a} c'(0)$

Together with assumptions 1 and 2 that $\beta y(s+\gamma) > y - w_0 > \lambda c_0$, this implies that $\frac{1}{1+a} c'(0) > c_0$ i.e. the marginal cultural cost imposed by temporary migrants is smaller than that imposed by any permanent migrant.

Given assumption 2 that the surplus from employing them is positive, the socially optimal decision in this case would be to fill all the v vacancies with temporary migrants. Unfortunately, there is the possibility that once admitted, the firms' lobby may bribe the government into making

the temporary workers permanent due to their increased productivity. This possibility and the resultant large cultural costs may limit the extent to which citizens are willing to allow in temporary workers in the first place. Since the social optimum here is rather simple and involves a rotating pool of v (temporary) migrants every period, the extent of inefficiency can be easily measured as the deviation of migration policy from this level.

Consider first the citizen's decisions in every period, which has two components – an election rule and a policy continuation rule. Here the primary issue under consideration is the repatriation of the temporary migrants versus their being made permanent. Thus the citizen's decision rule Ψ_t implements the re-election rule $\psi_t^v(\rho_t)$ as well as the policy continuation rule $\psi_t^p(\rho_t)$ to maximize the incentives it provides to the incumbent politician to follow the citizen's migration preferences. Thus, the citizen's equilibrium voting rule is very simple: the incumbent government will be re-elected if and only if all temporary workers are repatriated. A second aspect of this decision involves continuation of the migration policy if the government were to deviate and in fact allow the firms to retain the temporary workers permanently. Since politicians care both about rents from being in office *as well as* future welfare, the strongest incentive can be provided to them by promising the worst possible outcome on both dimensions. Since by assumption 2, the welfare benefit from bringing in temporary workers is always positive, the worst outcome on the welfare dimension is to scrap migration programs forever. Thus the promised (punishment) strategy following a deviation is $\psi_t^v(\rho_t = 1) = 0$ and $\psi_t^p(\rho_t = 1) = 0$. While one may view this as the usual grim trigger strategy of repeated games, here it can also be interpreted as the electorate losing faith in the political viability of migration and choosing to scrap it.[17]

We focus next on periods where the migration policy P^* of bringing in n_T temporary migrants is in place. Consider the equilibrium strategy of the incumbent politician. If offered a bribe B to retain the temporary migrants, he trades off the gain from accepting the bribe versus the loss in ego-rents R from being voted out of office as well as future welfare.

[17] It may be useful to make two points at this stage. First, instead of considering totally scrapping migration following a deviation, one might instead consider allowing the citizens to optimally chose a new policy at every stage following a deviation. However, this would require the entire path of choice to be worked out. It is possible to trace out this path, starting backwards from the point where it is no longer optimal to admit any migrants. However, it makes the analytics much less tractable without yielding any additional insights.

Second, an alternative to choosing a policy continuation rule would be to choose the type of new politician to elect into office. Suppose there are two types of politicians: pro- and anti- immigration. Then, on deviation, the voters could commit to always choosing anti-immigration politicians in the future, who would never implement any immigration programs at all.

In any period, the incumbent politician's lifetime payoff from accepting the bribe ($\rho = 1$), to retain n_T temporary workers, is

$$V_I(\rho = 1; n_T) = \theta[R + B] + U_N(n_T, 0) + \delta V_N(\rho = 1; n_T) \tag{4}$$

where $U_N(a, b)$ represents the native citizens' utility this period from having a temporary migrants and b permanent migrants in the economy, and $V_N(\rho = 1; n_T)$ is the citizen's lifetime utility from tomorrow if the incumbent pursues the policy $\rho = 1$ today i.e. allows the n_T workers to stay on permanently. In this case, since the incumbent is ousted from office, $V_N(\rho = 1; n_T)$ is also his continuation payoff. Since the migration policy is scrapped altogether as a result of such a deviation, $V_N(\rho = 1; n_T)$ is the utility from having only the n_T permanent workers in the future, and is given by $V_N(\rho = 1; n_T) = \frac{1}{1-\delta} U_N(0, n_T)$.

In contrast, the incumbent politician's payoff from rejecting the bribe ($\rho = 0$) and adhering to the voters' preferences equals

$$V_I(\rho = 0; n_T) = \theta R + U_N(n_T, 0) + \delta V_I(\rho = 0; n_T) \tag{5}$$

where $V_I(\rho = 0; n_T)$ is the value function that the politician associates with being in power, having complied with the voters' wishes to have a rotating pool of n_T temporary migrant workers. If the politician continues with the policy of repatriating the temporary migrants, then he enjoys being in office the following period as well. Thus the total gain to the politician from not deviating is given by solving the above equation to get:

$$V_I(\rho = 0; n_T) = \frac{\theta R}{1 - \delta} + \frac{U_N(n_T, 0)}{1 - \delta} \tag{6}$$

Therefore if the number of temporary migrants under consideration is n_T, the incentive constraint for the politician to follow $\rho = 0$ is given by:

$$V_I(\rho = 0; n_T) \geq V_I(\rho = 1; n_T) \tag{7}$$

Substituting for the V_I's from above, it implies that the minimum bribe-level $B^{\min}$ that will be required to persuade the politician to allow n_T experienced (temporary) workers to be retained by their employers is given by:

$$\theta B^{\min} + \frac{\delta}{1 - \delta} U_N(0, n_T) = \frac{\delta}{1 - \delta} \theta R + \frac{\delta}{1 - \delta} U_N(n_T, 0) \tag{8}$$

where the natives' utility function U_N incorporates both the additional income as well as the heterogeneity-disutility from the immigrant workers. Hence we have:

$$\begin{aligned} U_N(0, n_T) &= [y(1+\Delta) - w_P]n_T - \lambda c(\frac{n_T}{1+a}) = \beta y(s+\gamma)n_T - \lambda c(\frac{n_T}{1+a}) \\ U_N(n_T, 0) &= (y - w_0 - \lambda c_0)n_T \end{aligned}$$

On the other hand, recall that the firm lobby makes a take-it-or-leave-it offer to the politician where, in exchange for a bribe B, the politician agrees to let the lobbying firms retain their temporary migrants permanently. Thus we need to determine the maximum level of bribe that the firm lobby is willing to offer. For each firm, an extra experienced worker from period $t = 2$ onwards yields output of $y(1 + \Delta)$ each period. As discussed before, the surplus for the firm from having such a worker is $\beta y(s+\gamma)$. Hence the maximum bribe the firm lobby will be willing to pay for retaining permanently the n_T temporary workers is:

$$B^{\max} = \frac{\delta}{1-\delta}\beta y(s+\gamma)n_T \tag{9}$$

The incentive-compatibility constraint for the politician requires that this maximum bribe-level not be enough to persuade the politician to retain the temporary migrants i.e. $B^{\max} \leq B^{\min}$, which using (8) requires:

$$\begin{aligned} & \theta\frac{\delta}{1-\delta}\beta y(s+\gamma)n_T + \frac{\delta}{1-\delta}[\beta y(s+\gamma)n_T - \lambda c(\frac{n_T}{1+a})] \\ \leq\ & \theta\frac{\delta}{1-\delta}R + \frac{\delta}{1-\delta}[(y - w_0 - \lambda c_0)n_T] \end{aligned} \tag{10}$$

If this constraint is satisfied, then the optimal choice for a politician in any period will involve $\rho = 0$.

At the start of the game, in trying to decide on migration policy P^*, native citizens will take into account this constraint on politicians' action. Recall that, in this section, we are considering the case where the only decision is on how many *temporary* migrants to let in every period. Since by Assumption 2 the gain from bringing in temporary workers is positive, so long as they are not made permanent, the optimization problem for the citizen boils down to choosing the maximum number of temporary migrants n_T subject to the incentive constraint above. Rewriting it, we have:

$$n_T[(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0)] - \lambda c(\frac{n_T}{1+a}) \leq \theta R \tag{IC'}$$

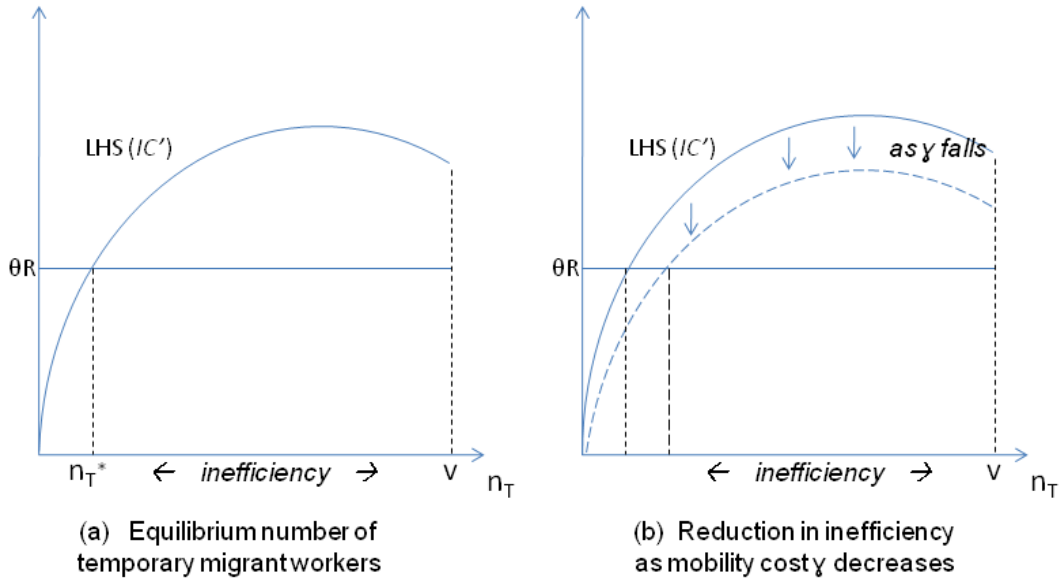

Figure 2:

This is portrayed in figure 2(a). It is clear from the figure that unless the end point (i.e. at $n_T = v$) of the left-hand side of (IC') lies below θR, the equilibrium level of temporary migration is lower than the social optimum. This is summarized in the proposition below.

Proposition 1 *Under assumptions 1-3, if*

$$[(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0)]v - \lambda c(\frac{v}{1+a}) > \theta R \tag{11}$$

then, under political constraints, the equilibrium level of temporary migrants n_T^* will be lower than the socially optimal level, i.e. $n_T^* < m_T$.

The basic intuition for the result is fairly straight-forward. Since firms gain from retaining temporary migrant workers, they lobby the politician to not repatriate the temporary migrants. An increase in the number of temporary workers increases the resources the firms are willing to expend to effectively lobby the government. Anticipating this, at the beginning citizens decide on a suboptimal (low) number of temporary migrants.

Put another way, the proposition suggests a case of *political failure* in the sense that everyone may gain from an alternative policy. There exist other (higher) levels of temporary migration that all parties would prefer. It is straightforward to see that firms would benefit from having

more temporary migrants to fill the available vacancies. For the citizens as well, higher levels of temporary migration are preferable, since by assumption 2 the immigration surplus, net of the cultural cost, from each extra temporary worker is positive. However, the inability of citizen-voters to exercise intertemporal control over the politician means that these levels are not politically sustainable.

Aspects of the above political equilibrium are best understood by examining the impact of differences in the relevant parameters of the model on the degree of inefficiency. When is such political failure more likely? The following corollary to Proposition 1 addresses this.

Corollary 1 *Under the conditions in Proposition 1, the level of temporary migration n_T^* increases with (i) economic factors: a fall in the inter-temporal productivity increase s or in the world-wage w_0, or a decrease in the migrant worker's mobility cost across firms γ, or a fall in the firm's bargaining power β, (ii) cultural factors: an increase in the cultural costs λ from migration, or a lower degree of assimilation by migrants a.*

Proof. An decrease in s, w_0, γ, β or a or an increase in λ tends to lower the left-hand side of (IC'). (For λ, $\frac{dLHS(IC')}{d\lambda} = n_T c_0 - c(\frac{n_T}{1+a}) = \int_0^{n_T}[c_0 - \frac{1}{1+a}c'(\frac{n_T}{1+a})]dn < 0$ by assumption 3.) From figure 2(b) it is then clear that this will result in a increase in n_T^* (although the figure depicts the impact due a change in γ, analogous figures hold for the other parameters as well). ■

The above corollary thus surprisingly suggests that higher cultural costs and greater ease of mobility across firms may in fact be associated with a greater amount of temporary migration. The intuition for this result, which is related to our explicit consideration of political constraints in the determination of migration policy, is perhaps best understood by examining some policy implications that follow. We highlight two of them below. First, a potentially Pareto improving policy may involve reducing barriers to migrant labor mobility within the host country. Second, a country may prefer to import (temporary) migrants from culturally *dissimilar* countries rather than from culturally similar countries. We outline the argument for both of these implications of Corollary 1 below.

(i) Employer Assignment and the (im)Mobility of Guest Workers: One of the salient aspects of most temporary labor migration programs has been the fact that the guest workers are tied to specific employers i.e. restricted in their movement to firms other than the original employer. As described in Table 1, this feature is common to some of the largest temporary migration programs

across the world, in countries such as the U.S., Kuwait and Switzerland.[18] Clearly, such restrictions on the mobility of guest workers lower the bargaining power of the migrant workers, and adversely affect their wages. This increases the profits of the host country firms that hire these workers. Therefore, the question of direct political (and practical) interest is whether this employer-guest worker 'tying' is a good thing from the *host* country's point of view.

Corollary 1(i) throws light on this issue, and suggests otherwise – allowing greater labor mobility makes larger migration programs politically feasible and is thus potentially Pareto improving. To see the argument, suppose that when visa restrictions prevent worker mobility across firms, the degree of worker (im)mobility is given by $\gamma(\nu_R = 1)$, and if such restrictions are absent, by $\gamma(\nu_R = 0)$, where $\gamma(1) > \gamma(0)$. Recall that a worker's outside option is given by $y(1 + g - \gamma(\nu_R))$. This implies that an increase in worker mobility (i.e. lower $\gamma(\nu_R)$) reduces the economic rent that the firm is able to appropriate from an experienced migrant worker. It thereby reduces the maximum amount the firm lobby is willing to pay the government in order to retain its migrant workers, i.e. $B^{max}(\gamma(1)) > B^{max}(\gamma(0))$. To see the impact on welfare, observe that in (political) equilibrium, there is inefficiency since not all vacancies are getting filled. With greater inter-firm mobility, more of these vacancies get filled as a higher time-consistent level of temporary worker migration is now politically sustainable.[19] Therefore, our theoretical framework suggests that any policy that increases guest worker mobility within the host country should be 'potentially Pareto improving' (in the terminology of Besley and Coate, 1998) and be made a policy priority.

(ii) Culture and Guest Worker programs: Our framework has two distinct insights on the role of culture and the design of guest worker programs. First, on the positive side our framework suggests that larger temporary migration programs are more sustainable in countries with a higher aversion to foreign workers (i.e. a high λ) or where assimilation into the native society is more difficult (i.e. a low a). In other words, ceteris paribus we can have larger temporary migration programs in (high λ) countries such as Japan as compared to (relatively low λ) countries such as Canada. Second, on the normative side, our analysis suggests that a simple way in which the degree of inefficiency can be reduced is by replacing, for example, culturally similar (low λ) migrants with culturally distinct (high λ) migrants, resulting in higher levels of politically sustainable temporary

[18] While not strictly a temporary labor migration program, the *H-1B* program in the United States assigns foreign workers to specific employers and makes mobility across employers costly (Ruhs, 2002).

[19] A lower γ implies that higher wages need to be paid to experienced migrant workers. However, these higher wages are never paid, because in equilibrium, only a rotating pool of temporary migrants is hired. The issue of the impact of higher wages on welfare comes up when permanent migrants are also brought in. This situation is analyzed in Proposition 3 in the next section.

labor migration – thus boosting overall national income and welfare.

Both these insights follow directly from Corollary 1 (ii). In particular, this corollary suggests that because it is (politically) much more costly (in terms of future payoffs) to the government to provide citizenship to culturally (dis)similar migrant workers (i.e. when λ is high or a is low), the firm lobby needs to make a larger bribe in order to successfully persuade the politician to retain the temporary workers in this case. Therefore, the sustainable level of temporary migration n_T^* rises with the cultural distance of the migrants.

Some of the largest ongoing temporary migration programs in the world are in the Middle East – Bahrain, Kuwait, Saudi Arabia and the UAE being prominent examples. During the late eighties there was a big expansion in the size of the guest-worker programs in these rich Gulf countries as well an important change in the nature of the programs. In particular, there was large shift in the source countries for much of the migrant workforce, away from other Arab countries, such as Egypt, Yemen and Jordan, which had previously been the main sources from which migrant workers were drawn. Instead, these countries chose to deliberately replace temporary migrants of Arab origin with those of South (or South East) Asian origin. In fact, there was a decrease in not just the share, but even in the absolute number of Arab workers.[20] While a number of factors could have driven this policy switch, our analysis offers the intriguing possibility that the political sustainability of the expanded programs was possible precisely because of the cultural dissimilarity of the South Asian guest workers, as against the Arab guest workers. Indeed, Jureidini (2006) in his survey of temporary migration programs in the Gulf States, argues that one factor that contributed to the replacement of Arab workers with other Asians was that "Arabs were more likely to stay and eventually make demands for citizenship and political participation. Asians were considered more dependable and less demanding and were easily expelled."[21]

[20] The Arab share of the foreign worker population in the Arab countries of the Gulf Cooperation Council (GCC) went down from 56 percent in 1985 to 32 percent in 2002. This decrease in the Arab share of temporary migrants was mirrored by the rise in the share of South and South East Asian migrants over the same period. For details, see Kapiszewski (2006).

[21] One might be hesitant to draw wider implications, given the large differences in the nature of politics in liberal western democracies as compared to the Middle East. However, we should point out that a simple modification of our model, where elections are replaced with the threat of political instability in a single-party/authoritarian regime, would also generate very similar results.

3.2.2 Temporary and permanent migrants

So far we have considered the case when the marginal cultural impact of permanent migrants is so high that citizens decide only on the number of temporary migrants to be allowed into the country to meet the labor shortage v. If the cultural cost is more moderate, and this labor shortage is expected to last indefinitely into the future, it may be worthwhile to fill some of the positions with permanent migrants and then use temporary migrants to fill the remaining slots. Thus in this section, we make the following assumption:

Assumption 4: $\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(0) > y - w_0 - \lambda c_0 > 0 > \beta y(s+\gamma) - \frac{\lambda}{1+a}c'(v)$

This assumption implies that the marginal cultural impact of a few permanent migrants is small enough so as to make the overall gain from their employment greater than that from temporary migrants. However, the cultural cost from filling all v slots with permanent migrants is so high as to outweigh the economic gain from doing so. Under this assumption, in this section we study the political considerations in play when citizens choose the number of permanent migrants to bring in along with the number of temporary ones.

If $n_P(i)$ is the number of new permanent migrants admitted in period i and $n_T(i)$ is the number of temporary migrants allowed in that period (and due to be repatriated at the end of the period), the overall national welfare is given by:

$$\sum_{i=1}^{\infty} \delta^{i-1}[(y - w_0 - \lambda c_0)n_T(i) + (y - w_0 - \lambda c_0 + \frac{\delta}{1-\delta}\beta y(s+\gamma))n_P(i) - \delta\lambda c(\frac{\sum_{j=1}^{i} n_P(j)}{1+a})] \quad (12)$$

As before, $y - w_0 - \lambda c_0$ is a temporary migrant's contribution to national welfare net of the cultural costs he/she imposes. It is the same for a permanent migrant during the first period of stay, and changes to $\beta y(s+\gamma) - \lambda c(\frac{\sum_{j=1}^{i} n_P(j)}{1+a})$ for subsequent periods, which takes into account the part of the productive surplus retained by the native firms as well as the cultural costs imposed. This overall welfare is to be maximized subject to the government's incentive constraint, which is now given for each period i by:

$$\begin{aligned} &\theta\frac{\delta}{1-\delta}[\beta y(s+\gamma)n_T(i)] + \frac{\delta}{1-\delta}[\beta y(s+\gamma)(n_T(i) + n_P(i)) - \lambda c(\frac{n_T + \sum_{j=1}^{i} n_P(j)}{1+a})] \quad (13) \\ &\leq \theta[\frac{\delta}{1-\delta}R] + \frac{\delta}{1-\delta}[\{y - w_0 - \lambda c_0\}n_T(i) + \beta y(s+\gamma)n_P(i) - \lambda c(\frac{\sum_{j=1}^{i} n_P(j)}{1+a})] \end{aligned}$$

This is the same as constraint (10) in the case of only temporary migrants, but now taking into account that permanent migrants are also being brought in. The important extra factor at

work here is that the addition of permanent migrants changes the marginal cost of retaining the temporary workers permanently, from $\frac{1}{1+a}c'(0)$ to $\frac{1}{1+a}c'(\frac{n_T}{1+a})$.

In the first-best case i.e. without the incentive constraints, the optimal outcome would involve importing all permanent migrants (if any) in the first period itself and then filling the rest of the slots using a rotating pool of temporary migrants. The intuition for this stems from the fact that the cultural costs imposed by permanent migrants are the same regardless of when they are imported. If their productivity gains outweigh these costs, then the gains should be availed of as early as possible. We first show (in the lemma below) that even in the presence of constraints to ensure that the politician does not succumb to the firms' lobbying efforts, the structure of the solution remains similar, i.e., the optimal still involves importing permanent migrants only in the initial period, together with a rotating pool of temporary migrant workers. This helps to simplify analysis of the equilibrium, which we do in proposition 2.

Lemma 1 *In the presence of political constraints, the optimum will involve* $n_P(i) = 0$ *for* $i \geq 2$ *and* $n_T(1) = n_T(2) = n_T(3) = ...$

PROOF: See Appendix.

Denoting by n_P the number of permanent migrants admitted in the first period and by n_T the number of temporary migrants every period, the overall welfare is now given by:

$$\frac{1}{1-\delta}(y - w_0 - \lambda c_0)n_T + (y - w_0 - \lambda c_0)n_P + \frac{\delta}{1-\delta}[\beta y(s+\gamma)n_P - \lambda c(\frac{n_P}{1+a})] \tag{14}$$

while the government's incentive constraint is:

$$\begin{aligned} &\theta\frac{\delta}{1-\delta}\beta y(s+\gamma)n_T + \frac{\delta}{1-\delta}[\beta y(s+\gamma)(n_T+n_P) - \lambda c(\frac{n_T+n_P}{1+a})] \\ &\leq \theta\frac{\delta}{1-\delta}R + \frac{\delta}{1-\delta}[(y - w_0 - \lambda c_0)n_T + \beta y(s+\gamma)n_P - \lambda c(\frac{n_P}{1+a})] \end{aligned} \tag{15}$$

The equilibrium level of permanent and temporary migration is then determined by maximizing (14) subject to the above incentive constraint along with the constraint $n_T + n_P \leq v$. The following proposition compares it with the socially optimal level.

Proposition 2 *Under assumptions 1,2 and 4, under political constraints, the optimal mix of migrants will involve an excess number of permanent migrants as compared with the social optimum i.e.* $n_P^* > m_P$.

PROOF: See Appendix.

The intuition for the above result stems from the fact that by increasing the number of permanent migrants, the marginal cultural cost of admitting an extra migrant is raised. Thus the cultural impact of making temporary migrants permanent is now bigger. Since the politician cares (partially) about the welfare of the citizen voter, as a result his incentive constraint gets tightened. In other words, as the marginal cultural cost of immigration goes up, the politician becomes less likely to accept the lobby's bribe to retain the temporary migrants. Thus the permanent migrants play a deterrent role in reducing the politician's incentive problem with respect to temporary migrants. It is this additional deterrence effect that causes the citizens to choose permanent migrants beyond their socially optimal level.

How is this level of permanent migration affected by the various parameters? This is analyzed in the following corollary to proposition 2.

Corollary 2 *The level of permanent migration n_p^* decreases with (i) a rise in the world wage w_0, or (ii) an increase in the cultural cost of temporary migration c_0. The effect of a rise in the inter-temporal productivity gain s or in γ or in the cultural costs λ on the level of permanent migration is ambiguous.*

PROOF: See Appendix.

The intuition for the ambiguous comparative static results stems from the fact that permanent migrants impact both the incentive constraint for politicians as well as the overall surplus. Increases in factors such as firm-specific productivity s, or in the mobility costs γ, which raise firm profitability cause the firms to lobby politicians much more aggressively to retain the temporary workers. As noted before, by raising the marginal cultural cost, permanent migrants help to tighten the politician's incentive constraint. When the incentives are more skewed, as is the case when firm profitability is higher, the incentive gain from bringing in more permanent migrants is not as high. This calculation encourages a reduction in the number of permanent migrants brought in when s or γ is high. On the other hand, by raising the lifetime surplus from any permanent migrant, an increase in s or γ suggests an increase in their number. These effects go in opposite directions, and thus their overall impact on the number of permanent migrants depends on which effect dominates. Similarly, an increase in the cultural cost parameter λ positively impacts the incentive constraint, but negatively the overall surplus.

The previous section established the important policy conclusion that an easing of mobility restrictions γ for migrant workers could be potentially Pareto-improving. One may ask if a similar

conclusion is also true here i.e. when both temporary and permanent migrants are used to fill the labor shortage. The additional issue here is that a lowering of γ improves the outside option for permanent migrant workers; as a result their wages rise, and consequently the surplus enjoyed by native citizens from each permanent migrant decreases.[22] Of course, the decrease in surplus to each firm also means that their incentive to lobby the government for making temporary workers permanent falls. As a result more temporary workers can be brought in without violating the government's incentive constraint. These two effects can be seen by differentiating the overall lifetime national welfare (14) with respect to γ (using the Envelope theorem):

$$\frac{dW}{d\gamma} = \frac{\delta}{1-\delta}\beta y n_P + \frac{1}{1-\delta}(y - w_0 - \lambda c_0)\frac{d}{d\gamma}\{n_T(n_P)\}$$

where $n_T(n_P)$ denotes the maximum supportable level of temporary migrant workers n_T for a given level of permanent migrants n_P. As discussed earlier, a rise in mobility costs γ implies higher rents for the firms and therefore a lower number of temporary workers are supportable i.e. $\frac{d}{d\gamma}\{n_T(n_P)\}$ is negative. This "incentive effect" is captured by the second term in the expression above. On the other hand, the surplus from each permanent migrant, $\beta y(s+\gamma)$ increases as his wage is now lower. The first term in the expression captures this "wage effect". Which effect dominates? This is analyzed in the next proposition.

Proposition 3 *When δ is low and/or the gains from permanent migrants $\beta y(s+\gamma)$ relative to that from temporary migrants $y - w_0$ are not too high, overall welfare for the native citizens rises with a decrease in the mobility cost γ.*

PROOF: See Appendix.

The intuition for this proposition derives from the fact that productivity gains from permanent migrants are realized in the future. When δ is low, it implies that the future "wage effect" is small as compared to the "incentive effect", due to which more temporary workers can be brought in today. Thus in this case, the incentive gain due to a lower γ outweighs the loss from higher (future) wages and overall causes an increase in welfare. Secondly, when the productivity gains from permanent migrants are only slightly higher than that from temporary migrants, the number of permanent migrants brought in, n_P, is low (due to their higher cultural costs). The loss in welfare due to higher wages for permanent migrants is proportional to their number (it is $\frac{\delta}{1-\delta}\beta y n_P$ in the expression for $\frac{dW}{d\gamma}$ above) and is small when n_P is low. The welfare gain from being able

[22] This did not arise in the previous section, as in equilibrium, no permanent migrants were employed.

to hire more temporary workers (due to the incentive effect) is much larger and so again under these conditions, welfare for the native citizens is raised from an easing of the mobility restrictions for migrant workers. In fact, the permanent migrant workers gain as well as their wage also go up. Thus again, any policy that facilitates guest worker mobility across employers is potentially Pareto-improving in this situation.

4 Additional Issues

4.1 Migration Policy and Cultural Assimilation

Our analysis has so far has taken the cultural costs to be exogenously given. In reality, the magnitude of these cultural costs imposed by migrants depends on the degree to which they have culturally assimilated in the host country. For instance, a number of influential commentators have compared the difference between the immigrant experience in the United States versus that in much of Europe. In broad terms, the United States is considered to be more of a 'melting pot' where migrants invest in assimilation and are welcomed (Waters and Jiminez, 2005). In contrast, barring a few exceptions, in Europe migrants often do not make investments in assimilation and are socially segregated (Huntington, 2004). Indeed these broad patterns of cultural assimilation across the Atlantic also mirror differences in the nature of migration policy, with permanent migrants being much more important in the U.S.[23] In this section we show how our framework can be adapted to reflect these broad differences. In doing so, we show that the greater assimilation in the U.S. need not be because socio-cultural fundamentals are different. Rather, it may be because of the existence of multiple cultural equilibria linking migration policy and assimilation.

We begin by observing that the migrant's willingness to imbibe the local cultural ethos and assimilate is (in part) a choice variable for the migrant and is likely to be determined by the returns to this investment. From the migrant's point of view, the perceived returns to investment in socio-cultural assimilation is driven by two concerns. First is the expected length of time the

[23] For instance, an editorial in *The New Republic* (dated 04/17/2006) argues that "..there is little that is more antithetical to the American ideal than a guest worker. While there are dangers in romanticizing this country's immigrant heritage, it is an unmistakable part of the national ethos. For generations, immigrants have come to the United States in search of a better life. In the process, they often remake themselves — as Americans. Even those who are here illegally, and whom we call illegal immigrants, can transcend that identity — or at least see their children who are born here transcend it. But a guest worker and his family have no such opportunity for transcendence....Indeed, to see the pernicious (and un-American) nature of a guest-worker program, one need only look across the Atlantic at the misery such programs have wrought in Europe."

migrant worker plans to stay, work and live in the country.[24] Since our focus here is on the length of time that the migrant spends in the country (temporary versus permanent), we primarily focus on this channel. However, before we move on, it is perhaps appropriate to mention that there is a second factor which affects investment in cultural assimilation. This occurs if natives make complementary investments in accepting and welcoming migrants. After all, social interactions are a two-way process, depending on attitudes and investments made by both migrants and natives. Indeed it is easy to see that this two-way interaction can give rise to multiple equilibria.[25] While the possibility of multiple equilibria is relatively easy to see in the case of two-way investments by migrants and natives, there is an additional more subtle argument that generates a similar outcome through its interaction with migration policy. We describe this now.

In particular, for temporary migrants a key issue is whether they can reasonably expect to be made permanent. For example, for many migrant workers in the U.S., an H1-B temporary permit is perceived to be a reliable stepping stone towards their permanent resident status and eventual citizenship (see Table 1 for additional examples). Therefore, if temporary migrants believe that they have a good chance of being made permanent, then their payoff from investment in imbibing the local culture is much larger. Conversely, if they perceive themselves to be truly temporary (having to return to their home country at the end of their tenure), then such temporary migrants will have very little incentive to invest in cultural assimilation. On the other hand, the decision by temporary migrants to homogenize themselves or not affects the natives' perceived cultural costs in making them permanent, and thereby impacts their decision of how many temporary migrants to bring in the first place. Thus the two decisions (that by the migrants and the natives) are interdependent, resulting in the possibility of multiple equilibria.

To examine this possibility we extend our benchmark model in a simple way by endogenizing the migrants' decision at cultural assimilation and by allowing for the possibility that some temporary migrants may be made permanent in the long run. Specifically, temporary migrants can decide

[24] Dustmann (1999) shows using German data that the degree of investment in human capital (language) depends on the expected length of time the migrant expects to be in the host country.

[25] If a migrant believes that natives are relatively insular and unlikely to interact meaningfully with him, then he will have diminished incentives to invest in assimilation into the local culture and may indeed prefer to spend more of his time associating with fellow migrants. On the other side, if natives believe that migrants will not invest in assimilation, they too have little to gain from making an effort to culturally interact with the migrants. This may result in a "ghetto" like equilibrium where migrants are socially segregated from natives. In contrast, if each group believes that the other will also make investments in social integration, then we have an equilibrium where there is a good degree of socio-cultural assimilation.

whether or not to invest in assimilation with the host country culture (e.g. by learning the local language and customs, making an effort to attend and participate in local customs). We assume that if migrants incur a cost e, their level of assimilation increases from a_0 to a_1, where $a_0 < a_1$. This reduces the cost that they impose on the local society from $c(\frac{n}{1+a_0})$ to $c(\frac{n}{1+a_1})$. Temporary migrants' decision to incur this cost or not depends on their perceived probability of becoming permanent migrants into this society and their gains from such assimilation with the local culture. We denote migrants' gains from increased interaction with the locals by V, which is only realized if they stay permanently. Second, we allow for the possibility that natives may prefer some degree of cultural diversity.[26] To model this in the simplest manner, we assume that $d(n_P)$ is the diversity benefit to natives every period from bringing in n_P permanent migrants. However, apart from contributing to increased diversity, permanent migrants impose other costs on the natives as discussed before, and we still use $c(\frac{n_P}{1+a})$ to denote these costs. In all other respects the model is the same as earlier.

The timing of the game is as before, with n_T temporary migrants admitted at the beginning of each period. Each migrant decides whether or not to make the private investment in cultural assimilation with the local populace. At the end of the period, if the government succumbs to the firm lobby, all n_T are made permanent. On the other hand, if it does not succumb, then among this group of temporary migrants, n_P are made permanent. In making this decision, the government cannot observe the degree of assimilation undertaken by each individual migrant and so it chooses the n_P permanent migrants *randomly* from among the pool of n_T temporary migrants. Thus if n_P increases or the pool of temporary migrants n_T decreases, the chance for each individual migrant to be absorbed permanently goes up.

An equilibrium for this game consists of the number of temporary migrants n_T who are brought in, investment decisions by them in cultural assimilation and the fraction of them who are admitted as permanent migrants, along with (as before) an electoral rule specifying government re-election as a function of its actions.

Under these assumptions we can show the following results, summarized in the proposition below.

Proposition 4 *If the ratio e/V is in an intermediate range, there exist multiple equilibria where, in one equilibrium, temporary migrants invest in cultural assimilation and are likely to be made*

[26] This relaxes the assumption made in our benchmark model that permanent migrants only impose (negative) cultural costs on the natives. While a simplification, in reality natives perhaps also gain from the cultural diversity that is brought by new migrants.

permanent citizens; and in the other equilibrium, temporary migrants do not invest in cultural assimilation and are likely to remain temporary. In contrast, if e/V is sufficiently small (large), then there is a unique equilibrium, where all temporary migrants invest (do not invest) in cultural assimilation.

The argument is the following. First, if a_i is the degree of assimilation by the temporary migrants, then the optimal number of permanent migrants requires trading off the diversity benefits against the cultural costs (ignoring productivity gains). This results in the optimal number of permanent migrants being given by:

$$d'(n_P^i) = \frac{1}{1+a_i} c'(\frac{n_P^i}{1+a_i}) \tag{16}$$

Note that when the assimilation level a_i is high, it is optimal to admit more permanent migrants as the marginal cost that they impose are smaller. Let us denote by n_P^1 and n_P^0 the number of permanent migrants and by n_T^1 and n_T^0 the number of temporary migrants when the migrants do and do not assimilate respectively. Note that $n_P^0 < n_P^1$ as the costs imposed by assimilated migrants is lower.

From each migrant's perspective, the probability of being made permanent is given by n_P^i/n_T^i and thus they incur the cost of cultural assimilation only if:

$$\frac{n_P^i}{n_T^i} V - e > 0 \tag{17}$$

As noted before $n_P^0 < n_P^1$. To study the impact of a_i on the number of temporary migrants to be brought in, recall from section 3 that as the cultural cost imposed by permanent migrants is lowered, the government's incentive constraint becomes harder to sustain as deviating from the given policy does not cost as much. This point is made specifically in Corollary 1 where as a increases, n_T goes down. In the present context, since $a_1 > a_0$, it implies that $n_T^1 < n_T^0$.

Combining the two facts, $n_P^0/n_T^0 < n_P^1/n_T^1$. In other words, in the case where migrants do invest in assimilation, the pool of temporary migrants brought in every period is smaller and the number of them made permanent is higher. Thus the chances for any individual migrant to be made permanent is high in this case, thus justifying their investment in assimilation in the first place. More specifically, this happens if $\frac{n_P^1}{n_T^1} V > e$. At the same time, if $e > \frac{n_P^0}{n_T^0} V$, it implies that of the large pool of temporary migrants brought in every period, too few are made permanent for any of them to invest in assimilation with the local culture. Thus, when $\frac{n_P^1}{n_T^1} V > e > \frac{n_P^0}{n_T^0} V$, we have the possibility of multiple equilibria.

On the other hand, if $\frac{n_P^0}{n_T^0}V > e$, then the only equilibrium is where everyone invests in assimilating into the local society, while at the opposite extreme, if $e > \frac{n_P^1}{n_T^1}V$, then the only equilibrium involves no assimilation by migrants, with very few temporary migrants being made permanent and most being repatriated at the end of their tenure. This completes the argument.

4.2 Cultural Heterogeneity and Migration: Some Microfoundations

The maintained assumption of this paper is that worker migration affects native welfare not only through its effect on overall income but also its effect on the culture of the host country. We further assumed that (under some conditions) the effects of permanent migration on native welfare are likely to be different from that of temporary migration. Indeed we suggested that even if one set aside distributional considerations, the political backlash against permanent migration may well be more severe than against temporary migration. We now elaborate on one such mechanism.

The key distinction that we highlight is that permanent immigrants acquire citizenship and voting rights. This has the potential to change the political dynamic, at least at the local level. For example, take education. As pointed out by Alesina, Baqir and Hoxby (2004), there is a fundamental trade-off that affects the provision of local public goods like education, namely that between the benefit of economies of scale and the cost of an increasingly heterogeneous population. For instance, there may be significant differences in preferences (on average) for bilingual education between the native and the immigrant population. Natives may prefer to spend school resources for extra piano classes while the immigrant may prefer particular language lessons. For simplicity, we capture these differences in a single dimension – the unit line. Assume that an individual i has payoffs given by $u_i = w - A(g - x_i)^2$, where g is the location of the public good provided (e.g. the share of resources spent on piano lessons) and x_i is the 'location' of the individual i, representing his ideal choice. Here A is a parameter denoting the importance of the publicly provided good in an individual's utility. It is likely to be low in an economy where there are ample alternatives to public education, for example. The second term in the utility function is the payoff to the individual from the local public good, with his payoff decreasing (at a convex rate) in the distance between his ideal point and the point actually chosen. Given this utility function, an individual's ideal choice for the public good is $g = x_i$.

Let us assume that native preferences are uniformly distributed on the unit line, with the (pre-immigration) median voter preferences among the natives (and therefore the location of the public good) given by $g^N = \frac{1}{2}$. To make the point in the simplest manner, we assume that all

migrants are identical and have their public good preferences given by $x_M = 1$. Then the addition of permanent migrants to the society results in a shift in the identity of the median voter. Suppose the initial mass of natives is unity, and that of the migrants is n; the median voter now changes from the one located at $x_i = \frac{1}{2}$ to that located at $x_i = \frac{1+n}{2}$, resulting in a change in public good provision to $g^M = \frac{1+n}{2}$. Given the preferences, the utility of a native located at x_i is now given by $u_i = w - A(\frac{1+n}{2} - x_i)^2$; thus, natives whose preferences are closer to $x_i = 1$ gain, while those located near $x_i = 0$ lose. What about overall welfare? Evaluating aggregate utility for the natives, it changes from $w - \frac{A}{12}$ to $w - \frac{A}{12}[1+3n^2]$ after the addition of a mass n of permanent migrants to the society. Thus there is a decrease in overall welfare by $\frac{A}{4}n^2$. The following proposition summarizes the impact.

Proposition 5 *Overall welfare for the native population falls at an increasing rate with permanent migration. Furthermore, the negative impact of permanent migration is higher the greater is the importance of public goods on citizens' welfare.*

Note that, as we have assumed in reduced form for our basic model, the cost imposed by the migrants is convex in their number. Notice also that the impact is higher the bigger is A. This implies that the constraints on immigration are likely to be higher in countries where there is greater dependence on goods and services that are publicly provided and hence there is enhanced concern that immigration may change the nature of their provision. Again, this may serve to partly explain the difference in attitudes towards immigration between the US and Europe (where publicly provided goods/services are more prevalent than in the US).

Notice that temporary migrants do not skew the allocation of resources for local public goods as much. This is mainly because of two factors: one, temporary migrants lack political clout and are unlikely to affect public good allocation to the same degree as permanent migrants; two, temporary migrants are less likely to bring with them their children and families, and therefore may not be as concerned with the provision of public goods such as education.

5 Conclusion

Aging populations, rising pension payments and labor shortages in parts of the developed world are likely to increase the debate on the shape of migration from the developing world. This paper explores a neglected channel that may prevent lowering of barriers to labor migration even in the face of greater economic gain – namely, concern about the country's culture and identity. We

showed how culture can affect both the extensive margin (i.e. size) of migration and the intensive margin (i.e. temporary versus permanent migration). Despite the potential to boost world income, the analysis here suggests that any policy aimed at encouraging migration will face political limits driven by cultural concerns.[27] In particular we demonstrate that countries may fail to encourage worker migration even if such a policy has no distributional impact and where enforcement of policy is administratively costless. The inefficiency that arises affects both the levels of temporary and permanent migration. Furthermore, our framework also allows us to understand which countries may find it politically difficult to take advantage of the globalization of labor migration and points out that simple alterations in worker-employer tying requirements can help make greater amounts of labor migration politically feasible.

While the era of substantially freer international labor migration may be a long time coming, our formal model suggests that there are several politically feasible policies that may allow at least some of the gains from labor market liberalization to be realized. This paper is but a first step in examining the impact of culture on the politics and pattern of migration policy. Many other issues remain for future work – for example, the dynamics in the process of cultural assimilation by migrants and the resulting impact on future migration policy. Should host countries deliberately choose a diverse migrant pool or focus instead on importing migrants from a particular cultural area? We leave this and much else for further exploration.

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[27] Kremer and Watt (2009) propose a policy which is designed to be both Pareto improving and politically feasible. They suggest that relaxing restrictions on the "migration of foreign private household workers can potentially (1) equalize wages among natives, (2) provide a fiscal benefit, and (3) limit the perceived impact of immigration on culture and crime." Despite its attractive features, our framework suggests caution about some of the political constraints that even such an apparently attractive program might face. The key point is that the household sector is one in which the (employer-specific) productivity of the worker naturally rises over time. For example, over time there is likely to be a household-specific increase in productivity of au pairs. By contrast, there are likely to be small differences in the productivity of workers with different amounts of experience in, say, the fast-food industry. Our model suggests, *pace* Kremer and Watt (2009), that the political feasibility of temporary migration programs might be greater in the latter sector than in the household production sector.

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Appendix

Proofs:

Proof of Lemma 1:

It is useful to rewrite the problem in terms of the total number of permanent residents in the country at any point in time. Denoting this by $z(i)$ for period i, the problem becomes:

$$\max_{n_T(i),z(i)} (y-w_0-\lambda c_0)(n_T(1)+\delta n_T(2)+.....)+[(1-\delta)(y-w_0-\lambda c_0)+\delta\beta y(s+\gamma)](z(1)+\delta z(2)+.....) - \delta\lambda c(\frac{z(1)}{1+a}) - \delta^2\lambda c(\frac{z(2)}{1+a}) - .....$$

subject to the government's incentive constraint for all i:

$$\theta\beta y(s+\gamma)n_T(i) + \beta y(s+\gamma)n_T(i) - \lambda c(\frac{n_T(i)+z(i)}{1+a})] \leq \theta R + (y-w_0-\lambda c_0)n_T(i) - \lambda c(\frac{z(i)}{1+a})]$$

Thus each combination of $n_T(i)$ and $z(i)$ satisfy the **same** incentive constraint, and the contribution to overall welfare is given by $(y-w_0-\lambda c_0)n_T(i) + [(1-\delta)(y-w_0-\lambda c_0) + \delta\beta y(s+\gamma)]z(i) - \delta\lambda c(\frac{z(i)}{1+a})$, discounted appropriately. Hence it implies that $n_T^*(1) = n_T^*(2) = n_T^*(3)....$ and $z^*(1) = z^*(2) = z^*(3)....$ because if $n_T^*(i) \neq n_T^*(i')$ and/or $z^*(i) \neq z^*(i')$, one would replace the combination $(n_T^*(i), z^*(i))$ or $(n_T^*(i'), z^*(i'))$ by the other depending on for whichever the value $(y-w_0-\lambda c_0)n_T^* + [(1-\delta)(y-w_0-\lambda c_0) + \delta\beta y(s+\gamma)]z^* - \delta\lambda c(\frac{z^*}{1+a})$ is higher (as both satisfy the same incentive constraint).

This implies that the number of temporary migrants imported every period is the same, and $z(1) = z(2) = z(3) = ...$ i.e. all the permanent migrants are imported in the first period itself. ■

Proof of Proposition 2: Denote l as the Lagrange multiplier on the inecntive constraint (15) and k as the Lagrange multiplier on the constraint $n_T + n_P \leq v$. The first order conditions with respect to n_T and n_P are respectively:

$$\frac{1}{1-\delta}(y-w_0-\lambda c_0) - l\{(1+\theta)\beta y(s+\gamma) - (y-w_0-\lambda c_0)n_T - \frac{\lambda}{1+a}c'(\frac{n_T+n_P}{1+a})\} - k = 0$$

$$(y-w_0-\lambda c_0) + \frac{\delta}{1-\delta}[\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a})] + l\frac{\lambda}{1+a}\{[c'(\frac{n_T+n_P}{1+a}) - c'(\frac{n_P}{1+a})]\} - k = 0$$

Combining the two equations gives:

$$\frac{\delta}{1-\delta}[\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a}) - (y-w_0-\lambda c_0)] = -l[(1+\theta)\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a}) - (y-w_0-\lambda c_0)]$$

Since $\theta > 0$, and $l \geq 0$, if $\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a}) - (y - w_0 - \lambda c_0) \geq 0$, then the equation cannot hold (since the left-hand side will be positive, while the right-hand side will be negative). Thus, it must be that $\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a}) - (y - w_0 - \lambda c_0) < 0$. Comparing this with the social optimum condition (3) shows that $n_P > m_P$.

Proof of Corollary 2:

Let us rewrite the incentive-constraint when it binds:

$$(1+\theta)\beta y(s+\gamma)n_T - (y - w_0 - \lambda c_0)n_T - \lambda[c(\frac{n_T + n_P}{1+a}) - c(\frac{n_P}{1+a})] = \theta R \tag{18}$$

i.e. for a given level n_P, it gives a maximum supportable level of n_T as a function of n_P. Let us call this function as $n_T(n_p)$. The left-hand side of the above equation is similar to that in figure 2 i.e. it is inverse U-shaped in n_t and its intersection with the R line gives $n_T(n_P)$. Given that $c(.)$ is convex, an increase in n_P lowers the left-hand side of the above equation and thus increases $n_T(n_P)$ i.e. $\frac{dn_T}{dn_P} > 0$.

Now, one can use $n_T(n_P)$ to rewrite the objective function in terms of only the number of permanent migrants as:

$$\max_{n_P} \frac{1}{1-\delta}(y - w_0 - \lambda c_0)n_T(n_P) + (y - w_0 - \lambda c_0)n_P + \frac{\delta}{1-\delta}[\beta y(s+\gamma)n_P - \lambda c(\frac{n_P}{1+a})]$$

with the attendant first-order condition:

$$\frac{1}{1-\delta}(y - w_0 - \lambda c_0)n_T'(n_P) + (y - w_0 - \lambda c_0) + \frac{\delta}{1-\delta}[\beta y(s+\gamma) - \frac{\lambda}{1+a}c'(\frac{n_P}{1+a})] = 0 \tag{19}$$

Analysis of this equation shows how the level of permanent migration, n_P, is affected by the various parameters.

The various parameters can affect this equation either directly or though their effect on $n_T'(n_P)$.

One can derive the expression for $n_T'(n_P)$ as:

$$\frac{dn_T}{dn_P} = \frac{\frac{\lambda}{1+a}\{c'(\frac{n_T+n_P}{1+a}) - c'(\frac{n_P}{1+a})\}}{(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0) - \frac{\lambda}{1+a}c'(\frac{n_T+n_P}{1+a})}$$

Hence $n_T'(n_P)$ decreases as β, s, γ, w_0 or c_0 increases or as λ decreases.

Returning to (19), an increase in θ lowers the left-hand side only through its effect on $n_T'(n_P)$. Thus n_P^* falls as θ increases. A rise in w_0 or c_0 lowers the left-hand side both directly as well as their effect on $n_T'(n_P)$; hence n_P^* falls as w_0 or c_0 increases. An increase in the cultural cost parameter λ or a decrease in the intertemporal productivity parameters s, γ have two countervailing effects:

they lower the left-hand side via their direct negative effect on the marginal cultural cost and marginal productivity, but at the same time raise the left-hand side through their positive effect on $n_T(n_P)$. Thus their overall impact on the level of permanent migration is ambiguous.

PROOF OF PROPOSITION 3:

From (18), one can derive $\frac{d}{d\gamma}\{n_T(n_P)\}$. Inserting this into the expression for $\frac{dW}{d\gamma}$, one gets:

$$\frac{dW}{d\gamma} = \frac{\beta y}{1-\delta}\frac{\delta[(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0) - \frac{\lambda}{1+a}c'\left(\frac{n_T+n_P}{1+a}\right)]n_P - (1+\theta)(y-w_0-\lambda c_0)n_T}{(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0) - \frac{\lambda}{1+a}c'\left(\frac{n_T+n_P}{1+a}\right)}$$

Since the denominator is positive (from the first-order conditions for deriving n_T and n_P above), the sign of $\frac{dW}{d\gamma}$ is determined by the sign of the numerator. Now,

$$\begin{aligned}
& \delta[(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0) - \frac{\lambda}{1+a}c'\left(\frac{n_T+n_P}{1+a}\right)]n_P - (1+\theta)(y-w_0-\lambda c_0)n_T \\
\leq\ & \delta[(1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0)](v - n_T) - (1+\theta)(y-w_0-\lambda c_0)n_T \\
\leq\ & \delta K v - [\delta K + (1+\theta)(y-w_0-\lambda c_0)]n_T(0) \\
\leq\ & 0 \quad \text{if } \delta K v/[\delta K + (1+\theta)(y-w_0-\lambda c_0)] \leq n_T(0)
\end{aligned}$$

where $K = (1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0)$. The first inequality follows from the fact that $n_T + n_P \leq v$, while the second inequality comes from the fact that n_T is an increasing function of n_P and so $n_T(n_P) \geq n_T(0)$. Thus to determine if $\frac{dW}{d\gamma} \leq 0$, one requires to plug in $n_T = \frac{\delta K v}{[\delta K + (1+\theta)(y-w_0-\lambda c_0)]}$ into the left-hand side of (18) with $n_P = 0$ and check if it is less than θR i.e.

$$\frac{dW}{d\gamma} \leq 0 \text{ if } K\frac{\delta K v}{[\delta K + (1+\theta)(y-w_0-\lambda c_0)]} - \lambda c(\frac{\delta K v}{[\delta K + (1+\theta)(y-w_0-\lambda c_0)]}/(1+a)) \leq \theta R$$

The left-hand side of the above inequality is increasing in δ and in K and is satisfied when either δ or $K = 0$. Thus $\frac{dW}{d\gamma} \leq 0$ when δ is low or when $K = (1+\theta)\beta y(s+\gamma) - (y - w_0 - \lambda c_0)$ is low i.e. when $\beta y(s+\gamma)$ is small compared to $(y - w_0 - \lambda c_0)$.