RUHR

ECONOMIC PAPERS

Lena Calahorrano
Philipp an de Meulen

Demographics and Factor Flows

A Political Economy Approach

RWI #299

Imprint

Ruhr Economic Papers

Published by

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI)
Hohenzollernstr. 1-3, 45128 Essen, Germany

Editors

Prof. Dr. Thomas K. Bauer
RUB, Department of Economics, Empirical Economics
Phone: +49 (0) 234/3 22 83 41, e-mail: thomas.bauer@rub.de

Prof. Dr. Wolfgang Leininger
Technische Universität Dortmund, Department of Economic and Social Sciences
Economics – Microeconomics
Phone: +49 (0) 231/7 55-3297, email: W.Leininger@wiso.uni-dortmund.de

Prof. Dr. Volker Clausen
University of Duisburg-Essen, Department of Economics
International Economics
Phone: +49 (0) 201/1 83-3655, e-mail: vclausen@vwl.uni-due.de

Prof. Dr. Christoph M. Schmidt
RWI, Phone: +49 (0) 201/81 49-227, e-mail: christoph.schmidt@rwi-essen.de

Editorial Office

Joachim Schmidt
RWI, Phone: +49 (0) 201/81 49-292, e-mail: joachim.schmidt@rwi-essen.de

Ruhr Economic Papers #299

Responsible Editor: Christoph M. Schmidt

ISSN 1864-4872 (online) – ISBN 978-3-86788-344-3

Ruhr Economic Papers #299

Lena Calahorrano and Philipp an de Meulen

Demographics and Factor Flows

A Political Economy Approach

RWI

Bibliografische Informationen der Deutschen Nationalbibliothek

Die Deutsche Bibliothek verzeichnet diese Publikation in der deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über: *http://dnb.d-nb.de* abrufbar.

ISSN 1864-4872 (online)
ISBN 978-3-86788-344-3

Lena Calahorrano and Philipp an de Meulen[1]

Demographics and Factor Flows – A Political Economy Approach

Abstract

We investigate the effect of population aging on international factor flows in a political-economy framework. Political barriers to immigration in developed countries and insecure property rights in developing countries impede factor flows. Taking into account different generations' conflicting attitudes towards immigration and expropriation, we explore how these policy barriers interact. We find that incentives to expropriate increase as more emigration from the developing country takes place. Meanwhile, the industrialized country admits less immigrants as less capital is allocated to the developing country. Furthermore, the effects of population aging on international factor flows are considerably underestimated if one does not take into consideration the interactions between immigration and expropriation policies.

JEL Classification: D78, F21, F22, J10

Keywords: Demographic change; political economy; migration; foreign direct investment

December 2011

1 Lena Calahorrano, Institut der deutschen Wirtschaft Köln; Philipp an de Meulen, RWI. *– We thank Marta Aloi, Gabriel Felbermayr and Christoph Lülfesmann for valuable comments. We are especially indebted to Philipp Harms and Oliver Lorz for their support. This research project was sponsored by the German Research Foundation (DFG).* *– All correspondence to Philipp an de Meulen, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany. E-mail: philipp.andeMeulen@rwi-essen.de.*

1 Introduction

The populations of virtually all industrialized countries and many developing countries age. However, demographic structures differ widely between industrialized and developing countries. In general, rich industrialized countries' populations are older since birth rates are lower and life expectancies are higher than in the developing world. Since individuals accumulate capital throughout their working life, industrialized countries dispose of relatively large stocks of productive capital per worker. This adds to high wages but low capital returns in comparison to developing countries. Consequently, large efficiency gains from international factor flows seem possible.

The significance of demographic structures for factor flows has aroused international interest, see, for instance, the United Nations' report on replacement migration (UNPD 2001) or INGENUE (2001) and Brooks (2003) for international capital flows. However, political constraints to factor flows exist both in developing and developed countries. Developing countries with a favorable demographic structure to inward investment often do not offer the institutional framework for international investors to fully reap efficiency gains. Governments of industrialized countries in turn tend to be sensitive to native resentments toward the admission of immigrants. Observed international factor flows are indeed far too low to equalize the returns to capital and labor. Brooks (2003) notes that capital flows would be considerably lower than predicted by his model if institutional risk was taken into account. Concerning labor, Facchini and Mayda (2008) make restrictive immigration policies responsible for the low level of international flows.

Hence, while international demographic differences induce economic incentives for factor flows, capital and labor mobility is politically restricted. These political restrictions are themselves affected by demographic structures: Harms and an de Meulen (2010) and Harms and an de Meulen (2011) show that expropriation decisions are affected by the age structure in the home economy, if governments take the different political attitudes within population into account. A large share of young individuals in developing countries may help to secure foreign investment. Since young agents earn mainly labor income, they benefit from high wages payed by highly productive multinationals. Moreover, due to their longer time horizon, they are particularly affected by potential investment embargoes in the wake of expropriation. Meanwhile, Calahorrano and Lorz (2011) show in a dynamic model with two overlapping generations that aging has an expansionary effect on demand for immigrants. This is because young immigrants are substitutes to (young) workers and complements to (older) capital owners. Pay-as-you-go pension systems may enhance demand for immigrants in the wake of population aging if contributions rather than benefits are flexible, see Haupt and Peters (1998) and Calahorrano (2010).

Based on this research, we jointly analyze migration and investment barriers in a com-

prehensive model. We consider a one-period setting with sequential decisions in two open economies, each populated by two generations. While the majority is young in the developing country, the reverse is true for the industrialized country. In both economies, the government sets policy as to maximize its political support among the two generations. The government's policy decision in the industrialized country is how many immigrants to admit, while in the developing country, imported capital can either be expropriated or not.

As in models without policy restrictions, migration and FDI turn out to be substitutes. However, the drivers behind this result are fundamentally different. The volume of FDI influences immigration policy, and analogously, the volume of migration influences the decision to expropriate. As more emigration from the developing country takes place, the share and thus political weight of the group opposing expropriation decreases. Meanwhile, as more capital is allocated to the developing country, the industrialized country admits less immigrants for two reasons. Firstly, the loss in gross returns on FDI induced by emigration increases the larger the volume of FDI. Secondly, the potential impact of immigration on the young generation's welfare given by the wage bill decreases since domestic wages also decrease.

We also investigate the effect of population aging in the two countries on factor flows. As the share of old individuals in the industrialized country increases, so does the industrialized country's demand for immigrants, whereas the volume of non-expropriation compatible FDI is unaffected. Demand for immigrants also increases as the share of old individuals in the developing country increases. However, an increase in the share of old individuals in the developing country decreases the volume of non-expropriation compatible FDI. Furthermore, we show that the effects of population aging become stronger when the interplay of policies is taken into account.

The remainder of the paper is structured as follows. We set up the economic model in Section 3. Section 4 analyzes the developing country's expropriation decision for exogenous migration. Similarly, Section 5 analyzes the industrialized country's immigration policy for given FDI. Section 6 simultaneously considers migration and investment policies. Sections 4, 5 and 6 all explore the impact of population aging on policies. Finally, Section 7 concludes.

2 Related Literature

Our analysis draws on two strands of literature. The first one deals with the impediments to capital flows from rich to poor countries. Contrary to Lucas (1990), Alfaro et al. (2008) find that bad institutional quality does play a major role in explaining the low level of capital investment in poor countries. The basic problem is that a sovereign authority cannot be enforced to not violate property rights of private firms. To prevent investor-hostile actions, capital investment must be incentive compatible in a way that the sovereign must be willing

not to expropriate. Several authors deal explicitly with expropriation risk of FDI. Eaton and Gersovitz (1984), for example, argue that the mere existence of expropriation risk distorts FDI flows even if expropriation does not occur. Cole and English (1991) and Thomas and Worrall (1994) as well as Aguiar and Amador (2011) and Aguiar et al. (2009) model the political economy of expropriation as a game between international investors and a host-country government. Expropriation generates immediate benefits but future costs, as investors are assumed to punish the host country for expropriation by withholding future investment. In such an environment, the government decides to expropriate unless the present value of the costs exceed the benefits. The authors find that in order to avoid expropriation, FDI must not exceed a critical threshold.

The second strand of literature we build on deals with endogenous immigration policy. In the static models by Benhabib (1996) and Mazza and van Winden (1996), individuals support admitting immigrants if these are different from themselves. Preferences may be reversed if immigrants receive political rights. This is also an important prediction of the dynamic models of Dolmas and Huffman (2004) and Ortega (2005). In our model, old capital owners' immigration preferences are limited, even though immigrants do not have any political rights. This is because migration entails a non-economic disutility and because it raises the capital intensity and thus lowers returns on the part of capital invested in the developing country, although it raises capital returns in the industrialized country. As we do, Sand and Razin (2009) analyze the impact of aging on immigration and also on redistribution policy. In their model the median voter's identity may change not only due to native population aging but also due to the immigration of individuals who have more children than natives. This may restrain the old's preference for admitting immigrants. We focus on the effect of marginal changes in the population share of both generations. In contrast to Sand and Razin, we therefore assume that the median voter in the industrialized country is always old.

3 The Basic Model

We consider an industrialized country and a developing country, both populated by young and old individuals. Each young individual supplies one unit of labor, potentially in either country, while the old individuals are out of the labor force.[1] Each old individual in the industrialized country owns a given amount of capital $\bar{k}$. The old in the developing country do not own any productive capital, only and endowment e^* which they can consume, as in Cole and English (1991). This is a plausible assumption since financial institutions are

[1]This is a common simplification in models on demographic change. A more sophisticated set-up with many generations could capture the gradual change in the relative importance of labor and capital income as individuals grow older. However, assuming only two generations is sufficient to illustrate the central conflict between younger and older individuals.

rudimentary in many developing countries, and savings often take the form of tangible assets.[2] The size of the total population is normalized to one in both countries:

$$N^y + N^o = 1 \qquad \text{and} \qquad N^{y*} + N^{o*} = 1 \,,$$

where the asterisk denotes the developing country's variables. We assume that the old are in the majority in the industrialized country, while the opposite holds for the developing country, that is $N^o > 0.5$ and $N^{o*} < 0.5$.

In both countries a homogeneous good is produced with a Cobb-Douglas production function:

$$Y = AK^\alpha L^{1-\alpha} \quad \text{and} \quad Y^* = \tilde{A}(K^*)^\alpha (L^*)^{1-\alpha} \,.$$

The size of the capital stock owned by the old generation in the industrialized country is $\bar{k} \cdot N^o$. Production in the developing country hinges on capital inflows from the industrialized country ($K^* = \bar{k} \cdot N^o - K$) since the developing country's inhabitants own no productive capital. We assume that foreign direct investment is administered by a mutual fund, which coordinates the single investment decisions.

In the industrialized country total factor productivity (TFP) A is assumed to exceed TFP in the developing country. This results from a less favorable business climate, for instance due to an inferior infrastructure, in the developing country. However, capital flows from the industrialized country are accompanied by technological expertise. Therefore, TFP $\tilde{A}$ exceeds the level A^* the developing country would achieve without the foreign expertise:

$$\tilde{A} = \frac{1}{\theta} A^* \quad \text{with} \quad 0 < \theta < 1 \,.$$

The foreign investors' productivity thus not only hinges on the initial conditions they find in the developing country – such as the state of the infrastructure and know-how, the regulatory burden etc. – but also on their know-how and their capacity to cope with these conditions.

Defining M as labor migration from the developing to the industrialized country, factor prices are given by

$$w = (1-\alpha) A \left(\frac{K}{N^y + M} \right)^\alpha \,, \quad r = \alpha A \left(\frac{K}{N^y + M} \right)^{\alpha - 1} \,,$$
$$w^* = (1-\alpha) \tilde{A} \left(\frac{K^*}{N^{y*} - M} \right)^\alpha \quad \text{and} \quad r^* = \alpha \tilde{A} \left(\frac{K^*}{N^{y*} - M} \right)^{\alpha - 1} \,,$$

in the industrialized and the developing country respectively. Both countries' governments set policy to maximize political support within the population, given by the weighted sum

[2] When introducing the expropriation policy in the developing country later in this section we argue why the assumption that the developing country's old do not own any capital combined with labor in production does not drive our results.

of inhabitants' utilities. Each agent's weight equals her (post-migration) population share. As argued by Hillman and Weiss (1999), such a framework is more appropriate for modeling representative democracies than a median voter framework.[3] It can be motivated by a probabilistic voting model as in Lindbeck and Weibull (1987) or Coughlin et al. (1990) and is quite common by now as the textbook treatments by Persson and Tabellini (2000) and Mueller (2003) show.

The respective government objective functions are

$$W = \frac{N^o}{1+M} \cdot U^o + \frac{N^y + M}{1+M} \cdot U^y \quad \text{and} \quad W^* = \frac{N^{o*}}{1-M} \cdot U^{o*} + \frac{N^{y*} - M}{1-M} U^{y*} \, .$$

The developing country's government does not take into account emigrants' utility, once those have exited the country. Analogously, immigrants to the industrialized country enter the industrialized country's objective function.

The policy decision in the developing country concerns the expropriation of foreign capital. Expropriation refers to the seizure of the capital stock, and, for simplicity, it is assumed to be always total. If the *developing* country's inhabitants incurred no costs from expropriation, the developing country would be subject to a classical time-inconsistency problem and would always expropriate. However, expropriation usually comes at some cost, explaining why international capital flows take place despite the risk of expropriation. While we rule out embargo threats as a measure to impede expropriation, we adopt a different approach, chosen e.g. by Eaton and Gersovitz (1984), Azzimonti and Sarte (2007) and Harms and an de Meulen (2011): since foreign investors lose control over invested capital after expropriation, they will no longer provide their technological expertise.[4] As a consequence of the withdrawal of foreign knowledge, TFP drops to A^* in the developing country. While the seized capital stock may nevertheless be used for production, the productivity breakdown reduces output.

The benefit from expropriation (the gross return to capital) is distributed equally among the developing country's old and those young who have not emigrated: each inhabitant of the developing country receives a transfer t with

$$t = \frac{T}{1-M} = \frac{(1 - \delta + \theta r^*) K^*}{1-M} \, .$$

Importantly, the costs of expropriation that the developing country incurs do not affect its

[3] While political regimes in many developing are rather non-democratic, it is nevertheless appropriate to apply the concept of support-maximizing governments. Even if political rights are not allocated fairly, regimes cannot fully ignore the political preferences within society to not run the risk of revolution, see Acemoglu and Robinson (2001).

[4] In a setting with a longer time horizon, one could also argue that expropriation reduces future capital inflows, see Cole and English (1991) and Thomas and Worrall (1994). However, the time-inconsistency problem is also present in the one-period setting that we consider: when it comes to the expropriation decision, capital investment is sunk.

inhabitants equally. In our setting, the TFP loss lowers the young generations wages, while the old generation is not affected negatively. Expropriation thus induces a distributional conflict among demographic lines. Note that relaxing our assumption that the developing country's old do not own capital to be combined with labor in production does not affect this intergenerative conflict: Assume a situation, where the old generation in the developing country owns domestic firms which compete with firms run by foreign investors. Labor is assumed to allocate to both sectors until wage levels even out. Then, as a consequence of expropriation and the subsequent technology drop in foreign firms, the wage level in the foreign sector decreases and labor will reallocate to domestic firms. As a result, the old capital owners from the developing country benefit from higher domestic capital returns. In such an environment, the distributional conflict is even reinforced.

The industrialized country's government decides on the number of admitted immigrants. Immigration to the industrialized country affects its citizens' welfare via its effect on factor prices. The young generation suffers from additional competition on the labor market which lowers wages. The old generation benefits from increasing capital returns on the part of capital invested at home (k) and suffers from decreasing returns on that part invested in the foreign developing country (k^*). Be aware that k and k^* do not denote the capital intensities in production (K/L and K^*/L^*) but rather the capital used in home and foreign production per investor (K/N^o and K^*/N^o). Individuals' utility is linear in consumption:

$$U^i = c^i \quad \text{and} \quad U^{i*} = c^{i*} \,, \qquad i = y, o \,,$$

with

$$\begin{aligned} c^y &= w \,, \\ c^o &= k(1 + r - \delta) + k^*(1 + r^* - \delta) \,, \end{aligned}$$

and

$$c^{y*} = \begin{cases} w & \text{in case of emigration} \\ w^* & \text{in case of non-expropriation} \\ \theta w^* + t & \text{in case of expropriation} \,, \end{cases}$$

$$c^{o*} = \begin{cases} e^* & \text{in case of non-expropriation} \\ e^* + t & \text{in case of expropriation} \,. \end{cases}$$

As a benchmark against which we can compare a situation with an interplay of policies, we set up two distinct models. In the first model, FDI is endogenously determined by the expropriation decision in the developing country while migration is exogenous. Conversely, in

the second model migration is determined by policy in the industrialized country while FDI is exogenous. We also analyze the impact of demographic changes in these two benchmark models. Finally, we set up a model where both policies are endogenous. In this model population aging has even stronger effects. None of these models can be solved analytically and we therefore recur to numerical simulations. In choosing values for our benchmark parameters we adhere to common assumptions in the literature. The chosen values are presented in Table 1.

Table 1: Benchmark parameter values

Parameter	Parameter value	Source
α	0.35	Börsch-Supan et al. (2003)
A	1	Normalization
A^*	0.5	Hall and Jones (1999) Dreher et al. (2007)
$\tilde{A}$	0.8	See text
N^y	0.44	UNPD (2006)
N^{y*}	0.57	UNPD (2006)
$\bar{k}$	0.16	See text
δ	0.7	Various sources

According to Börsch-Supan et al. (2003), the production share of capital is usually set between 0.3 and 0.4, so our benchmark is $\alpha = 0.35$. As for productivities, we normalize TFP in the industrialized country A to 1, since what matters for our analysis is the relative size of A, $\tilde{A}$ and A^*. (Hall and Jones 1999) find that average TFP among developing countries is only about 30 percent of the TFP level in the US. However, according to Dreher et al. (2007), developing countries' average TFP relative to the US is 0.53 if official output is considered and 0.84 if the shadow economy is also taken into account. Based on this, we set the developing country's TFP to an intermediate level, $A^* = 0.5$. For choosing a value for $\tilde{A}$, we take into consideration that multinational companies' productivity is affected by both the often less favorable local production conditions as well as by firm-related technological knowledge. We set the industrialized country's investors' TFP in the developing country to $\tilde{A} = 0.8$, which yields $\theta = 0.625$. In order to determine the relative sizes of the young and old generations, we look at the United Nations' Population Division's statistics on children per woman.[5] For the period of 2000-2005, total fertility in the world's more developed regions was about 1.6, while it was 2.6 for the world's less developed regions excluding the least developed regions. With the total population normalized to one in both countries, the resulting sizes of the young generations are $N^y = 0.44$ and $N^{y*} = 0.57$. The level of the capital stock per investor is set equal to $\bar{k} = 0.16$, implying an autarky capital intensity of about 0.2 in the industrialized country. Finally, we set the rate of depreciation to 0.7.

[5]UNPD (2006)

Assuming that the one period we consider lasts for about $20-25$ years, this implies an annual rate of approximately 0.05. This is within the range of the results of calibration exercises of different models found in the literature. Among those, Otrok (2001) finds an annual δ of about 0.15 calibrating a general equilibrium model of business cycles using quarterly data from the postwar US economy (1948-1997). DeJong and Ingram (2001) report $\delta = 0.08$ in their business cycle model calibration using quarterly US data between 1948 and 1995, while Nadiri and Prucha (1996) calculate the annual depreciation rate to be equal to 0.059 using US manufacturing data for the years 1960-1988. For the period 1960-1994 Lucke (1997) estimates an annual depreciation rate of around 0.03 for West-Germany.

4 FDI with endogenous expropriation policy

This section sets up a model where expropriation policy is endogenously determined whereas migration is exogenous. Expropriation of the capital stock can only take place after capital has been installed. To solve the model by backward induction we therefore solve firstly for politically determined FDI flows and secondly for optimal FDI from an individual investor's point of view. Thirdly, we analyze under which conditions FDI flows are restricted by the possibility of expropriation. Finally, we investigate the impact of demographic changes, i.e. an increase of the share of old individuals in both countries, on FDI.

Non-Expropriation Constraint

When deciding whether to expropriate the foreign capital stock, the developing country's government weighs the costs and benefits that arise from expropriation to maximize political support of the electorate. Political support is given by the weighted sum of the young and old generations' utilities, where each generation is weighted by its share in the electorate. We denote political support in case of non-expropriation by W and political support in case of expropriation by W_E. By setting $W \geq W_E$ we can derive a *non-expropriation constraint* as in Harms and an de Meulen (2011), i.e. a condition which makes the government abstain from expropriation. We have

$$W = \frac{N^{y*} - M}{1 - M} \cdot w^* + \frac{N^{o*}}{1 - M} \cdot e^* \ ,$$

and

$$W_E = \frac{N^{y*} - M}{1 - M} \cdot (\theta w^* + t) + \frac{N^{o*}}{1 - M} \cdot (e^* + t) \ .$$

The government decides not to expropriate if both generations' utility gains in terms of transfers do not exceed the costs in terms of wage losses $(N^{y*} - M)/(1 - M) \cdot (1 - \theta)\tilde{A}w^*$. This is the case only if the capital stock to be expropriated is not too large, i.e. if

$$K^* \leq \left\{ \frac{(1-\theta-\alpha)\tilde{A}}{1-\delta} \right\}^{\frac{1}{1-\alpha}} (N^{y*} - M) \,, \tag{1}$$

which constitutes an upper bound of FDI K^{*max}, compatible with non-expropriation. For the incentive-compatible level of FDI to be non-negative the following Assumption has to be met:

Assumption 1 $(1-\theta-\alpha) > 0$

Note that if θ is low the technology gap $\tilde{A} - A^*$ is large. Intuitively, for K^* not to be restricted to zero, expropriation has to be costly for the developing country. The incentive-compatible volume of FDI K^{*max} increases with the host-country's net cost of expropriation. This can be seen from equation (1). The political barrier to FDI flows is relaxed by a lower θ, by a larger δ and by less emigration. Firstly, with a lower θ the technology gap $\tilde{A} - A^*$ increases and so does the wage loss in case of expropriation. Secondly, with a larger depreciation rate δ, less capital can be distributed after production. Thirdly, less emigration has three different effects. It implies a larger labor force. As a consequence w^* drops and so does the wage loss $(1-\theta)\tilde{A}w^*$ incurred by each individual. Moreover, the return on expropriated capital to be distributed increases. However, the number of workers suffering wage losses becomes larger, increasing the host country's *overall* wage cost $(N^{y*} - M)/(1-M) \cdot (1-\theta)\tilde{A}w^*$ from expropriation. We call this last effect a *political weight effect*. If this last effect outweighs the effect on the capital return, the restriction on FDI inflows is relaxed. This holds since $(1-\theta) > \alpha$ by Assumption 1. Consequently, less emigration also relaxes the non-expropriation constraint.

In summary, expropriation has to be costly for the host country for non-expropriation compatible FDI to be larger than zero. Moreover, assuming $(1-\theta-\alpha) > 0$ the individual wage loss is large enough for the political weight effect of a larger labor force $N^{y*} - M$ to relax the non-expropriation constraint. Then, lower labor outflows M from the developing country lower the host country's willingness to expropriate and additional FDI inflows are feasible. Migration and FDI are thus substitutes, not because they both contribute to reducing differences in factor returns, but rather because a larger share of the electorate is affected negatively by expropriation when emigration is low.

Investment Constraint

In the absence of expropriation risk, the industrialized country's investors would export the share of capital necessary to equalize capital returns in both countries. We call the level of capital exports in the absence of expropriation risk K^{*opt}. We define an *investment*

constraint by

$$K^{*opt} = \frac{(A/\tilde{A})^{\frac{1}{\alpha-1}}\bar{k} \cdot N^o(N^{y*} - M)}{(N^y + M) + (A/\tilde{A})^{\frac{1}{\alpha-1}}(N^{y*} - M)} \ .$$

Obviously, the difference in capital returns and thus the optimal level of capital exports is lower the higher the immigration level, such that K^{*opt} is a declining function of M.

It is straightforward to understand that no FDI exceeding the non-expropriation compatible level is an optimal choice. This is because in case of expropriation, investors only receive a positive return on the part of capital invested at home. Consequently, utility levels can be increased by investing a larger fraction of capital at home and reducing FDI. If the non-expropriation compatible level of FDI is not sufficient to equalize returns, it does not pay to further reduce FDI, foregoing high capital returns in the developing country. Therefore, actual FDI is given by the minimum of K^{*opt} and K^{*max}. The assumption that investors' capital is administered by a mutual fund solves the coordination problem between investors of ensuring that the sum of capital flows to the developing country does not exceed the level compatible with the *non-expropriation constraint*.

Equilibrium and Comparative Statics

The level of FDI flows is determined by the *non-expropriation constraint* if $K^{*max} < K^{*opt}$. This is true if

$$M < \frac{\left[\frac{\bar{k}N^o \cdot (1-\delta)}{(1-\alpha-\theta)\cdot A}\right]^{\frac{1}{1-\alpha}} - N^y - (A/\tilde{A})^{\frac{1}{\alpha-1}} \cdot N^{y*}}{1 - (A/\tilde{A})^{\frac{1}{\alpha-1}}} \ ,$$

which holds for all $M < N^{y*}$ if

$$\frac{\bar{k}N^o \cdot (1-\delta)}{(1-\alpha-\theta)\cdot A} > (N^{y*} + N^y)^{1-\alpha} \ . \tag{2}$$

Given the chosen parameter values, both inequalities hold. Most importantly, the chosen value for θ is not too low. Intuitively, with a very low θ, expropriation would be too costly for the developing country because of the productivity loss. The possibility of expropriation then would not limit FDI flows.

Using the benchmark parameter values shown in Table 1, Figure 1 illustrates the individually optimal and the politically restricted level of FDI inflows, K^{*opt} and K^{*max} respectively, for different levels of migration outflows.

The solid curve shows the non-expropriation constraint and the dashed curve the investment constraint for different levels of emigration. Both decline in emigration. Moreover, the Figure shows that for all levels of migration $0 \leq M \leq N^{y*}$ the political barrier to FDI binds ($K^{*max} < K^{*opt}$).

The effect of population aging on equilibrium FDI is straightforward to derive. While the

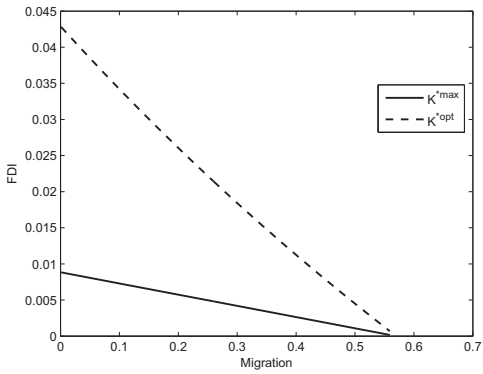


Figure 1: Investment constraint and non-expropriation constraint as functions of migration

demographic structure of the industrialized country does not affect the developing country's expropriation decision, a larger share of old individuals in the developing country increases their political weight. This has the same effect as an increase in emigration: it raises the political barrier to capital inflows, inducing less FDI in equilibrium. Ceteris paribus, FDI flows to countries with a larger share of young should thus be larger, also in the presence of political risk. Graphically, K^{*max} shifts to the right with a larger N^{y*}. Quantitatively, for given migration, a one-percent increase of the share of old individuals in the developing country transfers into a 1.07 percent decrease of FDI flows.

5 Labor flows with endogenous migration policy

We now proceed with the determination of equilibrium migration for given capital flows. The industrialized country government first sets its entry restriction before labor flows take place. We solve for the two equations determining the volume of individually optimal and politically restricted labor flows. We then show that the politically determined demand for immigrants binds, unless the population share of the young generation is very low. Finally, we discuss how population aging alters the equilibrium.

Emigration Constraint

If the developing country's young took their migration decision in the absence of any migration restrictions, migration would take place until utility levels (and thus wages) in both

countries are equal. This yields an *emigration constraint*:

$$M^{opt} = \frac{(A/\tilde{A})^{1/\alpha}(\bar{k}N^o - K^*)N^{y*} - K^*N^y}{(A/\tilde{A})^{1/\alpha}(\bar{k}N^o - K^*) + K^*} \ .$$

M^{opt} is declining in the level of FDI, since FDI flows reduce wage differences between both countries. However, potential migrants have to obey the limit on immigration set by the industrialized country's government, the *immigration policy constraint* M^{max}, which we derive in the next subsection.

Immigration Policy Constraint

The industrialized country's government chooses the labor entry restriction that maximizes its political support among both generations. Again, political support equals the sum of the young and the old generation's utility, each weighted with the respective group size. We assume that immigrants are nationalized immediately upon entry, which means that they augment the political weight of the young generation as the government decides whether to admit more immigrants. This is a technical assumption which allows a closed-form solution for immigration policy. In the absence of this assumption the politically determined demand for immigrants may be zero, see the discussion below.[6] Although the political participation of immigrants is typically lower than that of natives, it increases in length of stay (see, for instance, Ramakrishnan and Espenshade 2001). Furthermore, franchise extensions may be based on rational motives, as Acemoglu and Robinson (2000) and Jack and Lagunoff (2006) show. Dolmas and Huffman (2004), Sand and Razin (2007) and Ortega (2005, 2010) argue that immigrants do in fact shape policy. Whereas Dolmas and Huffman (2004) and Ortega (2005, 2010) focus on how immigration influences redistribution policy, Sand and Razin (2007) also consider the impact of immigration on future immigration policy. Bertocchi and Strozzi (2010) show that large migrant stocks make the introduction "ius soli" more likely.

The government's maximization problem is:

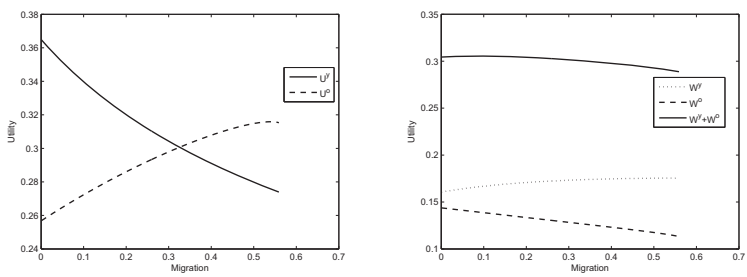
$$\max_M \frac{N^o}{1+M} \cdot U^o + \frac{N^y + M}{1+M} \cdot U^y \ .$$

where

$$\begin{aligned} U^o &= \left[\left(\bar{k} - \frac{K^*}{N^o}\right) \cdot (1 - \delta + r) + \frac{K^*}{N^o} \cdot (1 - \delta + r^*)\right] \ , \\ U^y &= w \ . \end{aligned}$$

[6] The young generation's preferred level of immigration would also be higher in the presence of pay-as-you-go pensions with fixed benefits. The young would then gain from sharing the burden of pension contributions with the immigrants.

Figure 2 shows utility in the industrialized country based on the benchmark parameter values. Figure 2(a) shows the utility levels of a representative young as well as a representative old agent, U^y and U^o respectively, as defined in section 3 for different levels of migration.[7] As illustrated by the dashed line, old investors benefit from larger immigration but at a declining rate. If migration approaches its maximum old agents' attitudes toward immigration even turn around. This is because migration raises the capital return on the part of capital invested in the industrialized country but decreases the capital return on the part invested in the developing country. If migration is low, the marginal return gain in the industrialized country through an additional labor inflow compensates the marginal capital return loss on the part invested in the developing economy. Hence, U^o increases with migration if M is small. In turn, each young worker clearly suffers from additional competition on the labor market and prefers zero migration. As the solid curve shows, U^y decreases with M for all possible migration levels. Since the young generation's initial utility loss, i.e. at $M = 0$, exceeds the old generation's utility gain, migration would be restricted to zero if migrants are not asserted political rights upon entry. Admitting immigrants who are nationalized upon entry does, however, initially increase the sum of utilities which determine the government's objective function.



(a) A young and an old agent's utility

(b) The young and old generation's weighted sum of utilities

Figure 2: Utility in the industrialized country as a function of migration

Figure 2(b) illustrates the sum of both generations' welfare (the term which the local government seeks to maximize) and each generation's welfare share, $W^o = N^o/(1+M) \cdot U^o$ and $W^y = (N^y + M)/(1+M) \cdot U^y$, separately. The effect of migration on W^y and W^o is contingent on the capital share α. In our benchmark parameterization, α is low and the wage loss from a marginal increase of migration cannot compensate for the increase of the young generation's population share. W^y then increases with M as illustrated by the dotted curve in Figure 2(b). Likewise, for the chosen level of α, the marginal effect of migration

[7] for $K^* = 0.005$

on capital returns is weak and is also dominated by the effect on the relative sizes of both generations. Hence, W^o decreases with M. This can be seen from the dashed curve in Figure 2(b). For any given level of K^*, $M^{max}|_{K^*}$ is given by the maximum of $(W^y + W^o)|_{K^*}$. M^{max} cannot be written as a function of K^* but results from all possible levels of K^* and the corresponding $M^{max}|_{K^*}$, see Figure 3.[8]

$M^{max}|_{K^*}$ is implicitly given by the first-order condition of the maximization problem (5), which reads as follows:

$$\bar{k} \cdot N^o(1-\delta) + \alpha \cdot \left[1 + M + \frac{N^{y*} - M}{1-\alpha}\right] w^* = \left[1 + M - \frac{N^y + M}{1-\alpha}\right] w \tag{3}$$

Equilibrium and Comparative Statics

International labor flows are politically restricted if $M^{max} < M^{opt}$. Note that the *immigration policy constraint* binds if $w > w^*$ holds for $M = M^{max}$. From equation (3) a sufficient condition for this to be true is $N^y + \alpha N^{y*} \geq (1-\alpha)^2$, which is fulfilled for our benchmark parameters (see Figure 3). This is because M^{max} is lower the larger the respective shares of young workers in both countries. We will elaborate on this later in this section.

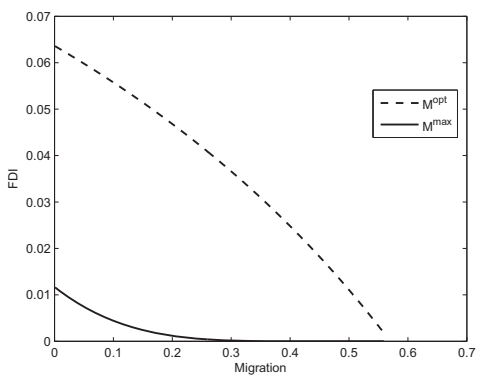


Figure 3: Emigration constraint and immigration policy constraint as functions of FDI

From Figure 3, illustrating the individually optimal and politically restricted migration levels for different levels of FDI, it can be seen that M^{max} is decreasing in FDI.[9] Analytically,

[8]Note that, among the parameters in our model, the depreciation rate δ crucially determines the chosen level of immigration. Ceteris paribus, for lower levels of δ, the gross capital return of the old generation is higher, increasing the sum of old agents' utilities. Then, in order to maximize the weighted sum of the total population's utility, the industrialized country's government will shift political weight from the young toward the old generation by permitting less immigration. If δ approaches zero, the migration barrier becomes stricter and migration is even restricted to zero if δ is too low.

[9]Note that we have switched x and y axes in Figure 3 to have the same axis order throughout the paper.

this can be shown using the implicit function theorem where a sufficient condition for the downward slope is $1 - \alpha \geq N^y + \alpha N^{y*}$. Hence, M^{max} is a negative function of K^* and restricts migration inflows to the industrialized country if Assumption 2 holds true.

Assumption 2 $1 - \alpha \geq N^y + \alpha N^{y*} \geq (1 - \alpha)^2$.

Note that $1 - \alpha \geq N^y + \alpha N^{y*}$ and thus $\partial M^{max}/\partial K^* < 0$ holds if α is not too large. The intuition behind the downward slope of M^{max} with respect to K^* is the following. Firstly, with larger capital exports, the old generation's support for immigration decreases. Naturally, seeking high capital returns, investors aim to combine their capital with labor. Thus, with a larger fraction of capital invested abroad, investors favor less labor migration from the foreign into the home economy. This effect becomes stronger with a lower level of α, since a lower α coincides with a larger labor share, increasing the marginal capital return loss of emigration in the developing country. Secondly, with additional capital exports, the wage of each young worker declines and so does the wage bill and the welfare of the young generation. Then, from the government's perspective, maximizing the welfare of the young generation – by admitting more immigrants – matters less. Thirdly, with a lower wage level, the positive marginal effect of M on the welfare of the young generation decreases, since each additional migrant adds less wage income to the overall wage bill. The latter two effects are also strengthened by a lower α which additionally lowers the wage level and hence the welfare and political weight of the young generation.

We next analyze how the *immigration policy constraint* reacts to increases in the population share of old individuals in both countries. As the *developing* country's labor force declines, this does not affect young workers' preferred level of immigration. The return on foreign investment of the industrialized country's old investors drops. This has two counteracting effects on old investors' political support for immigration. On the one hand, the lower return in the developing country ceteris paribus lowers income and thus welfare and political support of the old generation. Then, marginally increasing the limit on immigration, which decreases the share of old individuals, is less costly in terms of the marginal loss of political support from the old generation. On the other hand, a reduced labor force in the developing country raises the negative marginal effect of emigration on the capital return there. Hence, old investors suffer a larger marginal utility loss from additional migration. It can be shown analytically that M^{max} increases with N^{o*} in situations where migration is initially low, that is if

$$M^{max} < \frac{(1 - \alpha) \cdot (N^{y*} - \alpha)}{1 - \alpha^2} .$$

Intuitively, with little migration flows, there is a large number of workers in the developing country, reducing the negative marginal effect of emigration on the capital return there. As a result, old investors suffer only a low marginal utility loss from migration and support larger migration flows. Hence, with a lower population share of the young in the developing

country, the solid M^{max} curve in Figure 3 shifts to the right unless migration is already very large.

The quantitative effect of a marginal increase of the population share of old agents in the developing country on migration depends on the level of FDI. To measure the quantitative effect, we set K^* to the point where the policy functions M^{max} and K^{*max} intersect, see Figure 5. This is sensible since the intersection point determines the equilibrium levels of migration and FDI in an environment of both endogenous expropriation and migration policies. From that point a one-percent increase of N^{o*} increases migration by 0.5 %.

A larger population share of old agents in the *industrialized* country also has counteracting effects on demand for immigration. It implies a larger capital stock $\bar{k}N^o$ since with an exogenous capital endowment per investor $\bar{k}$ and for given FDI K^*, the share of capital invested at home must increase. Firstly, this increases the weight of domestic capital returns in old investors' utility functions. Secondly, with a larger population share of old agents in the industrialized country, the domestic labor force declines. Then, the marginal return gain of additional immigration in the investors' home economy becomes larger. Both effects enhance each old investor's support for migration. However, the sum of old agents' utilities increases, simply because the number of old agents increases. As the welfare of the old generation is larger, the industrialized country's government will ceteris paribus admit less migration to shift political weight from the young toward the old generation.

Turning to the young generation, each young worker benefits from the higher capital intensity in the industrialized country, implying higher wages. The government will ceteris paribus admit additional migrants to shift political weight to the group of young workers each earning high wages.

Overall one can show that the effect of a larger fraction of old agents in the industrialized country on migration is positive – thereby shifting the solid curve in Figure 3 to the right – unless the fraction of capital invested abroad is too high. Naturally, with a larger amount of FDI, the benefit from immigration on domestic capital returns of old investors is lower, and since domestic wage levels decline, the positive effect of migration on the young generation's weighted sum of utilities vanishes. However, for M^{max} not to increase with N^o, K^* would have to exceed the maximum plausible level of FDI $K^{*opt}(M = 0)$, which can be ruled out. The quantitative effect of a marginal increase of the population share of old agents in the industrialized country is large. Starting from the intersection of M^{max} and K^{*max} from Figure 5, a one-percent increase in N^o induces an increase in migration of 23 %.

6 FDI and migration with endogenous policy restrictions

We now turn to an environment where both expropriation and migration policy are determined endogenously. We assume the sequence of events illustrated in Figure 4.

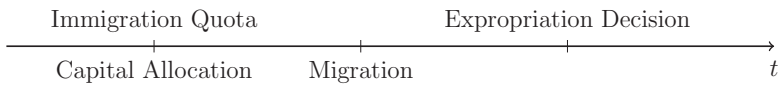


Figure 4: Sequence of Events

As argued in section 4, expropriation of the capital stock can only take place after capital has been installed. Moreover, as argued in section 5, the industrialized country decides on maximum migration before labor flows take place. We assume simultaneity with respect to the investors capital allocation decision and the migration policy decision.[10] Hence, neither the developing country government nor the industrialized country investors may influence the level of migration. Similarly, neither the industrialized country government nor the potential (developing country) migrants may influence FDI. Therefore, given equation (2) and Assumption 2, the political mobility barriers bind. The equilibrium levels of FDI and migration are thus politically determined. We now show that there is a unique intersection point between the non-expropriation constraint K^{*max} and the immigration policy constraint M^{max}, determining the equilibrium. We then analyze the effects of marginal changes in the two countries' age structures on the equilibrium.

Equilibrium

We first prove that there must be at least one intersection point between K^{*max} and M^{max}. We then show that there is a unique intersection point, determining a unique equilibrium for factor flows between the two countries.

Lemma 1 *There does exist at least one intersection point between the policy constraint functions K^{*max} and M^{max}, determining equilibrium FDI and migration in a situation of endogenous policy.*

Proof 1 *Using the fact that M^{max} declines with larger FDI flows and K^{*max} declines with larger migration, there must be at least one intersection point between the two policy barriers, since*

[10] If, in contrast, the migration policy decision is taken before the investors allocate their capital to both countries, the industrialized country government may loosen the expropriation constraint by confining immigration.

i) At $K^* = 0$: K^{*max} lies above M^{max}.
ii) At $M = 0$: K^{*max} lies underneath M^{max}.

Ad i): $K^{*max} = 0$ if $M = N^{y*}$. However, $\arg\max_M W^o(K^* = 0) + W^y(K^* = 0) < N^{y*}$, if α is small: The first order condition of the industrialized country governments's objective function at $K^* = 0$ is

$$A(\bar{k}N^o)^\alpha(1-\alpha-\frac{N^y+M}{1+M}) = \frac{(N^y+M)^\alpha}{1+M}\bar{k}N^o(1-\delta)\ .$$

The left-hand-side increases with M while the right-hand-side decreases with M. Moreover, since the left-hand-side decreases with α, less migration is necessary to solve the upper first order condition if α is low. Given our benchmark parameter values, α is indeed sufficiently low for $M < N^{y*}$ to solve the first order condition even at $K^* = 0$. Recall the intuition stated in section 5: with a lower α, the political support maximizing level of migration is lower.

Ad ii): We can calculate $K^{*max}(M=0) = \left\{\frac{(1-\theta-\alpha)\bar{A}}{1-\delta}\right\}^{\frac{1}{1-\alpha}} N^{y*}$. However, the industrialized country's government does not choose zero migration for $K^* \leq K^{*max}(M=0)$ since, analytically, the derivative of the political support function is not equal to zero but negative at $K^* = K^{*max}(M=0)$. Intuitively, the government can always enhance the welfare of the young generation simply by increasing the number of that group with the help of additional immigration. This overstates the old generation's marginal welfare loss of admitting the first immigrant at $K^* = K^{*max}(M=0)$. Put differently, FDI has to be larger than $K^* = K^{*max}(M=0)$ for an initial labor outflow from the developing country to cause gross capital return losses there, which are so large, that the industrialized country's government is not willing to admit a single worker from abroad.

In summary, there is at least one equilibrium where M^{max} intersects K^{*max} from top to bottom.

Lemma 2 *There is only one intersection point between the policy constraints K^{*max} and M^{max}, determining unique equilibrium levels of FDI and migration in a situation of endogenous policy.*

Proof 2 *Note that an equilibrium is given by an intersection point of M^{max} and K^{*max}. In equilibrium, migration thus has to solve the first order condition of the industrialized country government's maximization problem, where K^* equals K^{*max}, i.e. at this point, the derivative of the political support function with respect to M has to be equal to zero. However, at $K^* = K^{*max}$ this derivative monotonously increases with M. As a result, there is a unique level of migration solving the first order condition.*

The equilibrium is illustrated in Figure 5. It is given by the intersection point between the dashed M^{max} curve and the K^{*max} line.

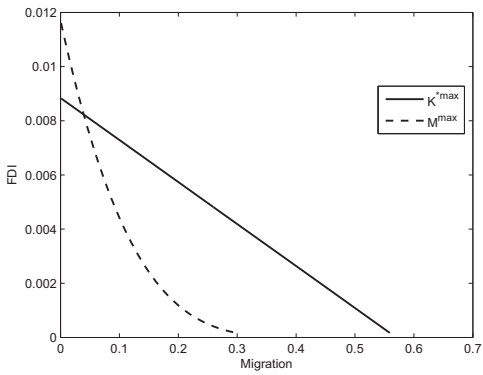


Figure 5: FDI and migration in equilibrium

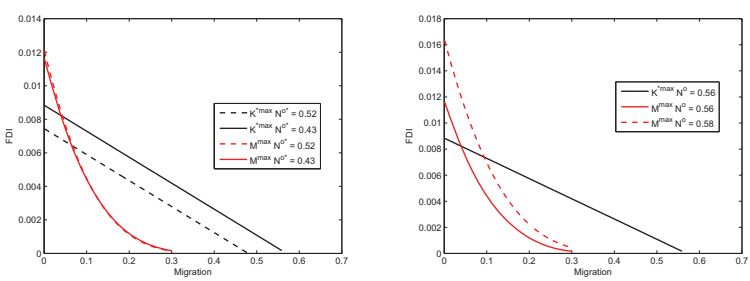
Comparative Statics

Sections 4 and 5 have shown how policies limiting international factor mobility are affected by world population aging. Migration increases as the population in either country ages. FDI is not affected by population aging in the industrialized country and decreases as the population in the developing country ages. The impact of aging is even stronger when the interplay between migration and expropriation policies is taken into account. Following the sequence of events illustrated in Figure 4 the industrialized country's government sets its migration policy at the same time as investors choose the fraction of $\bar{k}N^o$ to be invested abroad. Hence, when deciding on migration and foreign investment, agents take the respective other decision as given.

We begin with the effects of a larger fraction of old agents in the developing country (Figure 6(a)).[11] The migration barrier is relaxed since the return on FDI drops if the size of the working age group in the host economy declines. Then, old investors from the industrialized country suffer from lower income and utility. Following its aim to maximize the weighted sum of utilities, the government will admit additional immigrants to shift political weight away from the old generation. The investment constraint becomes stricter, since a lower population share of the young generation transfers into a lower political weight of the group that opposes expropriation.

[11]To illustrate the comparative statics effects graphically, the increase of N^o and N^{o*} have been chosen sufficiently large. However, the extent of these increases does not affect our qualitative results.

While the level of non-expropriation compatible investment flows drops with N^{o*}, the volume of this effect is underestimated if the repercussions from the relaxation of the migration restriction are not taken into account. With larger labor outflows, the share and thus political weight of the young age cohort opposing expropriation declines, further restricting FDI. Additionally, with less FDI flows, the migration barrier is further relaxed, again reducing foreign investment compatible with non-expropriation. Starting from the benchmark equilibrium, a one-percent increase of N^{o*} leads to a decline of FDI flows by 1.4 % in contrast to just 1.07 % if the repercussions from the immigration policy are not taken into account. Analogously, the relaxation of the migration restriction is larger with FDI endogenously determined by the expropriation policy. The quantitative effect equals an increase of migration by 4.3 % instead of 0.5 %. We now discuss the effect of a decreasing labor force in the industrialized country (Figure 6(b)). The domestic government reacts by relaxing the migration barrier, taking FDI flows as given. While migration flows increase, the non-expropriation compatible level of FDI flows does not change with the age composition in the industrialized country. The relaxation of the migration restriction affects the relative size of the young generation in the developing country. With a lower fraction of young workers opposing expropriation, the political barrier to FDI becomes tighter. Moreover, with less FDI, the industrialized country can enhance its' political support through additional migration. As a result of the joint analysis of political restrictions to migration and FDI, the increase of immigration in the wake of aging in the domestic society is considerably larger compared to an analysis where FDI is taken to be exogenous. Migration increases by 29 %, compared to just 23 % if the response of the expropriation policy is taken as exogenous. Moreover FDI flows are no longer unaffected, but decrease by 2.2 % as a reaction to a one-percent change in the age structure in the foreign industrialized economy.



(a) Effects of a larger N^{o*} (b) Effects of a larger N^{o}

Figure 6: Comparative statics effects of population aging

7 Conclusion

In this paper, we have analyzed migration and investment barriers in a comprehensive model. We have investigated the impact of population aging on those barriers in a one-period setting with sequential decisions in an industrialized and a developing country. The government in the industrialized country decides how many immigrants to admit whereas the government in the developing country decides whether to expropriate FDI or not. Although we also derived supply of migrant labor and of FDI, we showed that the demand for migrant labor and FDI, determined by the policy decisions in the two countries, binds.

We found that, as in models without policy restrictions, migration and FDI are substitutes, but that the drivers of this result are fundamentally different. Emigration of young workers from the developing country enhances the older generation's political weight. Since this generation clearly benefits from expropriation, the volume of non-expropriation compatible FDI decreases. The allocation of capital to the developing country reduces demand for immigrants for two reasons. Firstly, the investors' loss in gross returns on FDI induced by migration increases. Secondly, domestic wages decrease, making it less worthwhile for the governments to admit immigrants in order to increase the total wage bill of the labor force.

With respect to the effect of population aging we found that aging in the industrialized country increases demand for immigrants but leaves the volume of FDI unaffected, whereas aging in the developing country also increases demand for immigrants but decreases the volume of non-expropriation compatible FDI: With a larger share of old investors in the *industrialized* country, the industrialized economy as a whole owns a larger capital stock. Since the non-expropriation compatible level of FDI is unchanged, the amount of capital invested at home increases. The old generation's preferred level of immigration increases since they aim at maximizing the sum of gross capital returns in the home and the foreign economy. Additionally, the domestic wage level and thus welfare of the young generation increases. This makes it more worthwhile for the government to admit additional immigrant workers to increase political support of the young generation, since, by assumption, immigrants are nationalized upon entry. Similarly, since a larger population share of old individuals in the *developing* country implies a lower labor supply, returns on FDI decrease ceteris paribus. A lower welfare level of its old generation induces the industrialized country government to admit additional immigrant workers to increase political support of the young generation instead. Meanwhile, population aging in the developing country reduces the non-expropriation compatible level of FDI because the population share and thus political weight of the old generation, which benefits from expropriation, increases.

Most importantly, we show that the effects of population aging become stronger when the interplay of policies is taken into account. If aging relaxes the immigration barrier, ad-

ditional labor flows from the developing in the industrialized country are feasible. Then, the population share of old agents in the developing country increases, enhancing the propensity to expropriate. As a result, investors will reduce FDI. This in turn increases the demand for immigrants in the industrialized country.

References

Acemoglu, D. and J. A. Robinson (2000). Why did the West extend the franchise? *Quarterly Journal of Economics 115*, 1167–1199.

Acemoglu, D. and J. A. Robinson (2001). A Theory of Political Transitions. *American Economic Review 91*(4), 938–963.

Aguiar, M. and M. Amador (2011). Growth in the Shadow of Expropriation. *The Quarterly Journal of Economics (forthcoming)*.

Aguiar, M., M. Amador, and G. Gopinath (2009). Investment Cycles and Sovereign Debt Overhang. *Review of Economic Studies 76*(1), 1–31.

Alfaro, L., S. Kalemli-Ozcan, and V. Volosovych (2008). Why doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation. *Review of Economics and Statistics 90*(2), 347–368.

Azzimonti, M. and P.-D. G. Sarte (2007). Barriers to Foreign Direct Investment Under Political Instability. *Economic Quarterly 93*(3), 287–315.

Benhabib, J. (1996). On the political economy of immigration. *European Economic Review 40*(9), 1737–1743.

Bertocchi, G. and C. Strozzi (2010). The evolution of citizenship: Economic and institutional determinants. *Journal of Law and Economics 53*, 95–136.

Börsch-Supan, A., F. Heiss, A. Ludwig, and J. Winter (2003). Pension Reform, Capital Markets, and the Rate of Return. *German Economic Review 4*(2), 151–181.

Brooks, R. (2003). Population Aging and Global Capital Flows in a Parallel Universe. *IMF Staff Papers 50*(2), 200–221.

Calahorrano, L. (2010). Aging and Immigration Policy in a Representative Democracy. *MAGKs Discussion Paper* (18).

Calahorrano, L. and O. Lorz (2011). Aging, Factor Returns and Immigration Policy. *Scottish Journal of Political Economy (forthcoming)*.

Cole, H. L. and W. B. English (1991). Expropriation and Direct Investment. *Journal of International Economics 30*(3–4), 201–227.

Coughlin, P. J., D. C. Mueller, and P. Murrell (1990). Electoral politics, interest groups and the size of government. *Economic Inquiry 28*, 682–705.

DeJong, D. N. and B. F. Ingram (2001). The cyclical behavior of skill acquisition. *Review of Economic Dynamics 4*(3), 536–561.

Dolmas, J. and G. W. Huffman (2004). On the political economy of immigration and income redistribution. *International Economic Review 45*(4), 1129–1168.

Dreher, A., P.-G. Méon, and F. Schneider (2007). The devil is in the shadow: Do institutions affect income and productivity or only official income and official productivity. *CESifo Working Paper No. 2150*.

Eaton, J. and M. Gersovitz (1984). A theory of expropriation and deviations from perfect capital mobility. *Economic Journal 94*(373), 16–40.

Facchini, G. and A. M. Mayda (2008). From individual attitudes towards migrants to migration policy outcomes: Theory and evidence. *Economic Policy 23*(56), 651–713.

Hall, R. E. and C. I. Jones (1999). Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics 114*(1), 83–116.

Harms, P. and P. an de Meulen (2010). Demographic Structure and the Security of Property Rights in Developing Countries – An Empirical Exploration. *Ruhr Economic Paper* (229).

Harms, P. and P. an de Meulen (2011). The Demographics of Expropriation Risk. *Journal of Population Economics (forthcoming)*.

Haupt, A. and W. Peters (1998). Public pensions and voting on immigration. *Public Choice 95*, 403–413.

Hillman, A. L. and A. Weiss (1999). Beyond international factor movements: cultural preferences, endogenous policies and the migration of people: an overview. In J. de Melo, R. Faini, and K. Zimmermann (Eds.), *Migration: the controversies and the evidence*.

INGENUE (2001). INGENUE: A Multi-Regional Computable General Equilibrium Overlapping Generations Model. *mimeo*.

Jack, W. and R. Lagunoff (2006). Dynamic enfranchisement. *Journal of Public Economics 90*, 551–572.

Lindbeck, A. and J. W. Weibull (1987). Balanced-budget redistribution as the outcome of political competition. *Public Choice 52*, 273–297.

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries? *American Economic Review 80*(2), 92–96.

Lucke, B. (1997). An adelman-test for growth cycles in west germany. *Empirical Economics 22*(1), 15–40.

Mazza, I. and F. van Winden (1996). A political economic analysis of labor migration and income redistribution. *Public Choice 88*(3-4), 333–363.

Mueller, D. C. (2003). *Public Choice III*. Cambridge University Press.

Nadiri, M. I. and I. R. Prucha (1996). Estimation of the depreciation rate of physical and r&d capital in the u.s. total manufacturing sector. *Economic Inquiry 34*(1), 43–56.

Ortega, F. (2005). Immigration quotas and skill upgrading. *Journal of Public Economics 89*(9-10), 1841–1863.

Ortega, F. (2010). Immigration, citizenship, and the size of government. *B.E. Journal of Economic Analysis & Policy 10*. Issue 1. Article 26.

Otrok, C. (2001). On measuring the welfare cost of business cycles. *Journal of Monetary Economics 47*(1), 61–92.

Persson, T. and G. Tabellini (2000). *Political Economics*. The MIT Press.

Ramakrishnan, S. K. and T. J. Espenshade (2001). Immigrant incorporation and political participation in the united states. *International Migration Review 35*, 870–909.

Sand, E. and A. Razin (2007). The political-economy positive role of the social security system in sustaining immigration (but not vice versa). *NBER Working Paper* (13598).

Sand, E. and A. Razin (2009). Migration-regime liberalization and social security: Political-economy effect. *CESifo Working Paper* (2653).

Thomas, J. and T. Worrall (1994). Foreign direct investment and the risk of expropriation. *Review of Economic Studies 61*(1), 81–108.

United Nations Population Division (2001). *Replacement Migration: Is It a Solution to Declining and Ageing Populations?* United Nations Population Division.

United Nations Population Division (2006). *World Population Prospects: The 2006 Revision Population Database*. United Nations Population Division.