

LONG-TERM IMMIGRATION PROJECTION METHODS:
CURRENT PRACTICE AND HOW TO IMPROVE IT

ANNEX TO WORKING PAPER WP 2006-3

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ANNEX

Center for Strategic and International Studies Working Group on Long-Term Immigration Projections

As part of its Project on Long-Term Immigration Projections, the CSIS Global Aging Initiative convened a working-group made up of roughly 25 immigration experts, including demographers, economists, and representatives of major projection-making agencies. The working group met for two all-day roundtable sessions, the first on March 17, 2005 and the second on September 8, 2005. The discussions provided many valuable insights that helped inform CSIS' report. The transcripts of the meetings are available at www.csis.org/gai.

Five of the working group members were asked to prepare working papers. Two of the papers—those by Douglas S. Massey and Wolfgang Lutz—deal broadly with the challenges involved in building a long-term immigration projection model. Massey discusses the kinds of drivers that theory suggests should be included, while Lutz focuses more on model design issues. The remaining three papers—those by Jan Hofmann, Anna Maria Mayda, and Oded Stark—explore specific dimensions of the migration dynamic that we thought would benefit from additional analysis. Jan Hofmann looks at the role of trade as an immigration driver, taking the case of Germany as an example; Anna Maria Mayda looks at the role of immigration policy, and in particular how it can be made endogenous to a model; Oded Stark looks at the role of income inequality in origin countries.

This Annex includes the five working papers, as well as a complete list of working group members. The contents are organized as follows:

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BUILDING A COMPREHENSIVE MODEL OF INTERNATIONAL MIGRATION

Douglas S. Massey*

February 2006

Working paper prepared as part of the

**Center for Strategic and International Studies
Project on Long-Term Immigration Projections**

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ABSTRACT

This paper reviews theoretical ideas accounting for the supply of international migrants, the demand for their services, the motivations of movers, the infrastructure that connects sources of migrant supply and demand, and the intent and efficacy of state policies to regulate cross-border movements of people. These ideas offer a guide for the construction of improved forecasting models. The supply of international migrants is likely to be determined by transitions to the market now occurring throughout the developing world, and destinations will reflect links of trade, transportation, politics, and communication between developing and developed nations. The demand for immigrants in the latter is connected to the segmentation of labor markets and those persons who respond to these structural forces by becoming international migrants will be motivated by diverse goals, including the desire to overcome failures in capital, credit, and insurance markets as well as disequilibria in labor markets. In modeling migration it is imperative to estimate the influence of migrant networks and to capture the feedback effects of networks over time. The parameterization of such feedbacks according to a logistic function would enable forecasting models to do a better job of capturing the dynamic effects of migrant networks in promoting future immigration based on past experience.

INTRODUCTION

Forecasting the size and composition of a nation's population is challenging because it requires making guesses about the future course of fertility, mortality, and migration. Even if one makes reasonably accurate assumptions about future demographic behavior under static conditions, exogenous shocks can always occur to change those conditions in unpredictable ways. Natural disasters, pandemics, wars, depressions, and technological breakthroughs can radically alter the decision-making environment to affect demographic outcomes, both directly and indirectly. Owing to unexpected exogenous changes in the past, demographers largely failed to anticipate two of the most important population trends of the postwar period: the baby boom of the 1950s and 1960s and the abrupt increase in life expectancy of the 1970s and 1980s.

Despite past failures, fertility and mortality in developed countries now stand at very low levels and can reasonably be expected to change relatively little in the normal course of events, with mortality drifting slowly downward and fertility fluctuating within narrow limits in response to short term perturbations. Barring some massive catastrophe, future changes in mortality should not be abrupt; and although fertility has more potential for shifts over time, a return to the swelling birth cohorts of the baby boom is unlikely. The potential for natural increase in developed populations is thus quite small and some countries have already begun a process of natural decline.

As fertility and mortality have fallen and their temporal fluctuations have diminished, international migration has emerged as the most dynamic source of population change. During the 1990s immigration accounted for a third of U.S. population growth and by the end of the decade the share had reached 40 percent. Unfortunately for population forecasters, migration is also the hardest demographic factor to predict. Whereas people are born and die once and only once, they may move repeatedly or not at all during the time they spend in-between these two vital events. Moreover, whereas birth and death rates follow a characteristic age pattern whose contours shift in predictable ways as levels change, the age schedule of migration is malleable and not tied so closely to the overall level of population mobility.

Owing to their common grounding in human biology, mortality and fertility patterns are well represented by model schedules. Simply by picking a life expectancy and a total fertility rate, one can apply model fertility and mortality schedules to project the population forward with considerable accuracy. As long as guesses about trends in overall birth and death rates are reasonably accurate, the forecasts will be quite good. Projecting migration is trickier, however, as both the level and age pattern of mobility are sensitive to short-term fluctuations in social, economic, and policy variables. Moreover, the effect of migration occurs through the interplay of two very different kinds of behaviors—entering and exiting—which may be influenced by entirely different factors in entirely different places.

As a result of these empirical peculiarities, not only did demographers fail to anticipate the upsurge in immigration to the United States after 1965, unlike the case with fertility and mortality projections, demographers did not get much better in forecasting

international migration in the ensuing 40 years (Massey and Zenteno 1999). In 1964, for example, the Census Bureau projected the U.S. population forward assuming a net annual immigration of 300,000 persons distributed according to a fixed age and sex structure. This assumption predicted that a total of 9.3 million immigrants would arrive by 1995; but gross legal immigration over the period turned out to be 19.2 million, over 100 percent higher. Although this figure does not take into account emigration, which averaged about a third of the inflow, even discounting by 33 percent yields a value of 12.9 million, which is roughly 40 percent higher than originally projected. Moreover, official statistics only capture the *legal* portion of the inflow. If we very conservatively assume that net undocumented migration ran at 100,000 persons per year, then total net immigration through 1995 rises back up to 15.9 million, or 70 percent more than the Census Bureau's projections.

Although demographers did not realize it at the time, the assumption of 300,000 net annual immigrants was already out of date when the Census Bureau established it in 1964. To be sure, the figure seemed reasonable at the time, given the history of immigration to the United States that had prevailed up to that point. Gross legal immigration had only exceeded 300,000 thrice over the past several decades (in 1956, 1957, and 1963), so the assumption of a net increment of 300,000 migrants seemed safe, even conservative. Unfortunately, after 1965 gross annual immigration never again fell below 325,000 and by 1967 was running at 362,000 per year. After 1965 undocumented migration also accelerated.

Government demographers eventually realized that the assumed level of net immigration was too small, so in 1967 they increased it to 400,000 per year. Within ten years, however, gross legal immigration had surpassed even this figure, never to return again. Despite this fact, the Census Bureau clung to an assumption of 400,000 net immigrants well into the 1980s, by which time gross legal immigration alone was running at around 600,000 per year. In 1984 demographers raised the assumed net level to 450,000 and by 1989 to 500,000. Unfortunately, by 1989 gross legal immigration was running in excess of one million per year and net undocumented migration was estimated at around 200,000 per year.

By the early 1990s, Census Bureau demographers finally came around and raised the assumption to 880,000 net immigrants. Yet even this figure was unrealistically low: during the 1990s legal immigrants arrived at an average gross rate of one million per year, with a net figure of 300,000 coming in through undocumented channels. Since 2000 gross legal immigration has dipped to a gross average of around 950,000 per year (U.S. Department of Homeland Security 2004) while net undocumented migration has surged to over 600,000 per year (Passel (2005). The best estimate currently is that total net immigration to the United States easily exceeds 1.3 million persons per year.

Clearly, constantly raising the assumed level of immigration to reflect past trends has failed as a projection strategy. During a period of rapidly rising immigration, demographers have been playing a losing game of catch-up, yielding a series of adjustments that have been too little, too late. Under these circumstances, immigration to the United States and its contribution to population growth have been consistently

underestimated. The most recent evidence of this fact occurred when the results of the 2000 census showed an unexpectedly large population count (Farley 2001), with Hispanics overtaking blacks as the nation's largest majority more than a decade earlier than demographers had anticipated (Cohn 2003).

The failures of past immigration projections are evident, but can demographers do better? In this paper I argue that they can. Rather than making simple assumptions that set the volume and age-pattern of immigration at fixed levels, I hold that assumptions about future immigration must be dynamic and take into account the full array of forces that influence rates and age patterns of migration to the United States. Forecasting international migration thus requires a sound understanding of the forces driving in- and out-migration from around the world. At a minimum, this understanding should be used to make theoretically grounded, empirically informed judgments about the future trends in international migration (as opposed to assuming fixed levels and age patterns). Ultimately, however, a comprehensive forecast requires the specification of a structural statistical model to capture the effect of different factors at different levels of analysis and how they operate to influence the ebb and flow of people across borders.

ELEMENTS OF A COMPREHENSIVE MIGRATION MODEL

Although decisions about whether, where, and when to migrate are ultimately made by individuals, these actors are inevitably embedded within households and communities, which are themselves embedded within a social, economic, and cultural matrix that extends regionally and nationally; and nations themselves are located within global networks of trade, politics, and investment. As a result, no simple model of international migration can suffice to explicate past trends or predict future directions, and recent work has sought to integrate explanatory models across levels and disciplines (see Brettell and Hollifield 2000).

In their comprehensive analysis of migration theories done for the International Union for the Scientific Study of Population, for example, Massey et al. (1998:50) expressed considerable skepticism “both of atomistic theories that deny the importance of structural constraints on individual decisions, and of structural theories that deny agency to individuals and families. Rather than adopting the narrow argument of theoretical exclusivity, we adopt the broader position that causal processes relevant to international migration might operate on multiple levels simultaneously, and that sorting out which of the explanations are useful is an empirical and not only a logical task.”

In this paper I summarize the leading theoretical models that have been advanced to account for international migration and consider evidence on their key propositions. Based on this review, I outline a more comprehensive approach to the modeling of international migration. I argue that any attempt to account fully for international migration must address six fundamental questions: What are the structural forces within migrant-sending societies that generate large numbers of people prone to move internationally? What are the structural forces in migrant-receiving societies that generate a persistent demand for immigrant workers? What are the motivations of the people who respond to these structural forces by moving internationally and how do these motivations determine behavior? What are the transnational social structures that arise

in the course of globalization generally and international migration specifically to influence the likelihood of future movement? What determines how national governments act with respect to international migration? And finally, to what extent are governments able to realize the immigration policy goals they intend, and how do actual results differ from intended outcomes?

The Structural Sources of Immigrant Supply

There is widespread agreement that international out-migration does not stem from a lack of economic development, but from development itself (Massey 1988; Massey and Taylor 2004; Williamson 2005). The poorest nations in the world do not send out the most emigrants, and within migrant-sending nations, the poorest regions and communities are not the ones producing the most migrants. Whether in Mexico or China, international migrants generally come from regions and communities that are in the throes of rapid economic development (Massey and Espinosa 1997; Liang and Morooka 2004). It is the structural transformation of societies brought about by the creation and expansion of markets that produces the bulk of the world's migrants, both at present and in the past, a process that is theorized in sociology under world systems theory (Portes and Walton 1981; Sassen 1988) and in economics by institutional development theory (North 1990; Williamson 1996).

The transition from a command or subsistence economy to a market system entails a profound restructuring of social institutions and cultural practices. A legal system of enforceable contracts, property rights, land titles, and courts of law must be established; a social, cultural, and economic infrastructure sufficient to sustain market transactions must be created; and a physical infrastructure of transportation and communication must be built to enable and coordinate the movement of labor, capital, goods, and services between zones of supply and demand. In the course of these transformations, people are displaced in large numbers from traditional livelihoods in subsistence farming (as peasant agriculture gives way to commercialized farming) or state enterprises (as state enterprises are privatized in former command economies). The people so displaced constitute the leading source of international migrants, both now and in the past (Hatton and Williamson 1998; Massey et al. 1998).

The Structural Sources of Immigrant Demand

Despite pressure in sending societies, few migrants would come to the United States were there no demand for their services. Relatively few of those admitted as legal U.S. residents enter as refugees or asylees (just 7.5 percent in 2004) and the number of applications for such statuses has declined sharply in recent years, going from 156,000 in 1996 to just 43,000 in 2003 (U.S. Department of Homeland Security 2004). Because undocumented migrants are ineligible for transfer payments, they have no way of supporting themselves without working. As a result, they are even more unlikely than legal immigrants to remain to the United States without a job; and since 1996 the access even of legal immigrants to transfer payments has been significantly curtailed, giving them new incentives to leave when work is scarce (Fix and Zimmerman 2004).

The vast majority of migrants of working age go into the labor force upon arrival. Among male immigrants legally admitted to the United States in 1996, 85 percent of those with prior undocumented experience got a job within twelve months of arrival and two-thirds of those without illegal experience did so (Jasso et al. 2000). During the late 1990s, labor demand in the United States was such that the head of the Immigration and Naturalization Service suspended work site inspections and announced the cessation of all internal enforcement (Billings 1999). Over the past three decades, the United States has evinced a remarkably strong and steady demand for immigrant workers irrespective of the business cycle.

This strong and persistent demand is rooted in the segmented nature of labor markets within advanced post-industrial economies. Dual labor market theory (Piore 1979) explains this persistent demand in terms of the hierarchical structure of socially-embedded labor markets, which creates motivational problems at the bottom of the occupational pyramid (where people are unwilling to work hard or remain long in low status jobs) and structural inflation (because raising wages at the bottom generates upward pressures on wages throughout the job hierarchy). Market segmentation also stems from the basic duality of labor as a variable factor and capital as a fixed factor of production, which yields a capital-intensive sector to satisfy constant demand and a labor-intensive sector to handle secular fluctuations. Enclave theory (Portes and Bach 1985) elaborates on segmented labor markets by pointing out that ethnic communities also generate their own demand for immigrants and may, under appropriate circumstances, become vertically integrated in ways that generate a long-term demand for immigrant workers.

The structural segmentation of U.S. labor markets has been demonstrated empirically (Dickens and Lang 1985; Bulow and Summers 1986; Heckman and Hotz 1986). This segmentation yields an ongoing demand for unskilled workers willing to work hard at unpleasant, demeaning jobs with few prospects for economic mobility, people who see the work as a short-term means of raising cash rather than as a career or an identity-determining occupational status. In the past this demand was met by teenagers, women working as supplemental earners before and after childbearing, and rural-urban migrants, but the demography of advanced societies has eliminated these sources, causing employers to turn increasingly to immigrants (Massey et al. 1998). If immigrants are not already entering the country in sufficient numbers, employers jump-start new streams through deliberate labor recruitment, either privately or through government agents acting on their behalf (Piore 1979).

The Motivations for Migration

The social organization of today's global economy is thus characterized by the expansion of markets into former command and subsistence economies and the ongoing segmentation of labor markets in advanced industrial economies, yielding a large supply of potential migrants in the former and rising demand for their services in the latter. Those who move in response to these powerful macro-level forces are not passive actors, however, but active agents seeking to achieve specific goals through transnational movement. Any comprehensive model of international migration must theorize the

aspirations of those who respond to macro-level transformations by moving internationally. If one seeks to shape the behavior of migrants through policy interventions, it is critical to understand the reasons why people migrate.

The best-known model of migrant decision-making, neoclassical economics, argues that people move to maximize lifetime earnings (Todaro and Maruszko 1986). Individuals consider the money they can expect to earn locally and compare it to what they anticipate earning at various destinations, both domestic and international. Then they project future income streams at different locations over the remainder of their working lives subject to some time-sensitive discount factor and then subtract out the expected costs of migration to different destinations, yielding a mental estimate of net lifetime earnings.

In theory, people go to the location that offers the highest lifetime returns for their labor, so that in the aggregate labor flows from low- to high-wage areas. The departure of workers from the former constricts the supply of labor to raise wages at home while the arrival of workers in the latter increases the supply of labor to lower wages abroad. The flow continues until, at equilibrium, wage differentials disappear except for a residual reflecting the costs of movement, both financial and psychological (Todaro 1976). According to neoclassical theory, immigrants therefore aspire to permanent settlement and will continue arriving until wage differentials effectively disappear.

The maximization of lifetime earnings is not the only potential motivation for international migration, however, and an alternative theoretical model—known as the new economics of labor migration—has been derived to explain transnational movement. NELM argues that international migration offers a means by which people of modest means can overcome missing or failed markets for capital, credit, and insurance (Stark 1991), conditions that are common in societies undergoing economic development (Massey et al 1998). In contrast to permanent settlement abroad, NELM predicts circular movement and the repatriation of earnings in the form of remittances or savings. Rather than moving abroad permanently to maximize lifetime earnings, people move abroad temporarily to diversify household incomes or accumulate cash, seeking to solve specific economic problems at home in preparation for an eventual return.

In the developing world, labor markets are volatile and characterized by oscillations that render them periodically unable to absorb fully the streams of workers constantly being displaced from pre-market and non-market sectors. Lacking unemployment insurance, as is typical in the developing world, households self-insure by sending members to geographically distinct labor markets. In this way, the household diversifies its labor portfolio to reduce risks to income in the same way that investors diversify stock portfolios to reduce risks to wealth. If a rural Mexican household sends an older son to work in Mexico City and a father to work in Los Angeles, then if crops fail or agricultural wages plunge at home, the family can rely on income originating in other locations unaffected by local conditions.

Another failure common to developing countries is missing or incomplete markets for capital and consumer credit. Families seeking to engage in new forms of agriculture

or looking to establish new business enterprises need money to purchase inputs and begin production, and the shift to a market economy creates new consumer demands for costly items such as housing, automobiles, and appliances. Financing such production and consumption requires cash, but weak and poorly developed banking systems typically cannot meet new demands for capital and credit, giving households in developing nations yet another motivation for international labor migration. By sending a family member temporarily abroad for wage labor, a household can accumulate savings to self-finance investments in production and the acquisition of large-ticket consumer items.

The Emergence of Transnational Structures

A global economy wherein goods, capital, service, information, commodities, and raw materials flow relatively freely across international borders relies on an underlying infrastructure of transportation, communication, and governance to connect trading nations with one another and maintain international security (Massey et al. 1998). As trade between two countries expands, so do the various infrastructures that facilitate it, thereby reducing transaction costs along specific international pathways. However, reducing the costs of moving goods, services, and products also reduces costs for the migration of people. As a result, nations that engage in trade also tend to exchange people. Those possessing human capital flow into developing nations while those bearing labor flow in to developed countries (Massey and Taylor 2004). As of 2004, around one million Americans resided in Mexico and roughly 10 million Mexicans lived in the United States.

Once migration begins, however, a new social infrastructure arises that is under the control of the migrants themselves, and this development builds a powerful momentum into migration that yields a self-perpetuating process known as cumulative causation (Myrdal 1957; Massey 1990). The first migrants who leave for a new destination have no social ties to draw upon, and for them migration is costly, especially if it involves entering another country without documents. For this reason, the first international migrants usually are not from the bottom of the socioeconomic hierarchy, but from the middle ranges (Portes, 1979; Massey, Goldring, and Durand 1994). After the first migrants have left, however, the costs of migration are substantially lower for their friends and relatives who still live in the community of origin. Because of the nature of kinship and friendship structures, each new migrant creates a set of people with social ties to the destination area. Migrants are inevitably linked to non-migrants through networks of reciprocal obligations based on shared understandings of kinship and friendship. The non-migrants draw upon these obligations to gain access to employment, housing, and other forms of assistance at the point of destination, substantially reducing their costs.

Once the number of network connections in an origin area reaches a critical level, migration becomes self-perpetuating because migration itself creates the social structure necessary to sustain it. Every new migrant reduces the cost of subsequent migration for a set of friends and relatives, and with the lowered costs, some of these people are induced to migrate, which further expands the set of people with ties abroad, and, in turn, reduces costs for a new set of people, causing some of them to migrate, and so on. Recent

empirical studies in Mexico strongly support this scenario, showing that access to network connections substantially raises the likelihood of migration to the United States (Massey and García España, 1987; Palloni et al. 2001; Munshi 2003), and patterns appear to be quite similar elsewhere in Latin America (Massey and Aysa 2005).

Eventually, of course, communities reach a point of network saturation, where virtually all households have a close connection to someone with migrant experience. When networks reach this level of development, the costs of migration stop falling with each new entrant and the process of migration loses its dynamism (Massey and Zenteno 1999). At the same time, the rate of out-movement ultimately reaches a stage where labor shortages begin to occur and local wages rise (Gregory, 1986). These developments act to dampen the pressures for additional migration, and cause the rate of entry into the migrant workforce to decelerate and then fall off (Massey et al. 1994).

The Behavior of States

In the absence of governmental actions, the size and composition of international migratory flows would be determined solely by the foregoing factors—structural factors at origin and destination, the strategic behavior of migrants acting on particular motivations, and the emergence of transnational structures to mediate the flows—but in the present day all nations seek to influence the number and characteristics of foreign arrivals. State policies thus act as a filter affecting how the various macro-level forces and micro-level motivations are expressed in practice to yield concrete populations of immigrants with specific characteristics. A full statistical treatment of international migration thus needs to model the behavior of states as they evolve in response to domestic and international conditions.

State policies affecting immigration are the outcome of a political process in which competing interests interact within bureaucratic, legislative, judicial, and public arenas to develop and implement policies that influence the flow and characteristics of immigrants. Recent theoretical and empirical research yield several conclusions about the determinants of immigration policy in migrant-receiving societies (Massey 1999). First, even though doubt remains about precisely which economic conditions are most relevant, it is clear that a country's macroeconomic health plays a key role in shaping immigration policy. Periods of economic distress are associated with moves toward restriction, whereas economic booms are associated with expansive policies (Lowell et al. 1986; Shughart et al. 1986; Foreman-Peck 1992; Goldin 1994; Timmer and Williamson 1998).

In addition, immigration policy is sensitive to the volume of international migration itself, with large inflows generally leading to more restrictive policies (Timmer and Williamson 1998; Meyers 2004). Immigration policy is also associated with broader ideological currents in society, tending toward restriction during periods of social conformity and conservatism and toward expansion during periods of principled support for open trade as well as geopolitical conflict along ideological lines (Meyers 2004). During the Cold War, policy makers in capitalist nations accepted large numbers of refugees from communist societies on generous terms, and advocates of free trade pushed for the opening of borders with respect to workers as well as capital, commodities, and

goods. On the whole, these conclusions suggest that developed countries will move toward more restrictionist policies toward the rest of the world, even as they act to lower barriers to movement among themselves.

Meyers (2004) divides receiving-country immigration policies into three basic categories: those affecting labor migrants, those affecting refugees, and those affecting permanent settlers (who may include former labor migrants and refugees). Labor migration policies are generally determined bureaucratically by economic interest groups (employers and workers) who interact with public officials outside the public eye, yielding a “client politics of policy formulation” (Calavita 1992; Freeman 1995; Joppke 1998). Refugee policy is also formulated bureaucratically outside the public arena, yielding a slightly different client politics of negotiation between the executive branch and various social groups having political or humanitarian interests (Meyers 2004). Policies on permanent immigration occur in public arenas where the interests of politicians, legislators, and ordinary citizens weigh more heavily against those of bureaucrats and special interests.

Citizens, albeit to varying degrees, tend to be xenophobic and hostile to immigration. Small but significant minorities also oppose immigration on ideological grounds, as part of a commitment to zero population growth or reducing strains on the environment. Most citizens, however, are poorly organized and politically apathetic, leaving immigration policies to be determined quietly by well-financed and better-organized special interests operating through bureaucratic channels. During periods of high immigration, stagnating wages, and rising inequality, however, the public becomes aroused, and politicians draw upon this arousal to mobilize voters, thus politicizing the process of immigration policy formulation and moving it from client politics to public politics. This scenario clearly occurred in the United States during the period 1986-1996 as successive pieces of immigration legislation made it more difficult for Latin Americans to qualify for legal residence and dramatically increased resources for border enforcement.

The Efficacy of Restriction

In general, the likely thrust of government policies toward immigration is fairly clear—in the absence of compelling ideological reasons to accept large numbers of immigrants, democratic governments move toward restriction during periods of high immigration, high inequality, and rising economic uncertainty. These conditions prevail now and in the foreseeable future in the United States. While the intended goals of state policies may be clear, however, a central question concerns the ability of states to achieve the goals they intend. Although states may *attempt* to regulate immigration, it is by no means assured that this goal will be achieved in practice. Desired outcomes may be partially accomplished or achieved not at all, and it is even possible that state interventions produce results precisely opposite those intended by policy makers.

Evidence of the gap between policy intentions and actual results is the fact that in recent years virtually all developed countries have come to accept a large (although varying) number of “unwanted” immigrants (Joppke 1998). Even though most countries have enacted formal policies to prevent the entry and settlement of immigrants, liberal

democratic states have found their enforcement of restrictions constrained by several important factors (Cornelius, Martin, and Hollifield 1994). First is the global economy itself, which lies beyond the reach of individual national governments but which unleashes powerful social and economic forces that promote large-scale international population movements (Sassen 1996, 1998). Second is the internal constitutional order of liberal democracies, reinforced by the emergence of a universal human rights regime that protects the rights of immigrants and makes it difficult for political actors to assuage the restrictionist preferences of citizens (Hollifield 1992; Cornelius, Martin, and Hollifield 1994; Freeman 1992, 1995; Jacobson 1997). A third constraint is the existence of an independent judiciary that is shielded from the political pressures to which elected politicians must respond, thus allowing immigrants in liberal democracies to turn to courts to combat restrictive policies implemented by the legislative and executive branches (Joppke 1998).

The efficacy of restrictive immigration policies thus varies substantially depending on five basic factors: the relative power and autonomy of the state bureaucracy; the relative number of people seeking to immigrate; the degree to which political rights of citizens and non-citizens are constitutionally guaranteed; the relative independence of the judiciary; and the existence and strength of an indigenous tradition of immigration. The interplay of these five factors produces a continuum of state capacity to implement restrictive immigration policies, as illustrated in Table 1 (adapted from Massey 1999).

Table 1. Conceptual Classification of Factors Affecting State Capacity to Implement Restrictive Immigration Policies.

	Strength of Bureaucracy	Demand for Entry	Strength of Constitutional Protections	Independence of Judiciary	Tradition of Immigration	Continuum of State Capacity	
Relationship to:							
State Capacity	Positive	Negative	Negative	Negative	Negative		
Kuwait	High	Moderate	Low	Low	Low	High	
Singapore	High	Moderate	Moderate	Moderate	Low		
Britain	High	Moderate	Low	Moderate	Low		
Switzerland	High	Moderate	High	High	Low		
Germany	High	High	High	High	Low		
France	High	High	High	High	Moderate		
Argentina	Low	High	Moderate	Moderate	High		
Spain	Low	Moderate	High	High	Low		
Canada	High	High	High	High	High		
United States	Moderate	High	High	High	High		Low

Source: Massey (1999)

Next on the continuum of state capacity to restrict immigration are democratic states in Western Europe and East Asia with strong, centralized bureaucracies, but with

moderate demand for entry and little native tradition of immigration. Political elites in these countries can expect to meet with some success in restricting immigration, but, as described above, immigrants have important resources—moral, political, and legal—to forestall state actions and evade legal restrictions on entry and settlement. Next on the scale of state capacity are the nations of Southern Europe and South Asia, which likewise lack strong traditions of immigration but which also lack strong centralized bureaucracies capable of efficiently imposing their will throughout society. Immigrants to Spain, Italy, Greece, Thailand, or Malaysia thus have considerably more leeway to overcome barriers, and the states have less capacity to enforce restrictive immigration policies and bureaucratic procedures.

Finally, at the opposite end of the spectrum from the Gulf states are countries that lack a highly centralized state and that have strong traditions of individual liberty and long-standing cultures of immigration. Such countries as Canada and Australia have well-developed social and political infrastructures to support immigrants, protect their rights, and advance their interests. The most extreme case in this category is the United States, which faces an intense demand for entry and has a deeply ingrained commitment to individual rights, a long-standing history of resistance to central authority, a strong written constitution protecting individual rights, and an independent and powerful judiciary. In the United States immigration is not simply a historical fact, it is part of the national myth of peoplehood (Smith 2003).

LESSONS FOR FORECASTING

The foregoing discussion reveals international migration to stem from a complex array of factors and forces acting at different levels, often with complicated cross-level, longitudinal feedbacks. It is not surprising, therefore, that immigration has proved to be far more dynamic than demographers have thus far realized in forecasting models, and that static predictions based on constant assumptions and fixed projections have badly failed to predict the course of American immigration during the last quarter of the twentieth century. What does the foregoing review teach us about the nature of international migration and our ability to forecast its future course?

Respect the Salience of Markets

A principle lesson is the critical role played by markets in promoting and sustaining international migration throughout the world. Within developing nations, migration—both internal and international—is a byproduct of the structural transformation of society that occurs as markets progressively expand and penetrate into more areas of social and economic life. The growth and expansion of markets within countries is, in turn, linked to the insertion of nations within the global networks of trade, investment, and coordination that undergird the global market. As countries such as China and India join the global trading regime and shift from peasant agriculture and state-led production toward market mechanisms they can be expected to produce more, not fewer people seeking to adapt to the new realities of life in a rapidly changing market society through international wage labor. Demographers seeking to predict future levels of immigration for use in population projections would do well to pay close attention to

developments within these and other developing nations as they embrace capitalism and undergo transition to the market in coming decades.

At the same time, demographers need to broaden their view to consider not just labor markets, but also those for capital, credit, and insurance. Building a well-functioning market society is not a simple task, and along the way nations are likely to experience periodic market failures and prolonged periods when large segments of the population are exposed to missing, incomplete, or inefficient markets. In the past, demographers have focused largely on international wage differentials as the driving force behind international migration, and while large international population flows generally do not occur in the absence of significant wage differentials, they are neither necessary nor sufficient for immigration to occur (Massey et al 1998). Whereas neoclassical economics focuses on geographic disequilibria across national labor markets as the fundamental cause of migration, the new economics of labor migration pays greater attention to failures in credit, capital, and insurance markets as leading drivers.

Although some people clearly migrate in order to maximize lifetime earnings, many others move in order to overcome market failures at home. Throughout the world, the most important single target for migrant remittances and savings is the construction or acquisition of a home, suggesting that migrants may be moving as much to overcome missing mortgage and lending markets as to maximize lifetime earnings (Massey et al. 1998). In head-to-head comparisons between hypotheses derived from neoclassical economics and NELM, the latter usually have greater explanatory power (Stark and Taylor 1989, 1991). Massey and Espinosa (1997) found, for example, that temporal variations in real interest rates generally out-performed fluctuations in the expected earnings differential in predicting the likelihood of Mexico-U.S. migration. Ironically, those most likely to move in response to earnings differentials are those with human capital, and people with skills and education are generally welcomed as immigrants throughout the global economy (Massey and Taylor 2004). In building structural forecasting models or judging the level of immigration to assume in static models, therefore, it is important to consider the extent and rapidity of market expansion in different nations around the world, to consider not just labor markets but those for capital, credit, and insurance, and to differentiate between the movement of people selling their labor and those moving to maximize returns on their human capital.

Recognize the Circularity of Migration

Even though demographers recognize that immigrants naturally come and go across international boundaries, they nonetheless tend to under-appreciate the size and importance of emigration in assessing the relative contribution of international migration to population growth. In the United States, this fixation is pronounced because it follows American myth, which glorifies immigration as a one-way passage to paradise. As Emma Lazarus put it her celebrated poem inscribed on base of the Statue of Liberty, "Give me your tired, your poor, your huddled masses yearning to breathe free, the wretched refuse of your teeming shore. Send these, the homeless, tempest-tossed to me, I lift my lamp beside the golden door!" This emphasis on settlement is reinforced by neoclassical economics, which views migration as a permanent move undertaken to

maximize lifetime earnings rather than as a short-term strategy to accumulate savings or manage risk.

It is hardly surprising therefore, that past projection models have assumed a fixed number of net international migrants distributed according to a constant age-sex schedule, as if net migration itself were a discrete quantity affected by a coherent set of determinants. In reality, net immigration constitutes a small residual from much larger gross flows of people in and out of a country; and entries and exits typically respond to entirely different factors operating at different geographic locations. With the exception of the Irish and Jewish immigrants from the Russian Pale, international migration during the classic era between 1880 and 1920 was heavily circular and determined by fluctuating conditions in sending and receiving nations (Thomas 1973; Wyman 1993; Hatton and Williamson 1998).

Migration to the United States since 1965 likewise has been heavily circular, with out-migration generally averaging about a third of in-migration (Jasso and Rozenzweig 1982; Warren and Kraly 1985). Indeed, two-thirds of those entering the United States as “new” permanent immigrants have been in the country before in one status or another (Massey and Malone 2003; Redstone and Massey 2004). Rather than assuming a single value for net international migration, therefore, demographers would be on safer ground if they were to make *separate* assumptions about levels and patterns of in- and out-migration for purposes of population projection. Likewise, in specifying forecasting equations they would do well to model the two flows separately as functions of distinct sets of determinants.

The case of the United States is particularly instructive here. Projections during the 1990s failed not so much because the level of in-migration had changed, but because the rate of out-migration fell precipitously to record low levels, something that Census Bureau demographers failed to notice because they were not looking in the right place (Massey, Durand, and Malone 2002; Massey 2005). Not only is the separate consideration of in- and -out-migration mandated empirically, it is warranted theoretically under the New Economics of Labor Migration which explicitly posits return migration (Massey et al. 1998).

Although net international migration may be dominated by the entry and exit of foreigners, the crossing of international borders is not limited to immigrants, and in today’s global market natives also contribute to net gains and losses of population through international movement. Some 4.2 million U.S. citizens lived abroad at the time of the last census (U.S. Department of State 2002), and although this constitutes a small number compared with the 31.1 million foreigners in the United States, changes in the propensity of Americans to live abroad may influence projections more significantly in years to come as both retirement and business emigration expand.

Appreciate the Power of Feedbacks

Another reason that Census Bureau projections failed so badly in predicting the volume of immigration during the 1980s and 1990s is that they did not take account of the powerful endogeneity built into immigration processes by social networks. Known

variously as the “auspices” of migration (Tilly and Brown 1967), the “family and friends effect” (Levy and Wadyckia 1973), “chain migration” (MacDonald and MacDonald 1974), and “migration capital” (Taylor 1986), network ties lend migration a strong internal momentum. When someone without prior migration experience has a social tie to someone with current or past experience as an international migrant, his or her odds of moving internationally are dramatically higher compared with those who lack such ties (Massey et al. 1998). This basic empirical fact creates a powerful feedback loop between the past migratory behavior of people within a social network and the future migratory behavior of non-migrants who share the same network, yielding the feedback process known as cumulative causation (Massey 1990).

The principal lesson for demographers is that the more immigrants from a particular origin there are in a receiving country at present, the more can be expected to come in the future, up to asymptotic limits set by the logistic curve. Massey and Zenteno (1999) showed that building feedbacks through migrant networks into models projecting Mexican immigration to the United States increased the expected number of immigrants over static projections by 85 percent in the course of five decades, yielding a far more accurate forecast of future population size. Hatton and Williamson (1994, 1998) found that network effects dominated in statistical models predicting emigration from Europe during the classic era, especially during the phase of rapid expansion shortly after the initiation of mass movement.

Don't Be Surprised at Unintended Consequences

Although governmental policies may influence fertility and mortality at the margins, the effects are diffuse, indirect, gradual, and quite modest overall. Vigorous pronatalist policies to encourage childbearing in some European countries have met with limited success (Morgan 2003) and heavy investments in biomedical research and health care have yielded gradual rather than quantum increases in life expectancy in recent decades (Wachter and Finch 1997). In contrast, changes in immigration policy since 1965 have produced a series of sharp discontinuities in the volume and composition of immigration to the United States, usually in unexpected and often in unintended directions (Massey, Durand, and Malone 2002).

As already mentioned, immigration policies are generally developed in response to domestic politics and are grounded more in ideology or expediency than in any realistic appreciation of international migration as a social and economic process. As a result, state interventions to placate domestic political interests or satisfy specific constituents have frequently produced unanticipated effects that have worked as much to expand as to limit the flow of immigrants into the United States.

The contemporary era of international migration is commonly dated from the passage of the 1965 amendments to the Immigration and Nationality Act, which established a new “preference” system for allocating visas to prospective immigrants on the basis of kinship to U.S. residents and to a lesser extent, on the basis of domestic employment needs. By far the largest number of immigrant visas were reserved for direct relatives of U.S. citizens and resident aliens, with a much smaller share set aside for needed workers. In 2004, for example, two thirds of all resident visas went to the

relatives of people already present in the United States, compared with 16 percent granted on the basis of employment (U.S. Department of Homeland Security 2005).

The preference system was created to eradicate discrimination on the basis of national origin and was thought at the time to have few implications for the long-term expansion of immigration. But the allocation of visas to the relatives of citizens and resident aliens—most of them former immigrants themselves—inadvertently ended up reinforcing if not institutionalizing the tendency of network migration to build a strong momentum into U.S. immigration (Massey and Phillips 1999). Each time an immigrant receives a green card, it creates new entitlements for entry by that person's relatives, and if the new immigrant eventually goes on to become a citizen, the set of people eligible for entry expands even further (Jasso and Rosenzweig 1988; Massey, Durand, and Malone 2002).

Thus, because legislators in 1965 did not understand the role played by migrant networks in dynamizing international migration, a provision that was intended to rectify past discrimination ended up reinforcing one of the principal feedback loops by which immigration perpetuates itself over time. Likewise, in 1986 the members of congress sought to prevent undocumented migration by increasing the resources and personnel allocated to border enforcement, launching what would prove to be a two-decade long militarization of the Mexico-U.S. border. Since 1986, the number of Border Patrol Officers has tripled and the agency's budget has grown tenfold (Durand and Massey 2003).

This enforcement strategy assumed that immigration was a one-way street and that few immigrants left the country once they secured entry. Congressional representatives were unfamiliar with the new economics of labor migration, which argued that labor migration is motivated by a desire to solve economic problems at home and return. Mexican migration historically had been highly circular, especially among those without documents (Reichert and Massey 1979). Massey and Singer (1995) estimate that between 1965 and 1985, 85 percent of undocumented entries were offset by departures, and even many "permanent" legal residents come and go seasonally across the border without settling (Durand and Massey 1992).

Legislators were also unfamiliar with the experience of European nations, which after 1973 ended foreign labor recruitment and attempted to close their borders. Although the number of guestworkers fell, their place was taken by a growing number of spouses and dependents, and what had been a circular flow of male labor became a settled population of families, as male workers dug in their heels and refused to leave for fear of not being able to reenter later (Martin and Miller 1980). In the end, the rate of growth of the foreign born population accelerated in response to European attempts at border closure.

Much the same thing happened during 1986-2006 in the United States. The launching of Operation Blockade in El Paso in 1993 and Operation Gatekeeper in San Diego in 1994 tripled both the costs of border smuggling and the risk of death (Massey 2005). In response, undocumented migrants quite rationally took steps to minimize

border crossing—not by ceasing to migrate in the first place, but by staying longer and not returning once entry had been achieved (Massey, Durand, and Malone 2002). Trip durations lengthened (Reyes 2004) and return rates plummeted (Riosmena 2004) while volume of in-migration remained fairly constant and the probability of apprehension actually *fell*. As a result, the *net* flow of undocumented migrants into the country accelerated rapidly. The number of undocumented migrants in the United States consequently grew at an unprecedented rate, causing Hispanics to overtake blacks as the nation’s largest minority a decade before census demographers had predicted.

Although both of the above outcomes were unintended and unexpected by legislators, they could nonetheless have been anticipated by anyone familiar with recent theory and research on international migration. Indeed, the effect of recent immigration laws in reinforcing network migration and social capital accumulation had been predicted publicly in an op-ed piece based on social capital theory (Massey 1988). Likewise, the likely effect of border enforcement in reducing rates of return migration was anticipated as early as 1982 by Reichert and Massey (1982) and its effect in lowering apprehension probabilities was clearly documented in 1998 by Singer and Massey (1998). Legislators unencumbered by a scientific understanding of immigration nonetheless chose to escalate border enforcement, dramatically increasing the contribution of immigration to U.S. population growth over the past decade.

CONCLUSION: BUILDING A BETTER MODEL

The foregoing discussion offers guidance to demographers in deciding which levels of immigration to assume in future projections, offering a foundation for better guesses about future trends in emigration and immigration. Ultimately, however, a proper job of forecasting migration trends requires the construction of a full-blown econometric model that connects entries to and exits from the United States to key determinants identified from theory and prior research, one that allows for feedbacks across time and between levels. Although building such a model is a formidable challenge, and beyond the scope of this paper, we are nonetheless in a position to specify which variables are relevant from a theoretical and substantive viewpoint.

The aggregate supply of international migrants from different nations around the world is likely to be determined by their location on a continuum of market development, pointing to economic measures of industrialization, service sector dominance, and privatization as key indicators of migratory potential. The existence of political alliances and the emergence of trade, transportation, and communication links, in turn, predict likely destinations for these potential migrants. The most important “political” variables to include in any model predicting international migration are troop deployments and military bases (Jasso and Rosenzweig 1990). Wherever the United States soldiers for geopolitical reasons is likely to become a source of international migrants because dependent relationships inevitably form between U.S. and local officials, and marriages are contracted between soldiers and local women.

Demand for immigrants is also connected to the ongoing segmentation of labor markets within advanced industrial societies and to the relative supply of workers from domestic sources who are in a position to fulfill the demand for workers in the secondary

sector. Sociologists have developed several classification schemes that potentially can be applied to U.S. occupational distributions to measure the degree of segmentation on a year-to-year basis (Tolbert, Horan, and Beck 1980). The potential supply of workers can be measured as the relative number of women aged 25-65 who are not already in the labor force and the relative number of youths aged 15-20 who are neither in school nor at work.

The people who respond to these structural forces by becoming international migrants are likely to be motivated by diverse goals. Those seeking to maximize lifetime earnings pay attention to relative wages in the United States and other destination areas, suggesting the necessary inclusion of wage differentials in models of international migration. Those seeking to overcome failures in the capital, credit, and insurance markets, however, are more affected by the relative number of banks, prevailing interest rates, and insurance coverage. Recent theory and research suggest it is essential to include measures of more economic variables than simple wage rates or differentials.

Finally, it is imperative not only to model the influence of migrant networks but to capture their feedback effects over time. The ideal measure for such purposes would be the relative number of people of a given national origin who have migratory experience within the country of origin, but data on the distribution of foreign experience within specific national populations generally does not exist, and the most common proxy has been the relative number of migrants from a country who have already settled at the place of destination (Dunlevy and Gemery 1977; Walker and Hannan 1989). Thus a strong predictor of the rate of entry from a particular country is the relative number of migrants from that source who were present in the destination country at some point in the past, say five years ago. The parameterization of such lagged relationships according to a logistic function would enable forecasting models to do a better job of capturing the dynamic effects of migrant networks in promoting future immigration based on past experience (Massey and Zenteno 1999).

At this point, the principal obstacle to the construction of a valid and accurate model of international migration is not theoretical or technical. As social scientists, we know which variables are important and how they operate to determine international population movements. We also have the statistical tools necessary to estimate complex effects and interrelationships that are dynamic over time and across analytic levels. What we lack at this point is a body of data that is adequate to the task. Information on immigrants to the United States is limited to that contained on the visa application and since 1957 the nation has kept no statistics whatsoever on emigrants or emigration (Levine, Hill, and Singer 1985). The first order of business in building better models of international migration is therefore to improve the federal government's data gathering and tabulation capacities. At this point it is hard enough just to model past inflows to the United States, much less project them into the future.

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TOWARD BUILDING A COMPREHENSIVE MIGRATION PROJECTIONS FRAMEWORK

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ABSTRACT

This paper discusses selected challenges involved in migration forecasting. It begins with a discussion of how to capture uncertainty in future migration, then goes on to define a dynamic analytical framework which attempts to cover the most important causal mechanisms described by recent theories of international migration. This is done by capturing different drivers separately for sending areas and destination areas, including environmental and demographic factors, factors related to human capital development, labor market factors, and other quality of life related factors. These two sets of drivers, together with the given history of migration streams and the resulting social networks, determine the individual decision to migration. In combination with the impact of relevant government policies (mostly in the areas of destination), the individual decision can then be transformed into an actual move. The paper concludes with some more general consideration of how to forecast the population by some of the characteristics (such as level of educational attainment) that are expected both to drive conditions in sending and destination areas as well as in part to determine the shape of national migration policies.

Introduction

In this paper I will try to stretch the boundaries of what social science usually does in terms of anticipating the future. Based on a long, personal involvement in the methods of population forecasting (Lutz 1991; Lutz 1996; Lutz et al. 2004) and a recent comprehensive review of some of the main theories of migration (Massey et al. 1998), I will attempt to develop an outline of what could become a comprehensive framework for producing quantitative projections of future migration volumes, utilizing the tools of applied systems analysis. The paper will not go all the way to defining an operationalized model, but it will describe the main features and discuss alternative ways to formalize the relationships. It will also discuss new methodologies for projecting the future composition of the population with respect to some of the key driving forces in international migration, giving a few examples of what could be done along these lines. In a way, the paper tries to indicate how one could go about defining a comprehensive migration forecasting model, should significant funds become available to carry out such an exercise.

First, I will discuss some of the general challenges involved in population forecasting and address some specific difficulties one encounters when projecting migration. Special emphasis is also given to the question of how to deal with uncertainty in population forecasting. Next, a dynamic analytical framework will be presented, which attempts to cover the most important causal mechanisms as described by recent international migration theories. This is followed by a discussion of new analytical tools that allow for a projection of some of the key driving forces identified. Human capital forecasting, i.e., projections of the population by age, sex, and level of education, is used as an illustration. I will then turn to the question of how to capture the decision making processes, both at the individual level and at the level of formulating national policies. Finally, I will discuss the challenges involved in defining consistent scenarios for some of the drivers for which we lack appropriate analytical forecasting models.

Migration in the Context of Population Forecasting

For more than half a century, the standard method for projecting populations has been the so-called cohort component method. This method starts with a given structure of the population by age and sex and then year after year moves the people to higher ages (along cohort lines) while exposing them to the risk of mortality and considering in- and out-migration. In addition, the women of reproductive age are made subject to a set of age-specific fertility rates that result in a certain number of births, which in turn are moved to the very bottom of the age pyramid. Hence, this forecasting method explicitly considers sets of age-specific assumptions in the three components of population change: fertility, mortality, and migration.

While the mechanics of doing population projections is fairly straightforward, the problem is what assumptions to make about the future level and age pattern of fertility, mortality, and migration. There exists a huge body of scientific literature about the factors that determine each of these three components under specific historical, geographical, socioeconomic, and cultural conditions. But very few of these studies

explicitly address the question of what the specific empirical findings derived from such data analysis imply for the future trends of these components of demographic change. The communication between substantive researchers and those of you who prepare population projections has traditionally been rather weak. Nathan Keyfitz, one of the giants of demography in the twentieth century, wrote in the foreword to a book entitled *The Future Population of the World: What Can We Assume Today?* (Lutz 1996) the following assessment of the situation: “Forecasting is one of the oldest of demographic activities, and yet it has never been fully integrated with the main body of demographic theory and data. The fact that the public regards it as our most important task finds no reflection in our research agenda; the amount of it done is out of proportion to the fraction of space devoted to it in professional journals” (Lutz 1996, p. xii). The problem seems to be on both sides: The practitioners in the offices producing population projections traditionally have not paid much attention to a careful scientific justification of the assumptions made, and the substantive researchers have tended to regard forecasting as a rather specific technical activity that is unrelated to their own empirical or theoretical research.

This problem of lack of communication between researchers doing substantive research and others producing population projections pertains to all three components of demographic change, but they seem to be most disconnected in the field of migration research. In the field of mortality projections for industrialized countries, most projections now consider continued (linear) increases in life expectancy that also correspond to what the mainstream mortality researchers consider plausible. This is a rather recent convergence of views, because in the past, forecasters typically assumed a leveling off in life expectancy over the coming years, while there was little substantive reasoning for doing so. In the field of fertility, most national forecasting agencies in industrialized countries now assume that cohort fertility will stay roughly at its current level. This is a supposedly “safe” assumption, given that substantive research does not offer any good theory about the future level of fertility in post-demographic transition countries. There are many reasons to assume that fertility may continue to decline, but there are also reasons to assume stability or even increase. The balance of these arguments is not clear (Lutz forthcoming).

The past trends of migration in most industrialized countries have been more volatile than those of mortality and fertility. Part of the reason is that they are more directly influenced by political conditions that can change quickly (such as the fall of the Iron Curtain) and that are less predictable than the changes driven by slowly evolving socioeconomic, cultural, lifestyle, and public health conditions. A change of government following an election can change immigration policies or the enforcement of existing policies from one year to the next, thus greatly influencing the volume and type of migration streams in rather short time intervals. Partly because of this volatility, national population forecasting agencies typically just assume certain numbers of future migration (that tend to be in line with recent levels) and that are not based on any theoretical considerations. This is despite the fact that there are probably better theories of migration than there are theories of fertility in post-demographic transition conditions.

How do demographers deal with these uncertainties about future migration, fertility, and mortality trends? The traditional way of preparing population projections has been to present one main or medium variant that combines the assumptions that the forecasters consider the most likely ones. In addition, often a high and a low variant are presented that typically (such as in the UN projections) are based on alternative fertility assumptions, while assuming identical mortality and migration trends. Some national statistical agencies produce a larger number of alternative scenarios which also vary mortality and migration assumptions. But the full combination of three different assumptions for each component results in 27 different scenarios, which is rather confusing for the users. Even in this case, moreover, the user of projections typically does not know (1) what the alternative migration assumptions are based on in terms of story lines and substantive reasoning, and (2) what the chances are that the future migration trends will actually fall inside the specified ranges.

The alternative to the traditional variant method is probabilistic (or stochastic) forecasting. The growing body of literature on different approaches to dealing with uncertainty in population forecasting was recently summarized in a special issue of the *International Statistical Review* (Lutz and Goldstein 2004). Here I will simply present a specific example of how probabilistic forecasting can show users a realistic picture of what certain assumed uncertainty ranges for future trends in fertility, mortality, and migration produce in terms of an uncertain population age structure and size.

Figure 1 gives a probabilistic age pyramid for Austria in 2030, a country in which migration plays a key role in its population dynamics. Currently, around 10 percent of the resident population of Austria has foreign nationality. Without migration gains, the population of Austria would already have started to decline due primarily to low levels of fertility around a total fertility rate (TFR) of 1.4. Using different shadings (colors), the figure shows the 95, 60, and 20 percent uncertainty ranges for both sexes and each age group. The figure clearly indicates that the uncertainty is greatest for the youngest age groups due to the fact that of the three components of change, fertility has the greatest long-term impact on population dynamics. The age groups with the smallest uncertainty ranges in 2030 are the cohorts born between 1955 and 1975. Here the initial cohort size is well known; they are already beyond the prime ages of migration; and they are not yet at such high ages that the uncertainty about the future trend in old age mortality makes a difference. For the cohorts that will be younger than age 50 and older than age 30 in 2030 the rather broad uncertainty range is clearly a function of the uncertainty in future migration trends.

If one goes to the sub-national level, the uncertainty about the future level of migration flows may even dominate the picture. This is clearly seen for the probabilistic age pyramid for the city of Vienna in Figure 2, where in the past, migration into the city (both from other parts of Austria and from abroad) has been a major source of population growth. But recent decades have seen great fluctuations in migration gains, and it is uncertain how the trend will evolve in the future. For this reason, Statistics Austria assumes quite broad ranges between the high and low migration assumptions in their population projections. In the probabilistic context, the additional assumption is made

that those high and low values cover 67 percent of an assumed normal distribution of the future net migration gains (Lutz et al. 2003).

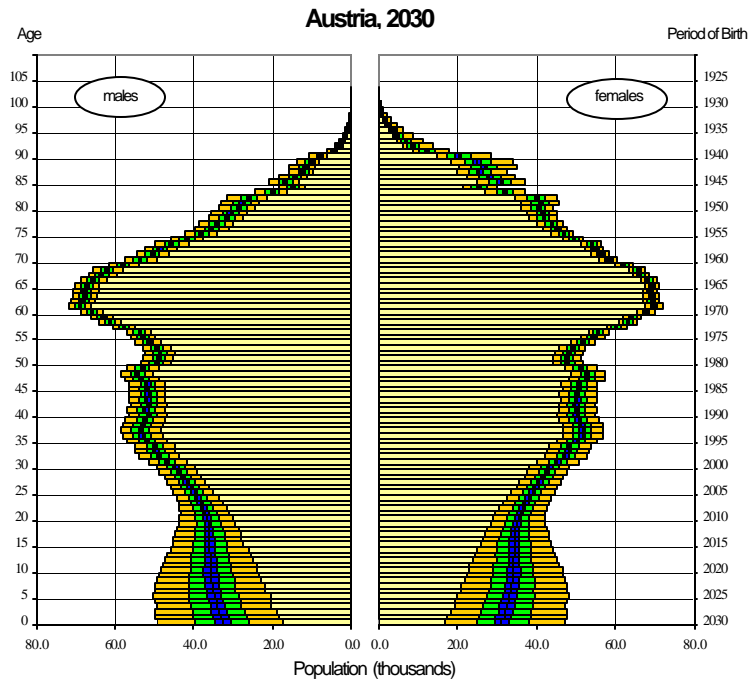


Figure 1: Probabilistic Age Pyramid for Austria in 2030.

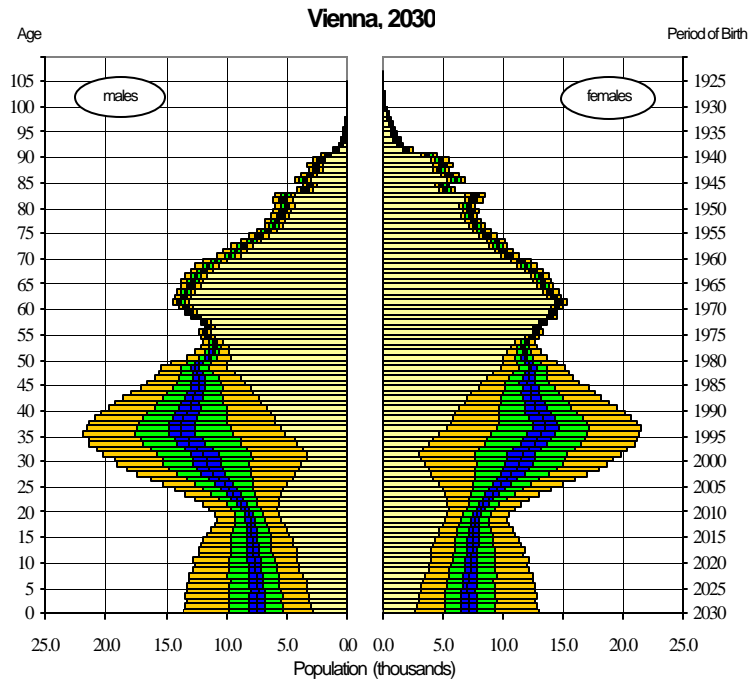


Figure 2: Probabilistic Age Pyramid for the City of Vienna in 2030.

Whatever the ways of trying to quantify the uncertainty of future trends and communicating this uncertainty to the users of projections, there is no way around making substantive assumptions about what are the likely future levels of the three components, and what are the likely ranges of uncertainty. Particularly with respect to migration, some more mechanistic approaches that try to derive the future level of migration gains and the variance around them from simply extrapolating the experience of past time series, do not seem to be satisfactory. Future migration streams will not simply be a continuation of the past. In addition to the old forces that drove migration, new drivers may play an important role and—different from the cases of fertility and mortality—policy changes may have significant short-term implications for the volume and direction of migration flows.

For this reason, the rest of this paper will not focus on different ways of coming up with specific quantitative assumptions about the size of likely and possible future migration streams, but rather address the substantive reasoning behind alternative assumptions. In doing so, I will take the first of the two above-mentioned approaches of dealing with uncertainty, namely, the one that aims at developing consistent scenarios based on alternative story lines. These story lines try to capture alternative possible and plausible future developments based on a consideration of driving forces and an attempt to produce a comprehensive picture of the net effect that these driving forces may have on migration. Hence, this approach does not immediately aim at quantification, but rather operates at the theoretical level. Quantification may come at the end, once satisfactory substantive models have been developed.

Trying to Convert Migration Theories into a Systems Model

The dominant theories of migration have been extensively discussed by Douglas S. Massy and other contributors to the CSIS Project on Long-Term Immigration Projections and shall not be summarized here. Instead, I will try to synthesize the most important aspects of these theories and incorporate them into a systems model that has the potential for quantitative simulation and estimation. The process will be structured in four steps which will form the rest of this paper:

- Try to structure a systems model: Identify key drivers and key decision processes.
- Discuss how the drivers can be measured and forecast in scenario form.
- Discuss what decision-making processes are involved and how to model them bottom up (micro).
- Think in terms of consistent aggregate scenarios (macro).

The main structure of the proposed systems model is outlined in Chart 1. One feature that most theories of international migration have in common is the distinction between conditions in the area of origin and conditions in the area of destination. This also roughly corresponds to the old distinction between “push” and “pull” factors. Another important dimension that most theories acknowledge is the path dependence of migration; migrants do not randomly move to other countries, but tend to follow established streams that have developed over history and correspond to existing social

networks. These two dimensions determine the basic structure of the proposed model as shown in the upper part of Chart 1.

On the left side of the chart, Box A refers to the conditions in the area of origin. These conditions can be grouped in five clusters, namely, environmental factors, demographic factors, human capital-related changes, labor market conditions, and other quality of life (QoL) factors. The same five clusters are also considered in the area of destination, which is represented by Box B in the upper right corner of the chart. In addition, Box B contains a sixth cluster—immigration population—that does not appear for the area of origin. I begin my overview of the proposed systems model with a discussion of these driving forces of migration:

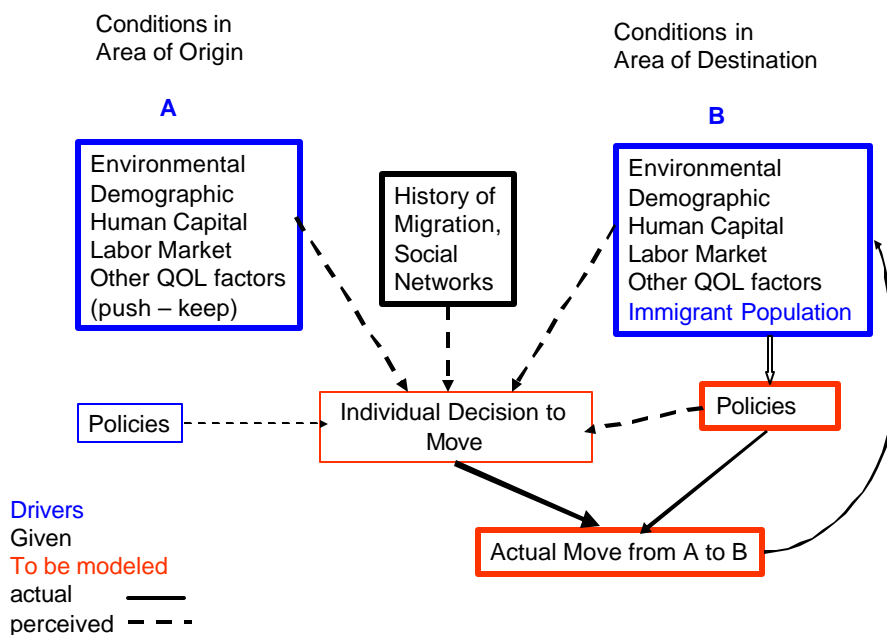


Chart 1: Outline of a Systems Model of International Migration.

Environmental Conditions: The physical setting, including the quality of the soils, climate, elevation, vegetation, availability of fresh water, air quality and several other environmental factors, is one of the most basic driving factors both in the area of origin as well as in the area of destination, although social science studies of migration give rather little attention to it. Many of the major migration streams throughout human history have been kicked off by changing climatic conditions or by people who under constant climatic conditions have left their original area in search of better conditions and more fertile land. As to the future, this factor may even have greater significance through the prospects of pending global climate change (O’Neill et al. 2001). How relevant this expected global climate change will be for the future of migration depends first and foremost on the time horizon. Over the next two decades, the rather gradual changes may not

have a great effect on triggering new migration streams; with a time horizon of 50-100 years, however, they may become very serious, if not dominating, factors. Current climate models clearly indicate that there will be winning and losing regions in terms of agricultural productivity (Fischer et al. 2002) and other relevant factors, including sea level rise and the frequency of extreme weather conditions, such as tropical storms and droughts. To what degree these changing environmental conditions will trigger new migration streams from the losing areas into the winning areas will greatly depend on an array of institutional factors and policies as will be discussed below.

Demographic Change: We currently live in a demographically divided world. While, at the aggregate level, we can now expect the end of world population growth over the course of this century (Lutz et al. 2001), there is still significant population growth to be expected in parts of the developing world, particularly in Africa and in the Arab world. On the other hand, many industrialized countries are already experiencing significant population aging and in some cases, even population decline. Over the coming decades, this tendency towards aging and decline will be further strengthened. Particularly around 2025-2030, when the very large baby boom generation (those born in the immediate postwar decades) is fully in retirement, the proportion of retired persons to persons in the labor force will dramatically increase. This tendency can be clearly seen in the Austrian age pyramid in 2030 (Figure 1 above). In that year, the cohorts born in 1960-1970 will be by far the largest age group—then aged 60-70 years—and will be almost twice the size of the youngest age groups 0-9. This rapid decline in the proportion of the working-age population in many industrialized countries, which will result in a likely shortage of labor, together with the expected rapid increase of the African and Arab population with a massive surplus of labor, makes it reasonable to assume significant migration from the countries of labor surplus to those of labor shortage. But as we will discuss in the following sections, the picture is more complicated than that. The fact that populations in Europe and Japan are rapidly aging, and soon will also be shrinking, does not necessarily mean that there will be many more migrants. Due to current rigid labor markets, several European countries have very high youth unemployment, even in the context of shrinking numbers of young people, while at the same time there is an influx of rather unskilled (partly undocumented) immigrants from the South and the East. In other words, demographic shifts of the sort described are clearly an important driving force in the background, but they do not directly translate into certain volumes of international South-North migration.

Human Capital: In times of rapidly developing new technologies, the difference between unskilled and skilled workers is becoming even more pronounced. Education is increasingly recognized as a key factor for both personal success and income security as well as national competitiveness and prosperity. For this reason, many theoretical contributions in the field of migration highlight the importance of education and human capital. The picture is, however, far from simple. While in some countries that have explicit quota and criteria for

immigration, there is a significant level of highly skilled immigrants; in others (mostly the countries of central and southern Europe that do not have long immigration traditions), most of the immigrants are at the bottom of the educational continuum. Particularly in the context of population aging, there will most likely be an increased need for personal services in health care, nursing homes, and other areas. But since the domestic labor force will be increasingly higher skilled in order to compete in the global economy, and is not willing to work for wages that are affordable for those in need of personal services, there is likely to be a high demand (pull) for cheaper immigrant labor in these sectors. Below there is a special discussion of future human capital profiles, so there is no need to be more specific about these tendencies here, except to state that education clearly plays an important role in the context of migration.

Labor Market: Although migration theory and empirical studies alike make it very clear that labor migration is not the only relevant form of migration, and in some cases not even the dominant one, it clearly is one of the key drivers of migration and deserves special attention as such. Some of the other important types of migration, such as family unification or even asylum seekers, often follow earlier labor migration. Labor market considerations, and in particular the role of wage differentials, have received great attention in the economic literature on migration, and there will be no attempt to begin summarizing them in this paper. Here it shall only be stressed that these considerations clearly must have an important role in any model that is supposed to forecast future migration streams, even though they may not be the only relevant considerations.

Other Quality of Life Factors: A closer look at specific migration streams, or more importantly, at conditions where there is little migration although there are still significant wage differentials, points to the significance of cultural and lifestyle factors as well as the value of staying close to family and friends rather than optimizing one's income alone. A good example can be found within the European Union today, where migration is completely free and unrestricted among the citizens of the EU-15 countries. Yet despite the fact that wages in Portugal are still significantly lower than, for example, in Germany, migration from Portugal to Germany is practically nonexistent. The reasons for this are what I call "other quality of life factors," they include the possibility to be able to work in one's own mother tongue, to continue to enjoy the food and climatic conditions that one is used to, and to benefit from existing familial and social networks.

Immigrant Population in Country of Destination: One important factor that is only listed among the conditions in the area of destination and not for the area of origin is the size and structure of the immigrant population. The model should try to quantitatively cover this aspect because it is relevant not only in terms of the social networks for potential immigrants, but it is also a key element in shaping the discussions about immigration in the country of destination, and ultimately

formulating migration policies which will have important consequences for actual migration flows.

Chart 1 also shows a box which is located between the conditions in the country of origin and those in the country of destination. This refers to an independent given, which is the *history of past migration streams and the resulting social networks*. Virtually all migration theories point at the path dependence of migration: Migrants tend to follow historically established routes, rather than distributing themselves randomly over potential receiving countries. Because these conditions are given by history and are not directly dependent on the current conditions in countries of origin and destination, they represent a separate force that needs to be treated independently in the model.

The proposed model lists policies on both sides, in the areas of origin and the areas of destination. Although the literature recognizes the role of policies in the areas of origin, particularly when it comes to either actively fostering out-migration in specific cases or for making it very difficult to impossible for citizens to leave the country (such as in the case of the former German Democratic Republic), most of the attention is given to policies in the receiving countries. There is also the possibility of policies at the multilateral level, e.g., under the United Nations umbrella, but currently this level of policy making is still not well developed with respect to international migration.

Chart 1 shows policies (both of the receiving countries and countries of origin) as influencing the core of the model, which is the individual decision to migrate. But policies also play a decisive role in the transformation of an individual decision to migrate to an actual move. If countries of origin create significant obstacles that make it either dangerous or very expensive to actually carry out the decision to migrate, then a certain fraction of those who would like to move will not move. Hence, policy plays a dual role in influencing the will to move as well as the possibility to move. It makes sense to treat these two dimensions separately, although in reality, often an anticipation of the difficulties will influence the will to move.

An important and probably the most difficult part of the model will be to anticipate how conditions in the country of destination will shape the migration policies of the country of destination. This is most difficult because of the often unpredictable nature of political processes within a country that may result in unexpected policy outcomes. But in a later section, where the issue of policies will be further discussed, I will show that it makes sense to systematically and quantitatively capture the driving forces that may exert certain pressures on policy making, even though the actual policy outcome will have a strong random component.

The core of this proposed projection framework is the *individual decision to migrate*. As depicted in Chart 1, it is proposed to model this decision by using the five different factors, described above, as influences: Conditions in the areas of origin and destination, the history of migration flows and the resulting international networks, policies in the country of origin and policies in the country of destination. All of these dimensions will synergistically influence the decision to migrate or to stay, which will

also depend on the characteristics of the individual (by sex, age, education, economic status, etc.) who makes this decision.

As discussed above, the decision to migrate does not automatically *translate into an actual move*. Here the so-called intervening obstacles play a key role. These can be the cost of moving, but most importantly, they are actions by the country of destination to regulate and/or restrict immigration. This policy dependence of actual migration flow—which is not directly a function of the balance of “push” and “pull” factors—is increasingly acknowledged in the literature and therefore cannot be disregarded in any comprehensive model of international migration.

A final arrow in Chart 1 indicates a *feedback loop* from the actual moves (the kind and volume of migration) to the conditions in the area of destination. Of course there are many more important feedback mechanisms in this system, since many of the factors discussed also depend on other factors in the model, but the difficult question is which of these potential feedback mechanisms should be quantitatively modeled here. Since any feedback loop in a systems model makes the model much more dynamic, which also means less predictable and more difficult to understand, a modeler should have a rather restrictive attitude towards including many dynamic feedbacks. The goal should be to include only the feedback mechanisms that make a difference and correctly reflect actual interdependencies. Moving toward this goal often requires experimentation and iterations with different model structures, i.e., sensitivity analysis to model structure. Hence, the one feedback mechanism specified in the model is just an attempt to capture the single, most important of many possible mechanisms. It may well turn out to be useful to add several more such mechanisms to the model, once it is operationalized and filled with empirical data.

How Can the Dynamics of Change of the Main Drivers be Captured?

In this section, I will introduce and apply the methods of multi-state demography for capturing the changing conditions in countries of origin and destination. The above described systems model only gives a qualitative assessment of which factors matter for foreseeing future levels of migration. The next challenge is to get a quantitative handle on the future trends in these driving forces and in the way they interact to produce a certain actual migration flow. In this section, I will discuss quantitative forecasts of the individual driving forces while their possible interactions will be discussed further down.

Fortunately for a forecaster, some of the relevant driving forces tend to change only slowly and have great momentum. This is due to the structure (stock) that has been built up by past trends which we already know, and the fact that changes from one year to another (flows) affect this stock only at the margin. If cumulated over longer periods of time, however, these flows influence the stocks significantly. One demographic methodology that can be used to capture many of these structural changes over time is called multi-state population projections methodology. It is a quite powerful extension of the traditional cohort component projection of population projection that can project over time the dynamics of populations that consist of various well-defined sub-populations which may have different vital rates and which interact, i.e., people can move from one category to another over time. In the following, I will discuss this method in terms of an

application to projecting human capital, i.e., the population by age, sex, and level of educational attainment. But the method is equally appropriate for projecting the future composition of the population of both the sending and the receiving countries by other relevant characteristics, such as labor force participation, ethnic composition, language use, foreign/domestic born, or even softer variables such as certain attitudes that are held, as long as there is some information of how these characteristics are distributed in the starting year and what are the age- and sex-specific transition rates from one category to another.

This method, which is based on a multi-dimensional expansion of the life table (increment-decrement table) and of the traditional cohort-component method of population projections, was developed at the International Institute for Applied Systems Analysis (IIASA) in Austria during the 1970s (Rogers 1975; Keyfitz 1985). The multi-state model is based on a division of the population by age and sex into any number of “states” which, in the original formulation, were geographic units, with the movements between the states being migration streams. But a state can also reflect any other clearly-defined sub-group of the population, such as groups with different educational attainment, with the movements then becoming educational transition rates. Actually, the projection of human capital stocks by age and sex is an ideal example of the application of the multi-dimensional cohort component model, because education tends to be acquired at younger ages and then simply moves along cohort lines. Change in the educational composition of the total population is then caused by the depletion (through mortality) of less-educated cohorts and the entry of more-educated younger cohorts. But the multi-state model is also dynamic in the sense that it considers the fact that fertility and mortality (and to some extent migration) are closely associated with education. Women with more education tend to have significantly lower fertility, lower maternal and child mortality, and greater personal longevity. A change in the educational composition of the population of young women will, hence, have direct impacts on the total number of babies born, even if the fertility within each educational group does not change.

The multi-state methodology is typically described in terms of equations with matrices indexed by age, sex, state, and time. The mathematics is complicated by the fact that it has to consider competing risks, i.e., accounting for the fact that individuals are simultaneously exposed to the risks of dying and moving to another state. Since the method is comprehensively documented in the literature cited above, here we will only describe it more intuitively through charts.

Figure 3 describes the standard method for projecting the population by age and sex only. It starts with an age pyramid for the last year for which empirical data are available and (since we are using five-year age groups) projects it five years into the future. This projection consists of four different processes: Every age group is shifted up the pyramid by one step, i.e., the cohort aged 20-24 in 2000 will be 25-29 in 2005. But some of the members of this cohort will not survive to 2005; this is accounted for by applying a set of assumed age- and sex-specific mortality rates over this five-year period. Similarly, sets of age- and sex-specific migration patterns are applied because some people may leave or enter the population over these five years. Finally, a set of assumed age-specific fertility rates will be applied to the female cohorts of reproductive age. This

results in a certain number of births over the five-year period that, according to the assumed sex ratio at birth and assumed child mortality, will be added to the new age pyramid forming the youngest age group.

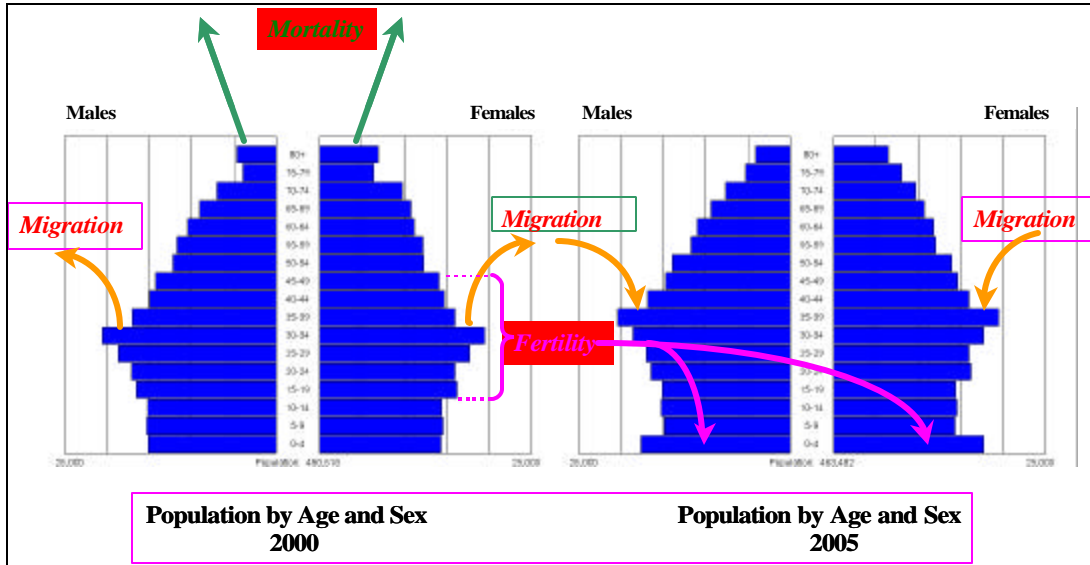


Figure 3: Principles of Regular Population Projections by Age and Sex.

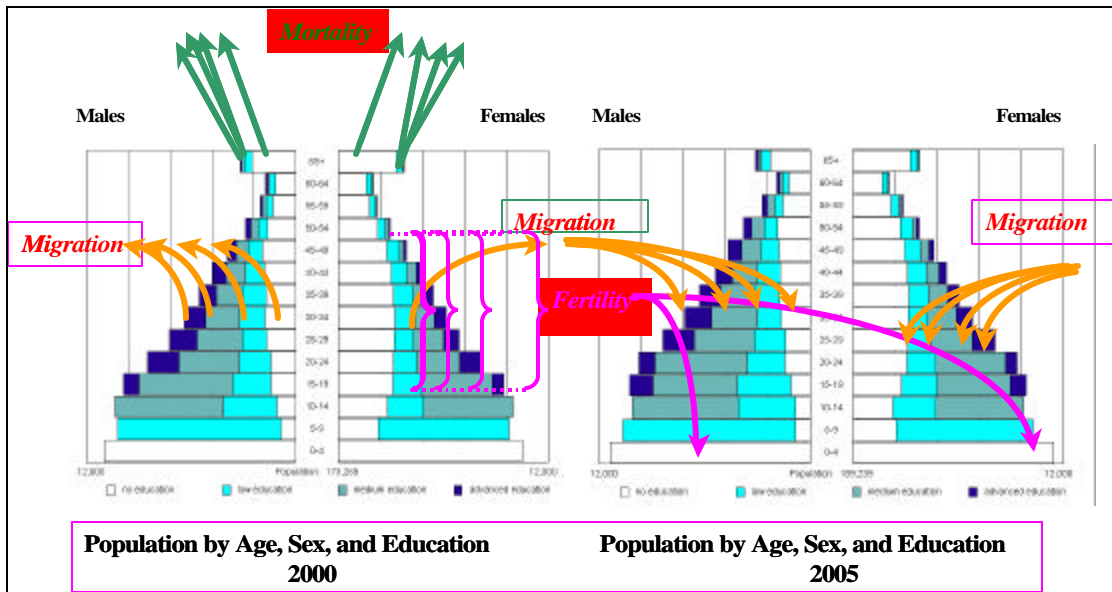


Figure 4: Principles of Multi-state Population Projections by Age, Sex, and Level of Education.

Figure 4 shows the structure of the multi-state model for human capital projections in which the population of each age and sex category is divided into four distinct groups according to educational attainment. Fertility, mortality and migration now have four age- and sex-specific schedules, one for each educational group. In addition, there must be three sets of age- and sex-specific educational transition rates, i.e., the age-specific intensities for young men and women to move, for example, from the category of primary educational attainment to secondary attainment. Although this model can handle transitions at any age, e.g., through adult education campaigns, in reality this is very rare. Transitions here are concentrated in the range below age 25, depending on the kind of transition. In the projections presented here, alternative scenarios will be defined about these transition rates that are a function of assumed school enrolment rates at different ages.

Figures 5 and 6 apply this methodology to the projection of the future population composition of India (Lutz and Scherbov 2004). Figure 5 gives the empirical data for the year 2000. The shadings (colors) show men and women at different ages who have no formal education or some primary, secondary, or tertiary education. Among other things, the figure clearly illustrates the gender imbalance of education in India as well as the fact that the younger generations are much better educated than the older ones.

Figure 6 gives the projections to the year 2030 according to two different scenarios, one that keeps all school enrolment rates constant at their 2000 level, and another that assumes that very ambitious education goals will be reached by 2030 that essentially bring the Indian school enrolment to the same level of that in the USA. These two age pyramids for 2030 show the great inertia that exists in the composition of human capital (and which also exists for most other population characteristics). Even in the case that no further improvement in school enrolment is to be achieved in the future, the educational composition of the total population of India will be much better in 2030 than it was in 2000. This is largely a long-term consequence of past investments in education and the resulting fact that younger Indians today are better educated than older ones, and over time, the younger cohorts will replace the older cohorts. But this great inertia is also demonstrated by the second scenario on the right hand side of Figure 6. Even in this most optimistic case, it will only be the younger age groups in 2030 that will be better educated than in the constant enrolment scenario. Above the age of 50, the two scenarios are practically identical. This is a consequence of the fact that education is mostly concentrated at the young ages, and it takes many decades until the better educated young ones make their way up the age pyramid. This is also true for projections along other relevant dimensions, as long as the relevant population characteristics are largely formed in young adulthood. If there are more transitions later in life, such as in the case of labor force participation and/or unemployment, this momentum is less pronounced and the distribution can change more rapidly at older ages.

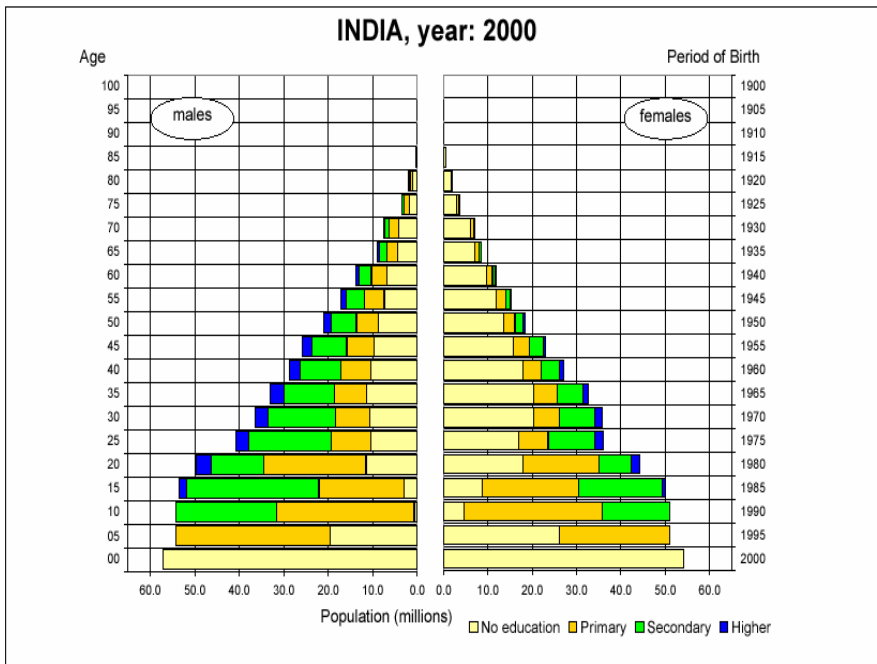


Figure 5: Population of India by Age, Sex, and Level of Education in 2000.

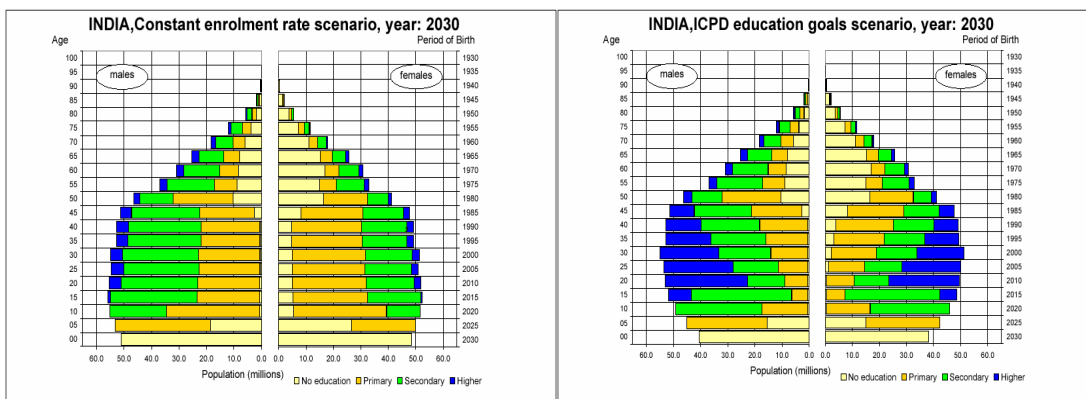


Figure 6: Population of India by Age, Sex, and Level of Education in 2030: Two Alternative Scenarios.

Applying this methodology, Lutz and Goujon (2001) recently produced the first global projection of the population by age, sex, and education to 2030. This was done at the level of 13 world regions. They consider three different scenarios on future educational attainment. Since education-specific fertility, mortality and migration assumptions are the same for the three scenarios, all the differences are due to the different assumptions on educational transitions: The constant scenario assumes that currently-observed education transition rates (corresponding to current enrolment rates) remain unchanged over the projection period. Applied to sub-Saharan Africa, for

instance, even this constant scenario will result in a somewhat better educated (and much bigger) population because of past improvements in education reflected in a somewhat better education of the younger age groups. The ICPD scenario assumes that it will be possible to meet the targets defined at the International Conference on Population and Development 1994 in Cairo, which implies a closing of the gender gap and universal primary education. The American scenario assumes the unlikely case that by 2030 American enrolment rates will be reached, which implies more tertiary education. Here the results impressively show that even under the most optimistic enrolment scenarios, the educational attainment of the adult population will not have changed very significantly by 2030 due to the great momentum of human capital formation.

Such human capital projections illustrate that the changing educational composition of the population is significant not only for individual development and a nation's institutional and economic performance, but also for the relative weights, productivity and competitiveness of major world markets. In this context, it is useful to look at absolute numbers of workers by skill levels rather than at the proportions discussed above. Figure 7 compares four of the economic mega-regions of the future (Europe and North America together, China, South Asia and sub-Saharan Africa) in terms of trends in the size of the working age population (age 20-65) by educational attainment. The data presented is taken from the ICPD scenario. At present, China clearly has the largest total working age population of these four regions, but its educated population (secondary and tertiary together) is still smaller than that of Europe and North America together. In terms of the educated working age population, South Asia is far behind, with less than half the size of that same population in Europe and North America, or China.

Over the next 20 years, South Asia is expected to surpass China in terms of its total size of the working age population. But in terms of the educational composition of the population, the difference between the two regions will be stunning. While in China in 2030, 73 percent of the working age population will be better educated (secondary plus tertiary), it will be only 40 percent in South Asia. The main reason for this divergence lies in the differences in investment in primary and secondary education over the last two decades between the two regions. Among the four major world regions, Europe and North America will continue to have the highest educational levels of the working age population, but in terms of absolute numbers of educated people, they will clearly fall behind China. Over the next three decades, China's educated working-age population is likely to increase from 390 million to 750 million, while that of Europe (without the former Soviet Union) and North America together will hardly increase from 430 to 510 in 2030. These significant future changes in the numbers of skilled workers are likely to have far reaching consequences for the weights in the global economic system. In sub-Saharan Africa, low human capital associated with enormous pressure on the educational system poses significant limits to the prospects for social and economic development in the near term. In 2000, only 19 percent of the population in the 20-65 age group had a secondary education or higher. Although this percentage will almost double to 35 percent in 2030 according to the ICPD scenario, this shows how sub-Saharan Africa is far from converging with other regions' levels of educational attainment.

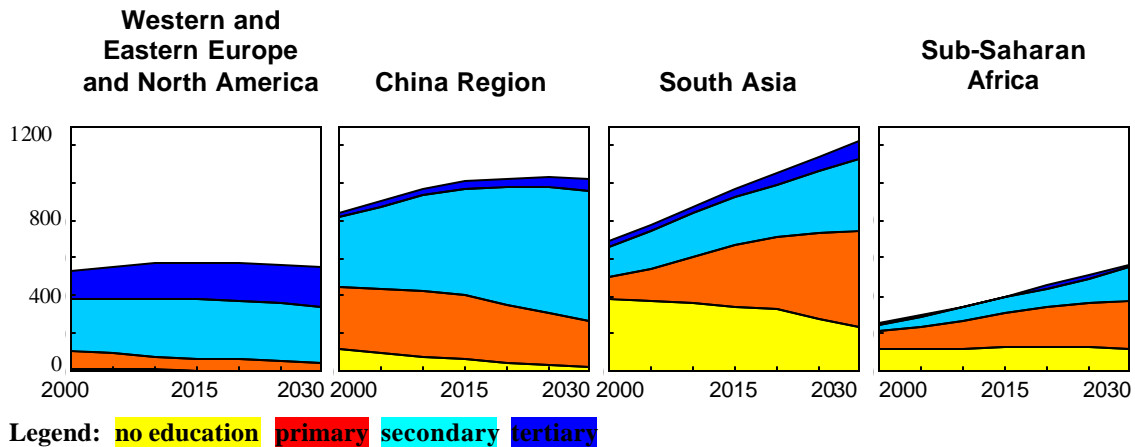


Figure 7: Population Aged 20 to 65 Years (in Millions), by Level of Education, According to the ICPD Scenario in Four Mega-regions, 2000-2030.

Source: Lutz and Goujon (2001)

The above-described human capital projections for major world regions are relevant for the projection of future international migration in two important dimensions. First, they illustrate an application of the multi-state methodology that is very appropriate for modeling several of the key drivers of migration in both sending and receiving countries along the lines described above. In particular, this methodology can also be used to project the characteristics of the immigrant population already in the destination country, giving special consideration to the level of integration (language skills, religious practices and social networks) since integration and integrative capacity tends to function as a valve for the future volume of migration flows. Second, the great expected shifts in the future distribution of human capital over different parts of the world is in itself a very important factor in the determination of likely future migration trends.

What Decision-Making Processes are Involved and How Can One Model Them?

The framework presented in Chart 1 above includes decision making at two very different levels. First, there is the individual decision of potential migrants to migrate or not to migrate. Second, there is the decision of governments about formulating and implementing certain migration policies.

The individual migration decision seems to be more straightforward to quantitatively capture in a model. Given their individual characteristics and predispositions and taking into account the whole array of incentives, ranging from the labor market to existing social networks to the role of other quality of life factors, the potential migrants either make an attempt to move to another place or they do not move at any given point in time. Whether this decision to migrate will be successful and result in an actual move to another country is another question. This depends on the obstacles, which again depend to a large extent on national migration policies.

There are several alternative analytical instruments that can be used to model this individual decision to migrate. The most conventional way would be to apply a

regression analysis in which the dichotomous variable “decide to move or stay” is a dependent variable, while all of the important driving forces would enter as independent variables. The parameters of such a model could be estimated empirically (mostly using existing survey data) and would result in an estimated proportion of potential migrants that decide to migrate. Assuming that the model structure and the values of the estimated parameters stay constant over time, the model can then estimate the impacts of anticipated changes in the driving forces (see discussion above) on the future proportions that decide to migrate. Alternatively, one could also think of defining agent-based models that would more directly capture the individual decision-making process, rather than just estimating proportions. Such agent-based models would have the advantage that they can reflect the interactions among several relevant individuals and make the decision of one individual dependent on that of other individuals, in addition to considering the whole array of driving forces discussed above. There is a huge body of specialized literature on agent-based modeling that cannot be discussed here. If one would like to follow this modeling approach for forecasting individual migration decisions, it would be necessary to delve deeply into this literature, which I have not done.

Even more complex than trying to model the individual decision to migrate is to try to anticipate how changes in the different drivers of national migration policies synergistically produce certain policies and certain implementations of such policies. Here the challenge is to model interactions among at least three different kinds of players: individuals, interest groups, and states.

It was discussed above that policies clearly matter in the field of migration and must be considered explicitly and prominently in any model dealing with future migration. But do we know which forces determine national migration policies? There clearly are diverging interests in receiving countries. One can characterize this process in different ways, but one simple way is to distinguish between three different forces that tend to shape this political decision-making process:

- A: The interest of employers (which also includes the interest of the customers of local services) who generally want cheap labor and a high supply of labor, which implies a wish for more immigration.
- B: The interest of workers who want higher wages and a tight supply of labor (which may differ by skills), and who therefore have a tendency to want less immigration.
- C: There is a third force which may be called “cultural” since it is not directly related to economic interests, and which may greatly differ from one country to another. Many citizens place a high value on some sort of cultural homogeneity and preservation of national identity. This force is clearly more pronounced in Japan and several European countries than it is in others.

Which of the forces dominate in politics and in the making of migration policies?

- Economic and political elites are often close to the interests of employers (A).

- The middle class often has dual interests (A+B): They want less competition for their own employment, but cheap availability of personal services.
- For workers, typically the interest in less competition/higher wages dominates (B).

Thinking along possible demographic differentials in this issue, one may also assume a certain age pattern of interests. The following list is more speculative than empirically founded:

- Young adults looking for jobs should want less competition.
- Young families are likely to want safe jobs together with cheap services.
- Older working adults should want less competition because their wages are often above their productivity.
- Retired persons want cheap services, but also cultural homogeneity.

One may also think of different interests by level of education. Typically one may assume that the higher the education of a person, the less the competition through immigrants, although in certain sectors such as IT, there may be significant competition at the high-skill level.

It is important to see that changes in the relative size and composition of these interest groups can, in turn, lead to changes in the process of national migration policy formulation.

What about the third force mentioned above that is related to national and cultural identity? When studying the policy formulation process across industrialized countries, there is no doubt that this is a strong force in shaping national immigration policies, particularly in countries that are not traditional immigration countries and do not have a history as major colonial powers. While in the public discussion among intellectuals, these forces are often too easily put into the category of irrational xenophobia, it is worth having a closer look at the possible factors behind this attitude. In Europe, it can be clearly observed that small nations with their own language are concerned about maintaining their cultural heritage in an age of globalization in which presumably only the big languages can survive. In this context, for instance, in a high-level European meeting on demographic change, a representative from the parliament of Finland recently said that for a small country such as Finland with a language that few migrants would be likely to learn, the question of the level of the birth rate in relation to the level of immigration was a “matter of life and death” for the nation. For bigger European nations, such as Germany and France, this fear of cultural extinction is less applicable, but may be replaced by considerations of cultural and linguistic rivalry. In some cases, national and cultural identity can become such a dominating force that it turns out to be even more important than economic standing. The example of Japan may go in this direction. Japan has little to no immigration, despite being most advanced in the process of population aging with an increasing need for personal services. But very high wages drive technological development in the direction of very high automation. In a somewhat exaggerated way, one might say that Japan follows the strategy of having robots instead

of immigrants. This may well be a direction that other countries in Europe might try to follow.

Finally, while discussing the forces that have been shaping national migration policy making and are likely to shape this process in the future, I would like to briefly consider the frequently heard assertion that the unavoidable rapid population aging that we will have in many industrialized countries will lead to a “need” for more immigration in these countries. While it is certainly true that the proportion of the population of conventional working age (20-60) is on the decline in many industrialized countries, it is not evident that this automatically leads to a “need” for immigrants to fill the “gap” as is often claimed. In most countries of Europe, unemployment is at very high levels and still on the rise, particularly among young adults whose cohort size is already shrinking due to past low fertility. Hence, this trend does not seem to confirm the hypothesis that smaller cohorts will find it significantly easier in the labor market. The empirical evidence in Europe also shows that employment is particularly high among immigrants, typically twice the level of the native born population. Unemployment is clearly highest among the less educated. These facts contradict the argument that a segregated labor market may need more immigrants at the lower end, while there may be job shortages for the natives at the higher end. Finally, the time horizon is very different in these considerations. While in the face of the above described situation it is not clear why would Europe now “needs” more of the same immigrants that are already unemployed in large numbers, the situation may well change over the coming 20 years, when the baby boom generation retires and major shifts in the labor force can be expected. Unlike efforts to increase the birth rate, which may take many years to be effective (if they work at all) and then one still has to wait more than two decades for the additional births to enter the labor market, immigration has the advantage of being able to change the labor force almost instantly. Hence, even if there is no need for migrants today, the policy instruments should be in place in order to regulate more immigration when it may be needed.

The Challenge of Defining Consistent Aggregate Scenarios

This final section will briefly deal with scenario analysis. Any forecasting model of the kind introduced here needs to be based on scenarios to some degree. For some driving forces of future international migration, we have appropriate methods for anticipating their structural change over the coming decades, as discussed in the previous section where scenarios only referred to specific parameter assumptions. But there are other factors for which there is deeper uncertainty in the sense that one does not really know what is the right underlying model structure that will be shaping the future. Particularly in this case of deep uncertainty (model uncertainty), the approach of developing consistent sets of scenarios that describe alternative future story lines has become very influential. This is, for instance, the approach that the IPCC (Intergovernmental Panel on Climate Change) takes and which is the basis for all the alternative runs of complex climate models that inform the discussion in this field.

In the field of migration, there are many factors in both the potential sending and receiving countries that do not lend themselves to projections along the lines of the multi-

state models described above since we have no good analytical handle on them. To this category belong technological change, future trends in poverty reduction and economic growth, certain dimensions of environmental change, issues of governance, possible armed conflicts and value change. To try to define consistent scenarios for some of these factors is a task that goes far beyond the scope of this paper. But in order to trigger a discussion in this field, I will outline two possible extreme scenarios that one may think of in terms of the forces shaping future migration:

- **Global internal migration.** This scenario would resemble a future of the world that is in a way like the EU today: Borders are open, there are no major countries with unacceptable living conditions, population size is finite, globalization (of goods and capital) lead to significant reductions in income differentials. As a consequence, migration could be expected to be at a rather low “normal” level, which reflects mobility rather than major irreversible migration steams.
- **Political/economic/environmental crises** in significant parts of the world. This could be seen as a worst case scenario. It implies that efforts towards global sustainable and equitable development are not successful, and that there will be regional crises and even armed conflicts. This will result in strong push factors that will have a humanitarian dimension/emergency relief dimension. This scenario will not only result in a lot of human suffering, but will likely lead to strong and mostly uncontrolled (if not uncontrollable) migration. The exact implications for the volume and direction of migration steams would be greatly dependent on policies of receiving countries resulting from a balance of (possibly contradictory) internal forces. It will, hence, be very hard to predict.

There are of course many more scenarios that one can think of and that also include different combinations of the relevant driving forces. A serious exercise in scenario definition is a combination of art (in thinking creatively and imagining the not yet existent) and science (in distinguishing the possible from the impossible). Such an exercise would be a significant effort in itself. It will not only have to try to “think the unthinkable” but should also take the existing empirical evidence into account and may include the consideration of odd and non-mainstream arguments as well as the mathematical specification of nonlinear models with surprises.

But the main purpose of scenario analysis is not to predict the future, but to depict the widest possible range of alternative futures which then allow the policy maker to study how well alternative possible policies will work under such different conditions. The challenge, hence, is to come up with robust policies that produce acceptable results under differing conditions and that are flexible enough to quickly adapt to new and so far unforeseen circumstances.

In the field of migration policies, one simple principle in this respect could be: No matter how much migration there is today and whether or not there is a perceived “need” of immigrants today, it is very advisable to have the right policy instruments in place

today for implementing rational choices about the right numbers and structure of migrants when they may be needed in the country of destination or experience strong push factors in the countries of origin.

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TRADE AND MIGRATION: COMPLEMENTS OR SUBSTITUTES?

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ABSTRACT

In recent years, international trade has increasingly been put forward as a driver of migration between countries. Yet theoretical models of trade and migration do not provide a consistent answer as to whether an increase in trade fosters migration (complementary relation) or rather slows it (substitutive relation). To help clarify this, we first evaluate the predictions of various theoretical models and provide an overview of earlier empirical results. Both clearly suggest a complementary relation. We then analyze yearly data on migration to Germany (1962 to 2004), the United States (1962 to 2004, with gaps), the United Kingdom (1961 to 2001, with gaps), and Australia (1967 to 2001, with gaps), investigating the effects of trade in isolation (univariate regression) and in concert with other drivers (multivariate regression techniques) in samples of bilateral as well as pooled multi-country data. Our results for Germany reveal a significant complementary effect of trade on migration. While the effect is small, it proves to be of a strength similar to that of other important drivers. Results for the other three countries in our study are inconclusive, though. Finally, we briefly explore how technological progress might affect trade itself in the coming decades.

INTRODUCTION

International migration is hardly a new phenomenon. People have moved from country to country for centuries, be it for social, political or economic reasons. But policy makers and business leaders alike are becoming increasingly interested in migration again. Some see it as a burden for social welfare systems or social cohesion, most as a must, in particular to rejuvenate the aging workforce in most of the developed countries.

In addition, migration is one the three main determinants of a country's population development. The other two—the birth and death rate—are generally believed to be easier to forecast, since they follow more regular trends. However, forecasting migration—especially the illegal part of it—has become increasingly difficult. Thus, accurate forecasts of future migration streams are the missing ingredient in population projections. And those are in high demand, since nations need them to plan all sorts of current and future public expenditures, ranging from social security to infrastructure.

This is why migration patterns, and in particular migration's main drivers, have to be better understood: to more reliably control migration, and to more accurately forecast migration streams. Factors classically seen as driving migration between two countries include (a) conditions in the sending country driving out inhabitants, such as, among many others, political troubles and persecution (“push factors”); (b) conditions in the receiving country attracting migrants, such as higher wages or lower unemployment (“pull factors”); and (c) those that facilitate or enable the migration process itself, such as transportation costs and the receiving country's immigration policies.

One driving factor increasingly put forward in recent years is trade between the sending and the receiving country. And this is a peculiar one, since—quite contrary to the drivers listed above—the very direction of its impact on migration is debatable. The most intuitive rationale why trade might affect migration is that trade indirectly transfers the production factor labor, just as migration does directly. Since the labor is embedded in the goods or services traded, the rise of one should dampen the other, which is called a “substitutive” relation. In fact, U.S. policy makers trying to curb immigration from Mexico embarked on a strategy built on this rationale. This seems reasonable from a practical point of view: Lowering trade barriers might be seen as a more direct and less costly means of controlling immigration than, say, trying to raise income levels or lower unemployment in the economy sending the migrants. To be sure, simply enforcing immigration policies is a more direct lever. But it is unclear to date just how large an effect policies really have on overall migration, i.e., including the illegal part.

Unfortunately, this is not the only line of argument possible. And some of the rival rationales point to a positive, or “complementary,” relation, i.e., one where migration increases with rising trade volumes. It is this combination of potentially large impact and still high uncertainty that has sparked a wave of theoretical and empirical studies on the interaction of trade and migration.

In this report, we sketch an overview of recent work in the field and try to fill some empirical gaps to be better able to (1) decide if there can be a general answer to the

question of whether trade and migration go hand in hand or rather substitute for each other, and (2) how strong the effect of trade is relative to that of other migration drivers. To do so, we analyze data for Germany, the United States, the United Kingdom, and Australia. Finally, we explore how technological progress might affect trade itself in the coming decades.

A QUICK GLANCE AT THEORY

Does theory point to a complementary or substitutive correlation of trade and migration? To analyze this theoretically one can either start from a trade model and try to draw implications for migration, or one can take a migration model and try to integrate trade. We will quickly explore both.¹

Looking at the trade theory camp, usually the classic Heckscher-Ohlin (HO) model or its derivatives are employed. In its most basic form, the HO model explains trade between two countries by differences in their factor endowments, be it land, capital or labor. If a factor is abundant in one country relative to the other, the factor should be cheaper there, which should ultimately lead to lower prices for the products that need its input extensively. The country with the abundant factor then has a comparative advantage in the industry producing these goods or services. This in turn leads to trading of this product between the two countries.

The tricky bit when applying this model to exploring the trade-migration interaction is that for the model to work properly, labor migration between the two countries usually is ruled out in the assumptions. But nevertheless suppose for a moment that there is migration, as the difference in factor prices would suggest (a difference in factor prices means a difference in wages, which is commonly regarded to be one of the pivotal migration drivers). Then this migration would be dampened by trade, as chances are that trade between the two countries—i.e., in an international market—would yield a convergence of goods and thus labor prices, which would in turn reduce the incentive for migration. Or, more straightforwardly, re-introducing the originally ruled-out migration undermines the very foundation of the basic HO model (i.e., assuming a very high elasticity of migration with respect to wage differentials), crippling its mechanism of trade generation.

The migration theory camp can be divided into those frameworks trying to explain how migration is initiated in the first place, and those seeking to explain the course of migration over time (i.e., its changes in direction and volume). The initiation type includes:

- *The Ricardian framework.* Here, trade results from differences in technology.² Each country exports those goods for which it has a comparative productivity

¹ We confine our list of frameworks analyzed to those most common in the literature. For background on the following discussion, see e.g., Howe and Jackson (2005), Bruder (2004), Jennissen (2004), Faini et al. (1999).

² The term “technology” is used here in a broad sense, meaning a cleverer use of the factor in question. This might be accomplished with better machinery, but can also be just a smarter way to do things using the same physical equipment.

advantage (through better technology, that is). If this sector is labor-intensive, and immigration policies are lax, then the labor productivity advantage attracts workers from the other country, as higher productivity means higher wages. In other words, immigration rises. Thus, the larger the technology difference, the more trade and migration at the same time.

- *World systems theory.* Proponents of this framework argue that migration follows—mostly former colonial—trade patterns. Their rationale is as follows: Former colonies may be largely independent from the former colonizer in political terms, but not so in an economic sense. Former colonies specialize in primary commodities, and their exports, which are mainly channelled to their former colonizers, depend on a small set of products. Thus, their economies are strongly affected by fluctuations in the prices of these products. As a result, the former colonies' growth is slowed, preventing the wage gap with their former colonizer from shrinking and hence boosting migration. So, again, trade and migration go hand in hand.

Other frameworks that try to explain the initiation of migration do not provide insight into the trade-migration interaction as clearly. These include the Keynesian, dual labor market, new economics of labor, relative deprivation, and new policy frameworks. Among the models explaining the course of migration over time are:

- *Network theory.* This framework states that those migrants already in the receiving country lower the migration costs and risks for those to follow. Migrants already in the receiving country provide knowledge about the migration process itself, make it easier to find a first dwelling and job (often inside their own community), help to deal with local authorities, and so forth.. Network theory is based on the insight that migration is often spatially focused regarding sending communities as well as target regions in the receiving country. Trade enters the equation in two ways. First, migrants have an incentive to engage in trade with their home country due to their comparative advantage in local knowledge and language. Resulting economic success strengthens their network in the receiving country, in turn encouraging more migration. Second, migrants usually demand their home country's products. Thus, trade and migration should be complementary here, too.
- *Institutional theory.* According to this framework, large numbers of migrants in the receiving country might help institutionalize settling (e.g., through voluntary support organizations helping with housing, work, and legal matters). In addition, large migration streams help institutionalize migration channels, be it legal or illegal ones (cheap flights due to heavily used connections, organized clandestine transport and counterfeit documents production). This process might be facilitated by large trade flows between the same countries: Trade might already have established frequent transportation links, brought down transportation costs, and helped in building up the necessary understanding of the other country's authorities and culture. Again, trade and migration would go hand in hand.

Given that each of these theoretical frameworks probably captures a slice of migration reality, one might be tempted—admittedly on shaky methodological grounds—to start counting: complementarity scores 4, substitution 1. More seriously, the framework arguably least rooted in reality with respect to migration is the HO model (it rules out migration). As this is the only one that suggests substitution, all told, theory seems to favor complementarity.

CONVERGING EMPIRICAL EVIDENCE

With this theory-led hypothesis of complementary trade-migration interaction in mind, we now briefly scan earlier empirical research, identify some blind spots we consider crucial, and sketch the main results of our own empirical contribution.

Empirical studies investigating the interaction of trade and migration do not number in the hundreds and do not date back much more than a decade. But they already cover a broad range of countries or regions and time periods, with one for Europe even looking at data from 1870 to 1940 (Collins et al. 1999). But they are not easy to compare, since...

- ... some test the effect of trade on migration, some vice versa, and some in both directions,
- ... they use a whole range of different measures for trade as well as migration (imports versus exports, immigration versus emigration versus net migration versus labor migration, stocks versus flows),
- ... they plug different combinations of these variables into different kinds of econometric models.

That can be considered a drawback. But the flip side is that this heterogeneity of approaches notwithstanding, the vast majority of studies report complementarity, regardless of time period or geographic region under investigation (see Figure 1 for a selection).

Our Analytical Approach

The works cited in Figure 1 typically combine bilateral trade and migration data from a number of country pairs (e.g., Germany/Turkey plus Germany/Italy plus Germany/Spain etc.) to create a larger data pool and thereby increase statistical reliability. In addition, most try to explain migration (or trade) with trade (or migration) in combination with other variables by means of a multivariate regression analysis. This gives a first idea of the relative strength of the effect of trade on migration (or vice versa).

Both the data pooling and the typical multivariate approach potentially blur relevant information: Are there differing trade-migration mechanisms between different country pairs that have so far been masked by pooling the data for many countries? Is there an effect on migration of trade only, or are trade and migration both just driven in the same direction by a third factor? Our approach to analyzing data for Germany, the

United States, the United Kingdom, and Australia as migration receiving countries therefore is as follows:

Figure 1. Complementarity as Far as the Eye Can See

Summary of empirical studies investigating the interaction of trade and migration (“complementary” denotes a positive correlation, “substitutive” a negative correlation)

Authors	Migrant Receiving Countries / Regions	Time Period	Main results (the main measures used for trade and migration are given in parentheses*)
Bowen and Wu (2004)	14 OECD countries	1980-2001	complementary (<i>exports vs total/net immigration</i>)
Bruder (2004)	Germany	1970-1989	partly substitutive (<i>trade vs foreign labor</i>)
			partly no effect (<i>exports/imports vs foreign labor</i>)
			partly complementary (<i>exports vs immigration</i>)
Bryant et al. (2004)	New Zealand	1981-2001	complementary (<i>imports/exports vs foreign labor</i>)
Blanes-Cristóbal (2003)	Spain	1991-1998	complementary (<i>exports vs immigration</i>)
Mundra (2003)	United States	1973-1980	complementary (<i>imports/exports vs immigration</i>)
Girma and Yu (2000)	United Kingdom	1981-1993	mostly complementary (<i>imports/exports vs immigration, for non-Commonwealth senders</i>) partly substitutive (<i>imports vs immigration, for Commonwealth senders</i>)
Collins et al. (1999)	Europe	1870-1940	weakly complementary (<i>trade vs immigration/emigration</i>)
Kohli (1999)	Switzerland	1950-1986	complementary (<i>imports vs non-resident labor</i>)
Others (7+): see e.g., Bryant et al. (2004)			almost exclusively complementary

* Typically, additional variables were used to explain the relationship of migration to trade (or vice versa).

1. *One sending country only, trade as the only migration driver.* Our first step is to correlate data for migration and trade between two countries for each pair of sending and receiving countries separately. This rules out blending possibly different trade-migration mechanisms between, say, the country pairs Germany/Turkey and Germany/Italy, and it is the most straightforward way of trying to answer our substitution versus complementarity question. No migration drivers other than trade are considered here in order to get a clear picture (quite literally, as more drivers prevent easy visual inspection). Chances are, though, that there are not enough data points for statistically relevant results.
2. *Many sending countries, trade as the only migration driver.* Only then do we pool the data for a number of sending countries (but for only one receiving country), as many other studies have done. Each receiving country is paired with its five to eight most important sending countries. But in this step, unlike other studies, we still only use trade to explain migration.
3. *Many sending countries, many migration drivers—the relative strength of trade.* Our next step is to plug in more variables, in addition to trade. The selection of the additional variables is based on both theoretical relevance and data availability. We conduct this multivariate analysis with pooled country pair data at

the outset.³ This approach enables us to compute the importance of trade in explaining historical migration data relative to that of other relevant drivers.

4. *The pure effect of trade.* The coefficients that represent the relative importance of the variables driving migration we calculated in the previous step are highly intercorrelated: Each variable does not only drive migration, but in real economic systems usually affects all other drivers to a considerable extent as well. The coefficient for trade might then overstate the effect of trade on migration. We thus factor out the intercorrelations systematically.

In all cases, we employ the *level of bilateral immigration flows* (per year per sending country population^{4, 5}) as our migration measure and the *year-on-year growth of the sum of import and export volumes* (divided by 2) as our trade measure. We use *immigration* as it is what most frameworks sketched above allude to,⁶ and we use the sum of imports and exports as both are relevant in most of the theories. We use the *level*⁷ of immigration flows and the *growth* of trade volumes as this combination corresponds best to the trade-migration interaction mechanism proposed above.⁸ For brevity, we utilize the terms “trade” and “migration” to denote these specifications in the following discussion.

In all cases we use linear regression models, while in those with more than one pair of countries we also use pool techniques.⁹ Migration is set to be the dependent (or driven) variable, trade and the additional variables are the independent (or driving) ones.

³ Actually, we tried the “one sending country only, many migration drivers” variant as well. This provided some preliminary guidance on which additional variables to look at, but, as expected, did not offer insights regarding the effects of trade on migration exceeding those found in step one.

⁴ We divide immigration flows by the sending countries’ population to account for the larger probability of countries with larger populations sending the same absolute number of migrants as smaller ones.

⁵ Some of the mechanisms linking trade and migration sketched in the theoretical models focus on *labor* migration rather than overall migration. But first, not all do, and second, labor migration data are not available for most countries.

⁶ Emigration (from rich countries) is driven by a different set of motives not accounted for here. Net migration, another candidate, captures a mixture of both these motives and those we discussed for the case of immigration.

⁷ If there was a continuous rise in migration levels over time *and* a continuous rise in trade growth rates, we might overstate the trade-migration correlation using these specifications. But our trade growth rates prove to be stationary (i.e., swinging around an average more or less constant over time). For more on this topic, see the sub-section *Many sending countries, many migration drivers*.

⁸ As we use linear models, the level of immigration flows should then be proportional to the growth of trade. Now consider “network theory,” for example. It states that those migrants already in the receiving country often engage in trade with their home country as an occupation, and that they demand their home country’s products for their own use. Given the proportional (or “linear”) relation, a *constant level* of immigration flows should then result in a *constant growth* of trade with their home country year on year. And this is exactly what intuition suggests in this case: Each year, the same number of people is added to the stock of migrants in the receiving country (i.e., a constant flow level), raising trade volumes by a constant amount year on year (i.e., a constant growth rate).

⁹ We use a model without fixed effects, i.e., without country-specific constants in the regression equations, and without time period weights.

The German Case: Complementarity is King

We start with Germany, since we have access to the best data for this country (and find the most telling results). Migration data are taken from Germany's Federal Statistical Office, trade data from the International Monetary Fund's Direction of Trade Statistics. We use yearly data from 1962 to 2004 (the starting year is determined by migration data availability).

1. One sending country only, trade as the only migration driver

Figure 2 shows scatter plots of our trade versus migration measures for each case in which we pair Germany with a sending country, namely Poland, Turkey, Italy, Greece, the United States, France, China, and Spain. In each case, we compute the correlation r between trade and migration (r^2 gives the share of variance of one variable explained by the other, with an r^2 of 1 indicating a perfect correlation) and its statistical significance (the degree to which the result for r can be trusted not to have come about by accident; this is usually expressed in terms of the error probability p , i.e., the likelihood that we are mistaken when assuming that a correlation exists).

The results for r^2 range from 0.10 down to 0.01, i.e., at the upper end 10 percent of the variance in measured migration is explained by the trade variable. This might not seem to be a huge effect, but given the large number of potentially strong migration drivers, large effects of trade alone should not be expected. The problem rather is that only one of the eight country pairs displays a correlation that is statistically significant. This is underlined by a visual inspection of the scatter plots in Figure 2. For a strong correlation, one expects data points to group more or less closely along a straight line. This hardly is the dominant impression here.

Only the correlation for Italy can be trusted to show a real effect. It has an error probability below 5 percent ($p = 0.040$), usually accepted as "good enough," and suggests a complementary correlation of trade and migration. This is preliminary good news for those in the complementarity camp. But except for this single case, we are not able to lift the fog created in most studies by pooling data for many country pairs, the goal for step one of our approach.

2. Many sending countries, trade as the only migration driver

The unconvincing results of step one might be due to a lack of data points. We therefore continued by pooling the data for all country pairs from the previous step into one single estimation (i.e., the same data for the same time period). This is standard procedure. In contrast to what is published in many studies, though, we only use trade as a migration driver in this step.

We find an encouraging result: In this pooled regression analysis, the trade effect on migration is significant, with an error probability below 5 percent ($p = 0.016$), and the effect is complementary. In other words, trade is in fact boosting overall migration to Germany. The flip side is that the effect is, in this averaging analysis, very small with an overall r^2 of 0.02 (2 percent of the variation of migration

Figure 2. Trade versus Migration: Very Scattered

Immigration flows (per sending country population per year, on horizontal axis) versus growth of trade flows (imports plus exports divided by previous year's value, on vertical axis), for country pairs given in the figures: years 1962-2004 (for Greece 1963-2004, for China 1973-2003)



explained by trade). But again, trade is only one of a large number of migration drivers.

3. *Many sending countries, many migration drivers—the relative strength of trade*

To find out more about trade's impact on migration relative to other presumably important migration drivers, we now plug some of those other drivers into our equation while sticking with the multi-country pair approach. These additional drivers are:

- *Income ratio.* Often, the income or wage gap between a pair of migration sending and receiving countries is considered a crucial migration driver. We use the ratio of GDP per capita, normalized by purchasing power parity (for U.S. dollars in 1990).¹⁰
- *Transportation costs.* The lower the cost of travel from sending to receiving country, the lower the migration barrier. A proper proxy that covers all relevant transportation means for all our countries with yearly data from a large enough historical period is hard to come by. We thus use shipping costs as a rough proxy, namely the deflated Liner Index as calculated by the German Ministry of Trade.¹¹ This ignores other transportation means-specific developments and most country-specific changes in transportation costs (a new railroad link, tunnel, etc.).
- *Distance.* Our proxy for transportation costs does not take country-to-country distances into account. But some sending countries are significantly further away from the receiving countries than others, which may raise the migration barrier (with unit distance transport costs being equal). We use a population-weighted average distance between major cities in the sending and receiving country as a proxy.¹²
- *Stock of migrants.* The migrants already in the receiving country create network effects and institutionalize migration, both of which drive more migration from the same sending country (see the section A Quick Glance at Theory, above). In our estimation model, the effect of the migrant stock on immigration is lagged by two years to account for the time needed for new immigrants to become an integral part of the migrant community and thus drive immigration further.

All of these additional migration drivers enter our econometric equation as levels. This might, under certain circumstances, lead to an overstatement of the actual

¹⁰ Taken from Groningen Growth and Development Centre and The Conference Board, available online at www.ggdc.net.

¹¹ It is based on freight charges for goods shipped to or from ports along the coast from Antwerp (NL) to Hamburg (DE), including ships of all flags. For a detailed discussion of its merits and shortcomings as an international shipping cost proxy, see David Hummels, *Have International Transportation Costs Declined?* (University of Chicago; 1999). We deflated the Liner Index with German inflation rates.

¹² Taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). For details, see www.cepii.fr/anglaisgraph/bdd/distances.htm.

correlations. But first, taking levels (rather than growth rates, which would solve the problem) makes a better match from a theoretical point of view. Second, we ran a statistical test which yielded no sign of overstatement.¹³

Again, our results are encouraging (see Figure 3). In this multivariate approach, too, we find a significant—and complementary—effect of trade on migration (with an error probability below 5 percent, or $p = 0.023$). In addition, transport costs and country distance are also significant (both with error probabilities below 1 percent), and the directions of their effects on migration both match intuition, i.e., higher transport costs as well as a rise in distance lowers immigration. More surprising is that neither the income ratio nor the stock of migrants prove to be significant migration drivers in our model for Germany.¹⁴ The combined power of explanation of our drivers is rather low at an r^2 of 0.23 (23 percent of the variation of migration explained). This indicates there are still more drivers in play that are not accounted for here, which is in line with theoretical analyses.

But rather than finding those drivers, our aim is to evaluate the impact of trade relative to *some of* the other supposedly pivotal drivers. To this end, the coefficients for our drivers in Figure 3 have to be normalized,¹⁵ since they are affected by both a driver's correlation with migration and the sheer magnitude of the numbers plugged in (e.g., an income ratio of 3.2 versus an immigrant stock of over one million). The results of this are shown in Figure 4. According to this comparison, the effect of trade on migration is, albeit smaller, of the same order of magnitude as that of the other significant drivers.

4. The pure effect of trade

The coefficient for trade, corrected in the above fashion, still contains “noise” that prevents us from judging the pure correlation of trade and migration. This noise is caused by the coefficient being a function of trade's correlation with migration (wanted) and of trade's correlation with all the other drivers plugged into the equation (unwanted). The latter is unwanted here, since one of the additional drivers might affect both trade and migration strongly, so that a correlation of trade and migration is observed, whereas in actual fact there is no causal link between the two whatsoever. Those unwanted effects, however, can be factored out systematically.¹⁶

¹³ We tested the data pool as a whole for unit roots using a variety of procedures. Most of them found no unit roots.

¹⁴ In general, this might be due to ill-specified proxies or in fact a lack of correlation with immigration. As the specifications used for these two proxies are straight forward, we tend to suspect the latter. But while this would be interesting to discuss, it is beyond the scope of this paper.

¹⁵ The corrected coefficient b_{corr} , which is a proxy for the variables' impact, is given by $b_{\text{corr}} = b_{\text{regression}} (s_{\text{driver}}/s_{\text{immigration}})$, where s_{driver} and $s_{\text{immigration}}$ are the standard deviations of the driver variable and immigration.

¹⁶ The technical term for this purified trade-migration correlation is a *partial correlation* for trade and migration *of the order p*, where p is the number of additional drivers (for details, see e.g., Jürgen Bortz, *Statistik für Sozialwissenschaftler* (Springer; 1999), pp. 439ff. To be sure, the only additional drivers that can be factored out in this fashion are ones that are part of our econometric equation in the first place.

Applying such a correction procedure, we still find an r_{corr}^2 of 0.02 or correlation r_{corr} of 0.14 between trade and migration (2 percent of the variation of migration explained by trade, with an error probability below 10 percent). This confirms what we saw earlier when we analyzed migration versus trade and neglected other drivers completely (see the sub-section *Many sending countries, trade as the only migration driver*, above). Thus, in the case of Germany, the effect of trade on migration seems to be real.

Figure 3. Germany : In line with Theory

Multivariate country pool regression results for Germany (independent variable is immigration; pool is for 8 most important migrant sending countries)

Variable	Coefficient	Error Probability
TRADE	1.64 E-03**	0.023
INCOMERATIO	5.15 E-05	0.229
TRANSPORT	-1.88 E-05***	0.000
DISTANCE	-2.65 E-07***	0.000
STOCK(-2)	1.39 E-10	0.615
C	4.47 E-03***	0.000
r^2	0.23	
adj. r^{2a}	0.21	

^a The adjusted r^2 accounts for errors in r^2 due to high numbers of independent variables; ** Error probability below 5%; *** Error probability below 1%

Figure 4. Trade : In the Same League as Other Drivers

Relative impact of immigration drivers for Germany (1962-2004)^a

Variable	Relative Impact
TRADE	0.12
INCOMERATIO	(0.08) ^b
TRANSPORT	-0.23
DISTANCE	-0.34
STOCK(-2)	(0.03) ^b

^a Original regression coefficients corrected for standard deviations

^b Original regression coefficient not statistically significant

In conclusion, we have found empirical evidence for the following in the case of Germany:

- *The effect of trade on migration is not negligible.* It proves to be statistically significant, which even holds after factoring out the noise of correlations with other supposedly pivotal migration drivers. In addition, the trade effect proves to be of the same order of magnitude as the effects of the other drivers.
- *Complementarity prevails.* In all our analyses, we found trade and migration to have a positive correlation, i.e., rising and falling in concert.
- *The inspection of bilateral correlations is not trust-building.* The effect of trade on migration becomes visible only when pooling data from various sending countries (or possibly when looking at a longer time span in a two-country analysis, though this approach is limited by data availability).

The United States, the United Kingdom, and Australia: Puzzling Results

An obvious next step is to try and repeat this kind of analysis for other countries typically taking in large numbers of migrants. We did so for the United States, the United Kingdom, and Australia. For all three, though, the time series for immigration and its

drivers available to us are shorter (or even have gaps).¹⁷ Furthermore, we do not have enough data on the numbers of migrants already in the country to include this driver at all. Results are inconclusive:

- The *inspection of bilateral data only* is as fruitless as in the German case (compare step one above).
- The analysis of *pooled data for many sending countries*, but with *trade as the only migration driver*, does not yield a significant trade-migration correlation for any of the three countries (compare step two above).
- The results of our *multi-country, multi-driver* analysis for the United States, the United Kingdom, and Australia are shown in Figure 5, together with the German numbers for comparison. Here, too, trade does not prove to be a significant migration driver for all three countries. To make things worse, the directions of the effects of the additional drivers are counterintuitive in a number of cases: for the United States and Australia, there is a significant effect of a rising income ratio slowing migration; for the United States, there is a significant effect of rising transportation costs boosting migration; and for the United Kingdom, a larger distance between sending and receiving country yields higher migration flows.

Rational explanations for this—and for some of the counter-intuitive results in the multivariate approach in particular—are difficult to come up with. The United Kingdom might on average receive more of its immigrants from far-away countries than from those nearby. Our proxy for transportation costs was very rough and might not be applicable to the United States. The significant migration-reducing effects of an increase of income gaps remain puzzling, though. In any case, more data are needed to be able to produce more reliable results for these countries.

¹⁷ Immigration data are from the *United Nations Demographic Yearbooks 1977 and 1989* and from the Migration Policy Institute (available online at www.migrationinformation.org); trade data are from the International Monetary Fund's *Direction of Trade Statistics*, as for Germany; income data are from Groningen Growth and Development Centre, as for Germany; data on transport costs are from the Liner index, as for Germany (which is a very rough proxy, but no other data were available); and country distances are from CEPII, as for Germany.

Figure 5. Puzzling Results for Other Countries

Multivariate country pool regression results (independent variable is immigration; pools for respective 5 to 8 most important migrant sending countries)

Variable	Germany		US		UK		Australia	
	Coefficient	Error Probability	Coefficient	Error Probability	Coefficient	Error Probability	Coefficient	Error Probability
TRADE	1.64 E-03**	0.023	-1.51 E-04	0.792	-2.14 E-04	0.657	1.80 E-04	0.698
INCOMERATIO	5.15 E-05	0.229	-6.70 E-05**	0.026	-1.29 E-05	0.367	-2.23 E-04***	0.000
TRANSPORT	-1.88 E-05***	0.000	1.05 E-05**	0.027	-1.19 E-05***	0.001	-1.92 E-05**	0.029
DISTANCE	-2.65 E-07***	0.000	-9.62 E-08**	0.013	1.20 E-07***	0.000	-3.12 E-07***	0.000
STOCK(-2)	1.39 E-10	0.615	no data		no data		no data	
C	4.47 E-03***	0.000	1.05 E-03	0.109	7.80 E-04	0.108	7.93 E-03***	0.000
r ²	0.23		0.32		0.57		0.65	
adj. R ^{2a}	0.21		0.30		0.56		0.63	

^a The adjusted r² accounts for errors in r² due to high numbers of independent variables; ** Error probability below 5%; *** error probability below 1%

THE ROLE OF TECHNOLOGY

If international trade proves to be an important migration driver, what is going to determine trade flows themselves in the next two decades? We believe that three crucial developments will be:

- *a rise of fossil fuel prices*, which might throw a wrench in the works of trade, in particular its international variety, by pushing transportation costs up,
- *the emergence of the networked traded good*, which will make trading physical goods a more controllable and more efficient business and thus, among other things, might help to retard the rise in transportation costs, and
- *the increasing pressure to outsource across borders (“offshoring”)*, which increases trade, since goods and services produced in outsourced processes typically have to be transferred back to the outsourcing organization or somewhere else outside the offshoring destination country.

All three developments heavily depend on technological progress. How technology might exert influence on them—and hence on trade—in the medium and long term is the topic of this last section.

Prospects for Mitigating Fossil Fuel Consumption

We expect fossil fuel prices to continue rising in the next two decades, since supply will not be able to keep up with rising demand. A global peak of oil production in this period, a matter of controversy among experts, would give an additional and very substantial push, but even without such a situation prices should continue to go up. The

economic expansion of emerging markets, especially China, will be among the pivotal drivers.

This will strongly affect the transportation costs incurred by the trade of physical goods. All relevant transportation modes—whether by air, sea, or land—are largely driven by fossil fuels (with the main exception being electricity-driven trains, in regions where electricity is generated by atomic energy to a large extent). A crucial lever to better control of the consumption of fossil fuels is technological progress in engine and fuel concepts:

- *Reducing consumption where fossil fuels are needed.* In the next two decades, we expect a whole range of new fossil-fuel-saving technologies to emerge and not-so-new ones to finally become more widespread, including (1) ever more information technology-(IT)-enabled control of processes in traditional combustion engines; (2) hybrid drivetrains combining a combustion engine and an electric motor; (3) more economical propulsion systems for commercial airplanes, set to hit the market during the next two decades as many current fleets are aged and competitive pressures have risen sharply; and (4) unconventional new ideas such as attaching sails or kites to conventional large-scale cargo ships.
- *Sidestepping fossil fuels altogether.* Some new technologies that promise to avoid fossil fuels completely should find more widespread use in the next two decades, too, though we expect significant diffusion at the end of the period rather than in the next few years. Among these technologies are (1) engines using renewable primary products as fuel, such as bio-diesel, and (2) fuel cells running on hydrogen. The former might see quicker diffusion, since it uses rather conventional combustion technologies. The latter, in contrast, is still suffering from teething problems, some of them rather fundamental, such as the lack of fuel storage capacity. What is more, it is not clear to date how enough hydrogen can be produced to drive large fleets without using fossil fuels in the process, and who is willing to bear the expense of building up a distribution network. But still, fuel cells are a very promising long-term alternative to fossil fuel drivetrains, at least on the roads.

All told, technological progress in the field of new engine and fuel concepts will help to curb fossil fuel consumption per unit of transport significantly in the next two decades. But it is far from certain whether these effects can compensate for the effect of rising fossil fuel prices on transport costs.

Prospects for Reducing Friction in Trade

While the previous sub-section explored how technology affects the costs of enabling a given trade flow, we now focus on technology-enabled ways to organize those trade flows more efficiently. In this manner, too, average trade costs might be lowered or their increase slowed. Important developments include:

- *Making ever smaller trade units individually identifiable.* Emerging information and communication technologies (ICT) enable the automatic and unambiguous

identification of the smallest physical goods. At the moment, this development is centered around so-called radio frequency identification (RFID) tags, small “electronic bar code” holders able to send the information stored on them to nearby sensors. Currently, they are still too expensive for broad-scale use, but prices are expected to plummet within the next decade. The possibility to automatically identify trade units promises to increase the efficiency of handling physical goods enormously, since the information collected can enter IT systems—from simple inventory to full-blown enterprise resource management systems—without human intervention.

- *Linking trade processes and goods in ever tighter networks.* The automatic identification sketched above can be leveraged by feeding it into interlinked ICT networks. Already today, networks of individual companies are interconnected. But over the next two decades, we expect linking to reach new levels. Currently, new interface standards for network-to-network or database-to-database connections are being developed and distributed (one ill-defined but potentially important field is “web services”). The proliferation of these standards should lower substantially the time and costs involved in knitting larger and at the same time more dynamic ICT networks. This in turn enables trading companies and trade operators—in principle at least—to exactly track the whereabouts of each and every piece of traded goods, making stocks and flows more transparent and better manageable, while reducing losses on the way.
- *Lubricating traffic.* Similarly, the flows of the vehicles carrying the goods will be managed more efficiently in the next two decades. This will happen both on an individual basis (when a fleet operator can track and guide its individual vehicles, which is already happening but bound to improve) and in a collective manner (when traffic is more intelligently managed by exploiting data collected through stationary traffic monitoring or so-called floating car data collection.)¹⁸

Again, while these technological (and ensuing organizational and possibly market) developments will help to contain transport costs incurred by trade, they might not be enough to make up for rising fuel prices. But having said that, they could still change trade and distribution patterns for physical goods dramatically, enabling new business models and possibly creating new incentives to trade.

Prospects for Broadening the Scope of Offshoring

Offshoring of the production of physical goods, including their transfer back to the outsourcing country, has been standard procedure for decades. Technological progress affects this kind of trade mainly through transportation costs, which have been covered above. A more direct impact of technology can be expected on the offshoring of services. This is the subspecies of outsourcing that has been growing strongly and debated hotly of late in the political arena and by the public at large. Services being offshored include call-center operations, back-office processes from chart drawing to number crunching to payroll accounting, software development, and increasingly research and development

¹⁸ Here, each vehicle itself acts as a sensor of its surrounding traffic situation (and possibly as a network node, too).

(R&D). Technological progress can enlarge today's scope of offshoring in several dimensions, including:

- *Reaching out to more offshoring destinations.* Today, offshoring is concentrated in a relatively small number of locations in terms of countries as well as regions within those countries. This will probably change when ICT networks are more broadly diffused in offshoring destinations in coming years. First, this simply enlarges potential supply (though a lot more than ICT infrastructure is needed to provide those services, primarily human capital). Second, such a broader geographical distribution of offshoring providers would slow down the wage rise perceivable already today in offshoring centers such as Bangalore, India. This in turn increases incentives for high-wage countries to offshore activities.
- *Creating higher quality ICT channels.* As the transmission capacity, transmission security, and so-called quality of service¹⁹ of ICT networks rise, an increasingly broad scope of services will become tradable, at declining costs. Such services will be those that (1) demand the transfer of large amounts of data; that (2) require new or still seldomly used forms of tele-collaboration such as video conferencing and virtual 3D design environments;²⁰ and that (3) deal with highly sensitive data, such as medical records and confidential R&D data. In other words, higher-quality ICT channels will help to drive offshoring of services that require more complex and more human-centered interfaces between those parts of the value-added chain done inhouse and those offshored.
- *Moving up the technology sophistication ladder.* Finally, the general advance of technology in the countries offshoring business processes will shift their comparative advantage towards higher technological sophistication. This will create pressures to offshore ever more sophisticated processes further down the ladder as well—those that constituted developed countries' comparative advantage yesterday. These will probably include more and more lower-end R&D processes and more complicated business services.

All three developments have the potential to enlarge the scope of offshoring. But the first two in particular are enablers rather than true drivers—and a number of language, cultural and trust barriers might prove to be more important than technology.²¹ In addition, offshoring today contributes only a small fraction to overall trade. Only around one percent of Europe's total IT service spending is channelled into the offshoring

¹⁹ An ICT network providing high *quality of service* is one that allows uninterrupted and smooth transmission of services as voice calls and video broadcasting, contents the internet was not optimized for originally.

²⁰ These environments are virtual 3D worlds which workers in different locations can “enter” and manipulate simultaneously, e.g., to cooperatively work on designs of machine parts or explore graphical molecule simulations.

²¹ For Germany, this has recently been underlined by a joint study by BITKOM and Deutsche Bank Research (Schaaf, Jürgen and Mathias Weber, *Offshoring Report 2005—Ready for take-off*, Economics 52 (Deutsche Bank Research; 2005.)

business. Thus, even though offshoring growth rates are and probably will remain high, we are starting from a rather low level.²²

CONCLUSION

In this study we set out to collect theoretical and empirical evidence to (1) decide if there can be a general answer to the question as to whether trade and migration are complementary or substitutive, and (2) how strong the effect of trade is relative to that of other drivers. Our results suggest the following:

- Most theories—those with the arguably stronger roots in reality in particular—*suggest a complementary* relation of trade and migration.
- Previous empirical studies, analyzing a considerable number of countries and a broad range of time periods, *almost exclusively find complementarity*.
- In our own analysis for Germany we *find complementarity*, too. Here, trade's impact on migration proves to be *of the same order of magnitude* as that of other drivers commonly regarded to be important. It has to be noted, though, that while the trade effect is statistically significant, the overall explanatory power of our model is low (2 percent of the migration variation explained by trade, 21 percent by all variables used in concert).
- For the United States, the United Kingdom, and Australia our data *do not show a significant impact* of trade on migration. But as other results of the analyses for these countries are hard to explain, and as we had to use a less comprehensive data set than in the German case, we are cautious about taking this at face value.

All told, we think it is reasonable to assume, as a starting hypothesis, that international trade and migration go hand in hand in a lot of cases. We cannot conclude, though, that this holds for each individual country pair. Up to now, the majority of studies, including ours, find complementarity only as an average phenomenon across many migrant-sending countries. In addition, the poor overall quality of migration data might disguise part of the effect.

With trade nevertheless a migration driver to be taken into consideration, we finally explored how technological progress affects trade itself. We find a whole range of technological trends that are likely to increase trade. A better understanding of possible developments in this area would help improve projections of international migration.

²² Offshoring of manufacturing is stronger by far already. But, as suggested above, technology's main effect on trade from this kind of offshoring is via affecting transportation costs.

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INTERNATIONAL MIGRATION FLOWS: THE ROLE OF DESTINATION COUNTRIES' MIGRATION POLICIES

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ABSTRACT

The goal of this paper is to provide a discussion of the relative importance of migration policy compared with other long-term determinants of international migration flows. We analyze the economic, social, political, and cultural variables that affect destination countries' demand for migrants—that is, migration policy—and characterize the nature and likely strength of the relationship. We conclude that the most important variables affecting the demand for migrants are likely to be the “human-capital gap” between natives and immigrants (that is, the ratio between the average skill composition of natives and the average skill composition of immigrants) and interest-group politics.

1. INTRODUCTION

The goal of this paper is to analyze the role of destination countries' migration policies in shaping international migration flows. In this introduction, we first provide a framework to think about how migration policy affects international labor movements and how it is itself, in turn, endogenously determined by a number of economic, social, political, and cultural factors. We next discuss the relative importance of migration policy compared with other long-term determinants of migration. Finally, we explain our reasons for using *political-economy models* to analyze migration policy by looking at another field of economics—international trade—which has widely used them.

International Migration Model

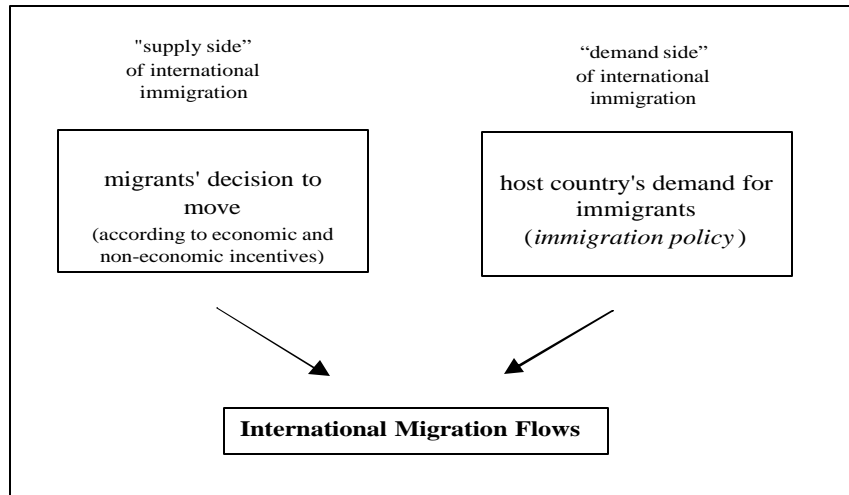
The size and composition of international migration flows are affected by both supply and demand factors (see Figure 1). The supply side is characterized by migrants' decisions to move, according to economic and non-economic incentives (see, for example, Sjaastad 1962; Borjas 1987; Borjas 1999a; Chiswick 1999). On the demand side stands the host countries' demand for immigrants, represented by migration policies. The migration literature in economics has mostly focused on supply factors, while the demand side of international migration has not received much attention. In his 1994 paper, Borjas notes: "The literature does not yet provide a systematic analysis of the factors that generate the host country's demand function" (1693).²³ This is surprising, as immigration policies have likely played a central role in shaping recent international labor movements. While migration flows have increased in the last decades, they have been relatively small in scale compared to other dimensions of globalization—such as trade and capital flows—and relative to the past (Faini 2003; Findlay and O'Rourke 2003; Obstfeld and Taylor 2003).²⁴ Yet incentives on the supply side of international migration flows are particularly strong at this point in time: High wage differentials across countries as well as reduced transport and communication costs have increased the incentive of migrants to move. Restrictive migration policies, then, are most likely the answer to the surprisingly small size of international migration (Mayda 2005b).²⁵

²³ As discussed below, more recent papers have considered the demand side of international migration flows.

²⁴ Policy stances towards trade in goods and labor flows have historically moved in the opposite direction. Immigration policies experienced a tightening in the twentieth century relative to the nineteenth, starting after WWI. Trade policies have been increasingly liberalized across the two centuries (except in the interwar period), especially after WWII (Faini 2003).

²⁵ There is debate in the literature about whether the size of recent international migration flows is high or low. As Faini notes in commenting on a recent conference paper (Boeri, Hanson, and McCormick 2002): "The basic premise of the paper is that migration is large and on the rise. However, this is not true, at least by any historical standards (Aghion and Williamson, 1998). The truth is that in many respects migration is the grand absentee of the globalization process ... In both episodes [the beginning of the twentieth century and during the 1950s and the 1960s], absolute and relative numbers were significantly larger than those seen in the present globalization phase" (Faini 2003, 158).

Figure 1: International Migration Flows: Supply and Demand Determinants



In other words, currently, given that migration pressures on the supply side are considerable while the number of immigrants is contained, it is very likely that immigration policy's constraints are binding. This is confirmed by anecdotal evidence from newspaper articles and migration data on the increasing importance of illegal immigration, which rises as the disequilibrium between supply and demand grows.

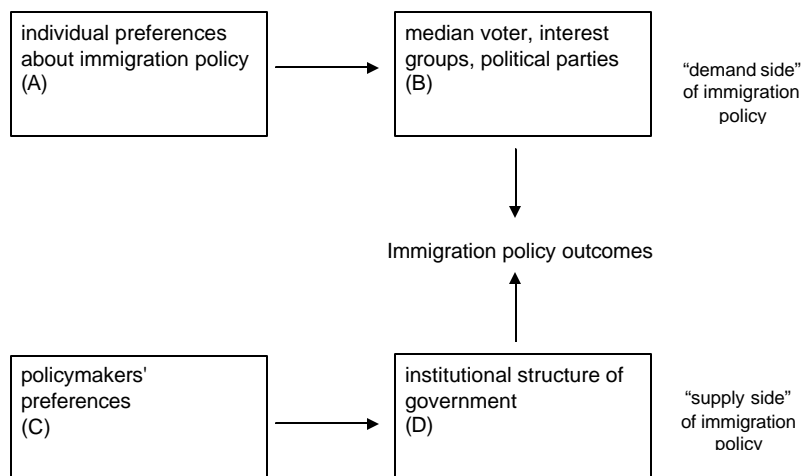
An indication of the importance of immigration policy, relative to other long-term determinants of migration flows, is based on the comparison of two different historical times: the last few decades and the period of the first mass migration wave (Hatton and Williamson 2003). Results in three empirical studies (Clark, Hatton and Williamson 2002; Hatton and Williamson 1998; Mayda 2005b) shed light on differences between the two periods. Both Clark, Hatton and Williamson (2002) and Mayda (2005b) analyze the determinants of international migration flows in recent decades (the former paper focuses on a single destination country, the United States, while the latter paper considers a number of host countries). Hatton and Williamson (1998) focus on the causes and economic impact of mass migration at the end of the nineteenth century and the beginning of the twentieth century, which is before international migration became policy-constrained. The comparison of the findings in these papers reveals that the impact of variables on the supply side (such as wage differentials) is stronger at the time of the first migration wave. This provides evidence for the constraining role of destination countries' migration policies, which reduce the magnitude of supply-side effects.

Additional results in Mayda (2005b), reviewed below in Section 2.1.1, offer empirical support for the hypothesis that migration policy is indeed a key determinant of international migration flows.

Migration Political-Economy Model

As Figure 1 shows, immigration policy affects the demand side of international migration flows. However, immigration policy is not exogenous. It can be thought of as the outcome of a political-economy model where, again, demand and supply factors interact with each other giving rise to an immigration-policy outcome. Figure 2 below represents the main components of this framework. It draws from a very similar figure in the Handbook of International Economics (Figure 2.1, p.1459), which represents a political-economy model of trade policy (Rodrik 1995). As illustrated in Figure 2 below, one of the main elements on the demand side of immigration policy are individual preferences—that is, voters' opinions about immigrants. In particular, what is relevant is whether an individual thinks that the number of immigrants should increase or decrease and what composition of immigrants he or she prefers, in terms of economic and non-economic variables (such as skill or capital composition, and cultural background). Next, what is important is how individual preferences about immigration policy are aggregated into political demands. We can distinguish various alternatives. If voting on immigration policy is based on majority rule, then what matters is the median voter's preference in terms of immigration policy (Benhabib 1996; Ortega 2005). Alternatively, the impact of individual preferences could work through interest-groups politics (Facchini and Willman 2005) or the interaction of political parties and/or grass-roots movements. Finally, on the supply side of the political-economy model, we find policymakers' preferences—in particular, whether policymakers maximize a social welfare function or, alternatively, give weight to political considerations (see discussion below)—and the institutional structure of government.

Figure 2: Determination of Immigration Policy



Motivation for Focusing on Political-Economy Models

The literature on the political economy of immigration policy is very much inspired by a parallel body of works on political-economy explanations of trade-policy

outcomes (for a review of this literature, see Rodrik 1995; Helpman 2002; Gawande and Krishna 2003). This is not surprising, given that trade and immigration are closely related to each other. In the standard Heckscher-Ohlin model, trade and immigration are substitutes. Both trade and immigration allow countries to exchange services of factors of production—indirectly through trade and directly through immigration—and thus become integrated with each other. In turn, international economic integration in the form of both trade and immigration produces gains, but also implies strong distributional effects. While the gains-from-globalization result would suggest an open-door policy to both trade and immigration (at least from an economic point of view), this is not what we observe in terms of policies because of distributional effects, which affect the politics of both trade and immigration.²⁶ Hence, in analyzing policy outcomes in these two dimensions of globalization, we need to move out of a framework in which policy is chosen to maximize social welfare and instead take political considerations into account, which is the goal of political-economy models. (This point is related to box (C)—policymakers' preferences—in Figure 2.)

Differences between Trade and Immigration from an Economic Point of View

From a purely economic point of view, some qualifications are needed in comparing trade and immigration. Both trade and immigration produce world-wide gains. Both at the global level and for each trading country (under fairly general assumptions), the gains-from-trade result is well established in the literature. In the standard model with perfect competition and constant returns to scale in every sector, for example, there exist gains from trade in goods that are based on comparative advantage. Concerning immigration, a recent wave of literature has pointed out that the global gains from free labor migration are substantial and might be much larger than the gains from removing existing trade barriers (Rodrik 2001; Walmsley and Winters 2002; Pritchett 2003; Martin 2004; Rosenzweig 2004). However, compared with trade, there is less consensus in the literature regarding the impact of immigration on each country (destination and origin) separately. In some models (for example, in Borjas's (1999a) model and in Trefler's (1997) sector-specific model) immigration raises the destination country's welfare. In some other works immigration does not have any effect on natives' welfare (for example, in the multi-cone HO model with factor-price-insensitivity). Finally, in another set of models, labor flows hurt the destination country (for example, in Davis and Weinstein's (2002) and in Trefler's (1997) Ricardian models).²⁷ Therefore, to the extent that immigration is believed to reduce a destination country's welfare, we do not need political-economy explanations to justify restrictive immigration policies.

²⁶ From a purely economic point of view, distributional effects cannot explain restrictive trade and immigration policies, as long as there are gains on average from trade and immigration (that is, winners' gains are larger than losers' losses). The reason is that other policies are better suited to implement income redistribution.

²⁷ In these models the impact of immigration mostly works through the labor-market channel. Besides the labor market, immigration has a more pronounced impact than trade on other aspects of the destination country's economy, for example on its welfare state.

Differences between Trade and Immigration from a Non-Economic Point of View

From a non-economic point of view, the differences between trade and immigration are clear. Both trade and immigration affect countries from a non-economic point of view. As Rodrik (1997) points out, trade induces arbitrage in national norms and institutions, as competition in international markets of goods and services creates pressure towards institutional harmonization across countries. However, the non-economic impact of immigration is much more direct than it is for trade, as international labor movements imply the meeting, which often becomes a clash, of individuals of different cultures and traditions. To the extent that immigration is believed, arguably, to reduce a destination country's welfare from a non-economic point of view, again, we don't need political-economy models to explain constraints on immigration.

An Overview of the Previous Literature

Numerous papers have analyzed different aspects of the supply side of the international migration model outlined in Figure 1. Within this literature, we focus our attention on two papers—Mayda (2005b), Clark and Hatton and Williamson (2002)—which are the first to emphasize the role of migration policy and introduce it in the empirical analysis, together with supply-side factors. A recent strand of the immigration literature focuses more directly on the demand side of international migration and, in particular, on political-economy explanations of immigration-policy outcomes. The main papers in this literature are Benhabib (1996), Ortega (2005), Facchini and Willman (2005), and Bianchi (2005). Bertocchi and Strozzi (2005) concentrate on the determinants of a specific aspect of migration policy: citizenship laws, which affect voting rights of second-generation immigrants. Goldin (1994) and Timmer and Williamson (1996) offer historical accounts of the political economy of immigration restrictions at the beginning of last century. Finally, the literature on individual attitudes towards immigrants in a single country (Citrin et al. 1997; Espenshade and Hempstead 1996; Kessler 2001; Scheve and Slaughter 2001; Dustmann and Preston 2001a, 2001b) and across countries (Bauer et al. 2000; Brücker et al. 2001; Chiswick and Hatton 2003; Gang et al. 2002; Mayda 2005b; O'Rourke and Sinnott 2005) is also relevant for the demand side of international migration since, as pointed out above, voters' preferences are a key input of immigration-policy outcomes.

An Outline of the Rest of the Paper

The goal of this paper is to survey these works and identify the economic, social, political, and cultural variables that affect a destination country's immigration policy through the channels illustrated in Figure 2 (Section 2). Based on this survey, we will describe how one might design a research project that would empirically test the relationship between these determinants and immigration policy (Section 3). Finally, we give our preliminary judgment on what such a research project might find (Section 4).

An Overview of the Paper's Conclusions

This paper will describe a number of variables that affect the demand side of international migration. In light of the final goal of the CSIS Project on Long-Term

Immigration Projections—a "driver-based" projection model—it is useful to restrict the attention to those drivers that are likely to explain most of the variation in the data. According to our analysis, these variables are the "human-capital gap" between natives and immigrants and the political pressure of lobbying groups. The human-capital gap between natives and immigrants represents the ratio (or difference) between the average skill composition of natives and the average skill composition of immigrants. The human-capital gap determines how immigration affects the relative supply of skilled to unskilled labor in the destination country and, therefore, incomes of individuals in the host economy. Each individual will vote on migration policy according to such economic effect of migration. If voting occurs according to majority rule, the human-capital-gap information needs to be combined with information about the skill level of the median voter.

Another key driver of destination countries' migration policies is interest-group politics: Through political pressure and financial contributions, lobbying groups are able to affect migration-policy decisions and make them different from what voters would have selected. Our conclusion at the end of the paper is that both variables need to be taken into account in a quantitative model. Both voters' preferences—which are affected by the human-capital gap—and interest-groups politics help explain why migration policies are restrictive but still allow positive inflows of immigrants.

2. SURVEY OF THE LITERATURE ON IMMIGRATION POLICY

An extended body of works analyzes immigration policy in the United States and in other countries and their changes over time. For example, differences in immigration-policy outcomes across countries and over time are discussed in Joppke (1998), Money (1997), Freeman (1992), and Freeman (1995). While aware of this literature beyond the field of economics, in this paper we will mostly focus on theoretical and empirical *economic* models of migration policy.

2.1 Literature on Supply Determinants of International Migration Flows

As pointed out in the introduction, we focus on two papers within the literature on supply determinants of international migration flows, Mayda 2005b and Clark, Hatton, and Williamson 2002, since these are the first to emphasize the role of migration policy and introduce it into the empirical analysis, together with supply-side factors.

2.1.1 International Migration: A Panel Data Analysis of Economic and Non-Economic Determinants, by Anna Maria Mayda (2005b)

Using data on immigrant inflows into 14 OECD countries by country of origin between 1980 and 1995, Mayda (2005b) discusses and empirically investigates the economic and non-economic determinants of international migration. This paper incorporates both the supply side and the demand side of immigration, which is captured by immigration policies. The study does not attempt to model policy formation from a theoretical point of view, but rather empirically shows that policy matters. Some of the results of the analysis are consistent with the predictions of a standard international migration model, while others represent empirical puzzles. In particular, pull effects—

that is, the positive impact on immigrant inflows of improved economic opportunities in the destination country—are positive and significant. This result is robust across different econometric specifications. On the other hand, the impact of push factors—that is, worsening economic conditions in the origin country—is usually not significant and seldom consistent in sign with the theoretical predictions. In a very basic model with only supply-side factors, the asymmetry in the two effects—pull and push—is surprising, given that in theory they should be similar in size (and opposite in sign). One potential explanation is related to immigration policy, which, at the same time, might be neutralizing push factors (if quotas are binding) and driving positive and significant pull factors through the political-economy channel (for example, an increase in wages in the destination country might relax the political constraints on policy-makers when they set the level of migration). The empirical analysis also shows that, when migration policy becomes less restrictive in a given country in a given year, the impact of pull factors becomes more positive and the impact of push factors becomes negative and significant. Next, changes in relative income inequality in the source country relative to the destination one have a non-monotonic effect on the size of migration flows: positive if there is positive selection of immigrants to the host country, negative otherwise, as predicted by Borjas' (1987) selection model. Finally, one important feature of this paper is that it incorporates non-economic determinants of migration inflows. Among them, the most important from an empirical point of view are related to geography, demographics, and network effects: the physical distance between the destination and origin countries (which negatively affects migration flows); the share of the population which is young in the origin country (which positively affects migration flows); and the size of past migration inflows to the destination country from the same origin country (which positively affects migration flows).

2.1.2 Where Do U.S. Immigrants Come From, and Why? by Ximena Clark, Timothy J. Hatton, and Jeffrey G. Williamson (2002).

Clark, Hatton and Williamson (2002) identify and explain trends in U.S. immigration flows over the past several decades. The starting point of the paper is a discussion of the main changes in U.S. immigration policy in recent decades and how these changes, especially the 1965 Amendments to the Immigration Act, unexpectedly increased immigration from low-income countries. The goal of the empirical analysis in the paper is to explain this transformation in U.S. immigrant composition. The authors point out that, while immigration to the United States has been widely researched empirically, several shortcomings characterize the previous literature. For example, some studies use country cross-sections, or cover a limited number of years, or only explore a subset of all migration inflows to the United States. Other papers omit a number of key variables such as the age structure of the population and the existing immigrant stock from the same origin country. Clark, Hatton and Williamson (2002) specify their econometric model trying to address such limitations. A number of variables are considered as determinants of bilateral U.S. migration inflows from all over the world, including the wage gap between destination and source countries, which represents migrants' gain from moving to the host country, the associated costs of moving such as the cost of travel, an individual-specific cost, and indirect costs associated with quantitative policy restrictions on migration and skill-selective immigration policies.

Another important variable considered in the migration decision is the age of the potential migrant: A young migrant has a higher discounted value from migration, in expected terms, than an older migrant of similar skills. Finally, one particularly important aspect of the analysis is the use of the number of quotas or visas for different immigrant categories to capture U.S. immigration policies.

The migration model is estimated using panel data on immigration to the United States by place of birth from 81 source countries across the 28 years between 1971 and 1998. The estimates have, in general, the expected signs and are statistically significant. For example, a 10 percent increase in a source country's income per capita reduces immigration to the United States by around 6 percent; raising the share of a source country's population aged 15-29 by 10 per thousand increases immigration to the United States by 4.5 percent or by 0.3 per thousand individuals of the source country's population; a country's migration rate to the United States is reduced by about 21 percent for every additional thousand miles between the country and the United States; finally, the immigration stock of a typical country increases by 1.1 percent per year due to the impact of the existing immigration stock.

The authors also run counterfactual simulations to assess the effect of changes to immigration policy in 1977, 1986, and 1990 on immigration levels and shares. Next, they run counterfactual simulations to assess the impact of economic and demographic variables by source country. The authors conclude that the changing composition of immigration over the last three decades has been driven by a combination of economic, demographic, and policy forces. In Europe, relatively high income, small youth cohorts, and relatively equal income distributions have restrained immigration to the United States. In South and Central America, the opposite has generally occurred. Finally, based on the simulations, it appears that the “friends and neighbors effect”—related to the existing immigrant stock from the same origin country—has only played a minor role in influencing immigrant composition across the decades analyzed.

2.2 Literature on the Political Economy of Migration Policy

In this section, we review some of the most important political-economy papers on migration policy: Benhabib (1996), Ortega (2005), Facchini and Willman (2005), Bianchi (2005), and Bertocchi and Strozzi (2005).

2.2.1 On the Political Economy of Immigration, by Jess Benhabib (1996)

Benhabib (1996) investigates the type of migration policy that is chosen by a destination country where natives vote using majority rule. In this paper, the purpose of migration policy is to regulate the capital-labor ratio²⁸ (*capital composition*) of the flow of immigrants,²⁹ rather than the size of the immigration flow. The assumption in the

²⁸ Capital can be interpreted to mean or to include skill, that is, human capital. Therefore the results in this paper can be read in terms of the *skill composition* as opposed to the capital composition of immigrants.

²⁹ The ultimate goal of migration policy in this paper is to achieve—through the inflow of immigrants—a target average capital-labor ratio of the population.

model is that natives, who are characterized by different capital-labor ratios,³⁰ vote based only on the economic effect of immigration on their individual utility (which is equal to their total income). Therefore the non-economic impact of immigration is ignored in this paper. Under the majority voting setting, policy is determined by the preference of the median voter in the capital-labor ratio distribution. By definition, ranking individuals in order of increasing capital/labor ratio, the median voter is the individual such that half of the individuals in the population each owns less capital relative to labor than the median voter, while the other half owns more.

The paper proceeds in three steps. It first shows each individual's preference in terms of a *given* migration policy. That is, it determines whether each individual would vote in favor or against a migration policy characterized by a given capital composition of immigrants. Next, the author examines the median voter's preference for any given policy. Finally, the paper investigates which policy would win against any other policy in a pair-wise contest under majority voting.

The first result can be explained as follows. Consider an immigration policy that admits immigrants with a given capital composition. If the post-immigration capital-labor ratio is higher than the pre-immigration capital-labor ratio, then voters at the top (bottom) of the capital-labor distribution will vote against (in favor of) such immigration, since their total individual income is reduced (increased) by such immigration. On the other hand, if the post-immigration capital-labor ratio is lower than the pre-immigration capital-labor ratio, then voters at the top (bottom) of the capital-labor distribution will vote in favor of (against) such immigration, since their total individual income is increased (reduced) by such immigration. The intuition for these predictions is straightforward. In this model, the impact of immigration on total individual income (on the wage and the rate of return to capital, in particular) is only a function of how immigration affects the (average) capital-labor ratio in the economy. The reason is that, in a model with one good produced, two factors (labor and capital) and constant returns to scale, both the wage and the rate of return to capital are fully determined by the capital-labor ratio in the economy (assuming a fixed level of technology). If the capital-labor ratio decreases (that is, the post-immigration capital-labor ratio is lower than the pre-immigration capital-labor ratio), then the rate of return to capital increases and the wage decreases. The opposite occurs if the average capital-labor ratio increases.³¹

Let's consider, for example, an immigration policy that increases the (average) capital-labor ratio (see Figure 3). The higher the capital-labor ratio of an individual, the larger is the weight of capital income in total income, and the more he or she will be concerned about reductions in the rate of return to capital.³² On the other hand, the lower the capital-labor ratio of an individual, the larger is the weight of labor income in total

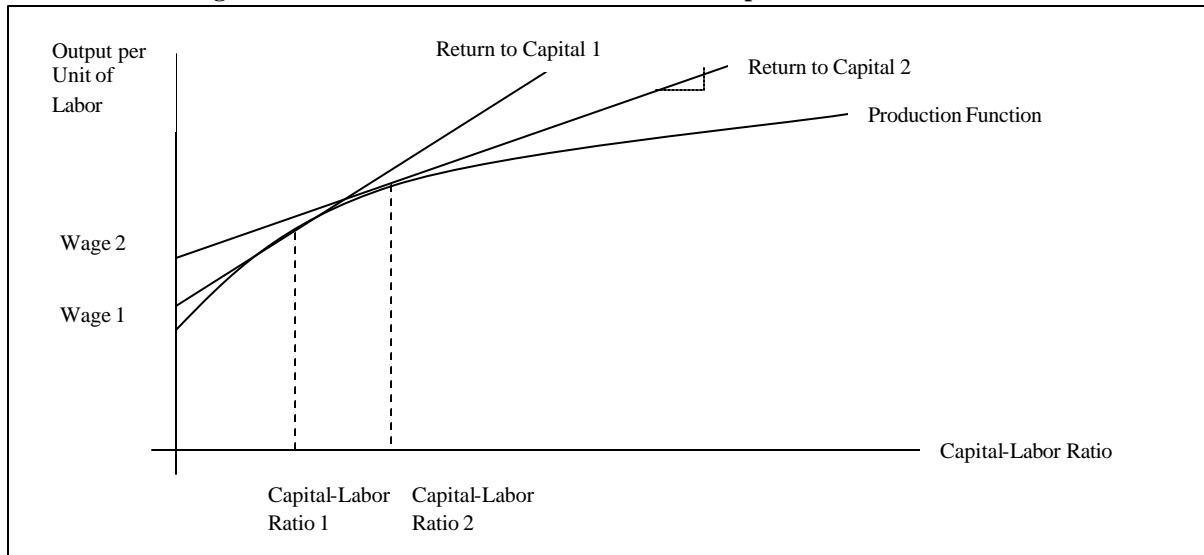
³⁰ If we assume that each agent only supplies one unit of labor, then his or her capital-labor ratio equals his or her capital holding (that is, the units of capital he or she owns).

³¹ Notice that, in this model, immigration does not affect the distribution of the capital-labor ratio among natives. That is, the amount of capital owned by each native individual is constant.

³² Assuming that each individual owns one unit of labor, his total income equals the wage plus capital income, which is equal to the rate of return to capital times the amount of capital owned by the individual.

income, and the happier he or she will be about the wage increase. Between the two sets of individuals, there will be one who is *indifferent* to the given immigration policy since his or her total income is not affected as the capital-labor ratio in the economy changes due to immigration. The *indifferent* individual represents the threshold individual between those who are in favor of and those who are against immigration. His or her capital-income loss is exactly offset by his or her labor-income gain.

Figure 3: Factor Returns as a Function of the Capital-Labor Ratio³³



Next the author investigates which policy would win against any other policy in a pair-wise contest under majority voting. When voting, each individual chooses the policy that maximizes total individual income. Since total individual income is a convex function of immigration policy (in particular, of the capital composition of immigrants), total income is maximized at either the policy that produces the highest or the lowest post-immigration capital-labor ratio. As is intuitive based on the above discussion, for individuals at the bottom of the capital-labor ratio distribution, total individual income is maximized by the policy that produces the highest post-immigration capital-labor ratio. For individuals at the top of the income distribution, just the opposite is true. The policy chosen under majority voting is the one that defeats any other policy in a pair-wise contest from the point of view of the median voter. Interpret capital as human capital (skill). If the median voter has a high capital-labor ratio, the policy chosen under majority voting is the one that only admits unskilled immigration (or, alternatively, free migration, given that in practice it is hard to put an upper limit on the skill composition of immigrants). A migration policy only admitting skilled migrants will be chosen if the median voter has a low capital-labor ratio.

³³ In Figure 3, the slope of each tangent line to the production function represents the rate of return to capital corresponding to the given capital-labor ratio, while the y-axis intercept of the tangent line represents the wage.

To conclude, this paper presents a basic model that explains how immigration policy—defined in terms of the capital composition of the flow of immigrants—is formed. Immigration policy is determined by the distribution of the capital-labor ratio in the existing population, which votes according to majority rule. As pointed out by the author, future extensions of the model should include a multisector economy (multiple goods) with a heterogeneous labor force (in this model each person is equally productive) or a mechanism that determines the size of immigration flows as the outcome variable, as opposed to the capital composition of immigration flows (the present model has no restrictions on the size of immigration flows).

2.2.2 *Immigration Quotas and Skill Upgrading*, by Francesc Ortega (2005)

Ortega (2005) uses a *dynamic* setting to explore the evolution over time of immigration policy in an economy comprised of both high-skilled and low-skilled workers. The main contribution of this paper is to analyze the trade-off that arises in a dynamic version of Benhabib's (1996) model in which immigrants' children have the right to vote and, therefore, affect the political balance of the destination country. The arrival in the destination country of immigrants, whose skill composition depends on the existing immigration policy, alters the skilled-to-unskilled labor ratio of the workforce in the destination country. This, in turn, affects the current-period skill premium as well as the skill composition of next period's electorate, and thus the political balance and migration policies in the future. In this model voters are aware of such effects.

The dynamic trade-off that arises works as follows. On the one hand, skilled (unskilled) natives prefer an immigration policy that admits unskilled (skilled) immigrants to their country. The reason is as in Benhabib's (1996) model: Since skilled and unskilled workers are complements in production, the arrival of unskilled (skilled) immigrants increases the skilled (unskilled) wage. On the other hand, the arrival of unskilled (skilled) immigrants can bring about a situation in which unskilled (skilled) workers gain the political majority and, therefore, vote for policies that benefit them as a group. Therefore, two opposing effects of immigration are at work: an economic effect in the short-run and a political effect in the medium-to-long run. Another complication of the model—which is consistent with the data—is the fact that skill upgrading takes place in the economy, independently from the arrival of immigrants.³⁴ Therefore, in choosing the skill composition of immigrants, natives take skill upgrading into account and choose immigrants that are less skilled than they would have, absent skill upgrading.

This paper offers predictions about the determinants of changes in immigration policy. According to the model, immigration policy can be either characterized by a cycle equilibrium or a quota equilibrium. A cycle equilibrium is one in which the political majority switches from one group to the other and, along with it, immigration policy too changes. This is the case in which short-run considerations—based on the short-run impact of immigration on the current wage through factor complementarity and substitutability—are the dominant force. A quota equilibrium is one in which the group in the majority—either skilled or unskilled workers—limits the number of immigrants through quotas, in order to retain future political power. In this case, the medium-to-long

³⁴ There is skill upgrading in an economy if the skills of the labor force improve over time.

run political cost of admitting immigrants of the other category is higher than the short-run economic gain through increases in factor returns. Interestingly, in all quota equilibria, immigration turns out to be mostly unskilled, due to the need to offset skill upgrading through migration policy. In light of these predictions, Ortega interprets the U.S. experience after WWII as consistent with a skilled-majority quota equilibrium, together with skill-upgrading taking place over time.

In testing this model across countries, it is necessary to account for differences in legislation regarding voting rights and citizenship for immigrants. Particularly useful from this point of view is the dataset constructed by Bertocchi and Strozzi (2005), which is discussed below.

The details of the model are here described. There are two types of workers, skilled and unskilled. All agents live for two periods. When they are children, they do not work. When they are adults, they work and receive a wage according to their type (skilled or unskilled), have a child, then cease to exist. Skilled workers have skilled children and can decide to work in either skilled or unskilled jobs³⁵. Unskilled workers have skilled children with a small probability p (less than 50 percent). Natives and immigrants are identical in these aspects of the life cycle. However, while natives vote on immigration policy when they are adults, immigrants cannot. Immigrants arrive in the country when they are adults, and face a fixed entry cost that is common to both types of immigrants. Their children are citizens and can vote on immigration policy.

The author first determines the effect of exogenous immigration flows on wages of both types of workers. Assuming that the population (composed of both immigrants and natives) is initially relatively unskilled (under a given immigration flow), unskilled workers earn a lower wage than skilled workers. However, over time, with skill upgrading (since both skilled and unskilled workers bear skilled children) the economy tends to have a higher proportion of skilled workers, which drives down the skill premium, encourages some skilled workers to work in the low-skill sector, and equalizes the wages of both types of workers.

In the model natives choose the skill distribution of the population—which affects their wages—by voting on the composition of immigration flows. The electorate population of the following period is composed of both skilled and unskilled natives. The skilled workers are composed of children of previous generation skilled natives and immigrants, as well as a fraction p of the children of previous generation unskilled natives and immigrants. Unskilled workers are composed of a fraction $(1-p)$ of the children of unskilled natives and immigrants. The electorate votes on immigration policy, which indicates how many of each type of foreign workers to let into the country.

Voters prefer one of two possible policy rules: one that admits unskilled immigrants and another that admits skilled immigrants. There are two forces that shape

³⁵ This assumption is necessary to assure a non-negative skill premium. Since both types of labor are used as complements in the production of one good, in the event of a scarce supply of low-skilled workers, the ability of skilled workers to fill unskilled jobs is necessary to ensure that the marginal product of the unskilled worker equals the marginal product of the skilled worker.

voters' opinions about immigration policy. On the one hand, agents would prefer to represent a relatively small portion of the population to ensure a high wage. Skilled workers prefer an unskilled policy and unskilled workers a high-skill policy. On the other hand, a minority group would have no influence on future policy. Therefore, there are several possibilities that emerge. The first possibility is a cycle equilibrium. If workers do not care about losing power in the future, the current-period majority would vote for a policy that would bring them the highest feasible wage—one that admits immigrants of the other group, placing this other group in the majority in the following period and producing a complete reversal in policy. As the name suggests, this would give rise to alternating immigration policies and the associated skill composition of the population in each period. The second two possibilities are equilibria in which immigration policies are fairly stable through time, but differ based on the group in the majority. In this setting, each group seeks to secure high current-period wage without sacrificing its political stance in future generations. Therefore, the skilled would advocate a relatively low-skilled policy (low ratio of skilled to unskilled workers) that would maximize their current wages without losing control over the policymaking process. In a similar fashion, low-skilled workers would also advocate a policy that would maximize their wages without losing control over the future policymaking process. However, due to skill upgrading, the unskilled would admit more unskilled immigrants than absent skill upgrading, to maintain the majority. In summary, while the ratio of skilled to unskilled workers advocated by an unskilled majority is higher than that advocated by a skilled one, in both cases the resulting post-immigration ratio of skilled to unskilled workers is less than the ratio prior to immigration.

To conclude, this paper offers a dynamic general equilibrium model of immigration policy. It extends Benhabib's (1996) seminal work by incorporating two types of labor and endogenizing the voting population's distribution of the capital-labor ratio by considering immigrants' right to vote.

2.2.3 *The Political Economy of International Factor Mobility*, by Giovanni Facchini and Gerald Willmann (2005)

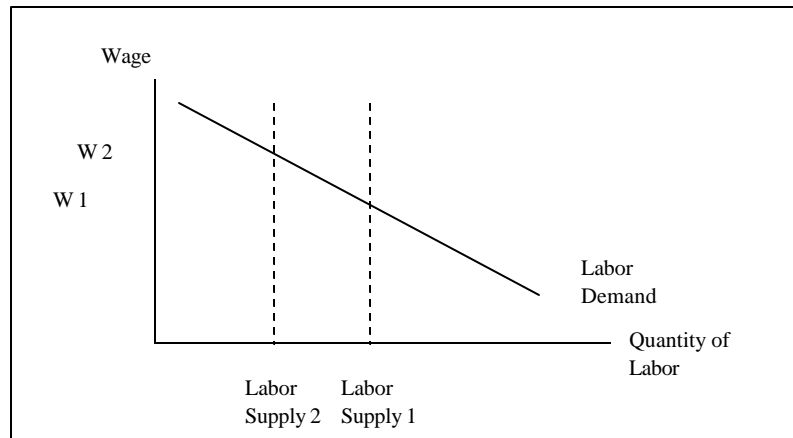
Facchini and Willman (2005) model migration policy as in Grossman and Helpman's (1994) "protection-for-sale" paper on trade. In particular, the goal of this study is to assess the political-economy outcomes—in terms of international factor mobility in a given destination country—when politically organized factors lobby the government for protection. The authors use an auction model in which the government determines the amount of protection to grant each factor as a function of the complementarities and substitutabilities between factors of production as well as the contribution schedules presented by each lobby.

The paper first discusses the case in which the government's policy instrument is the domestic price of each factor.³⁶ Second, it discusses the case in which the government instead sets quotas for each factor. Finally the authors show that, when the government fully captures the rent generated from factor trade, the two settings are equivalent.

³⁶ This case replicates the scenario in which, in the arena of trade policy, the government sets a tariff which determines the domestic price of the good.

In the model, the population is divided into groups of individuals who own different factors used in the production of one good.³⁷ These factors can be imported if there is insufficient domestic supply, since both domestic and international factors are identical for purposes of production. However, in an effort to secure a high return to the factor owned, an exogenous subset of factor owners—which are politically organized—lobby the government for “protection” against the use of their foreign counterpart. In particular, they present to the government a menu of contributions (“bids”) they would make based on the domestic factor prices the government decides to set (the chosen policy). Essentially, lobbyists strive for a policy that curbs the international supply of a factor so that the domestic sources of that factor are employed at a higher price. Figure 4 uses labor, as an example of a factor of production, to illustrate this result.

Figure 4: Labor -Market Equilibrium



For the case in which the government sets the domestic price of each factor, the chosen policy is represented by the factor-price vector that maximizes the government's objective function, which is the sum of the contributions it receives from organized factors and total welfare. Total welfare is simply the sum of each factor's total return—gross of lobby contributions—which is composed of factor income (price of the factor times the units of the factor employed) plus its share of the common surplus (profit from production plus the revenue generated by immigration policy, that is, total imports of factors multiplied by the domestic-world price differential).³⁸

The policy chosen offers protection (either positive or negative) by essentially imposing import/export subsidies/taxes. If the group lobbies, it gets an import tariff or an export subsidy on its foreign counterpart (if not, it gets the reverse: an import subsidy or export tax). If the factor lobbies, the magnitude of this protection is increasing in the domestic supply of the factor and decreasing in the share of lobbyists in the population. The more abundant or important the factor is, conditional on lobbying, the higher is the

³⁷ This is left general (inputs can be capital, labor of various skill types, etc.).

³⁸ Additionally, this policy is chosen in such a way to induce lobbies to offer truthful contribution schedules, that is the government chooses a policy such that it would not be optimal for lobbies to bid more than they can afford.

protection (otherwise the greater is the import subsidy). On the other hand, the more politically organized factors there are, the less influence each has on the outcome, yielding lower protection overall.

The authors next discuss the effects of substitutes and complements on lobbying efforts and policy outcomes. Whether two factors are complements or substitutes depends on the specification of the production function. If two factors are complements, an increase in imports of one factor causes the marginal product of the other factor to rise, which drives up its factor price. Therefore each politically organized factor will want to have more protection for itself but less protection for its complements. If two factors are substitutes, higher imports of one factor cause the marginal product of that factor, as well as its substitutes, to decline. Therefore each politically organized factor will prefer itself and its substitutes to be protected.³⁹

In the second part of the paper, the above analysis is repeated using quantity, instead of price, as the policy instrument. As before, each lobby presents its contribution contingent on the government's action, which is a set of quantities. The prices are now determined in equilibrium, given factor supply which is controlled directly by policy. However, unlike in the previous setting, where the government fully captures the revenue from factor trade, in this case there could only be partial capture, with the remaining factor trade revenue received by the imported factor.

Despite this difference, the authors show that the game in which the government sets quotas is strategically equivalent to the one in which it sets prices, if the government receives all of the factor trade surplus. This result follows from the fact that lobbying efforts depend on the outcome (factor's total return), regardless of whether the outcome results from price setting or from imposing quotas, since the government, in either setting, ultimately controls the use of the factors of production. The only difference between the two games is the government's choice of variable.

The quota game can be used directly to analyze the formation of immigration policy. In this case, the factors of production would be workers of different skill type, whose entry is regulated by the government. Furthermore, the partial capture received by the immigrants would reflect the well-established stylized fact that immigrants tend to have a lower wage than similarly skilled natives.

In conclusion, this paper shows how organized factors of production shape immigration policy by their lobbying efforts. Lobbies influence the government's policy, which affects the supply of factors as well as their total return.

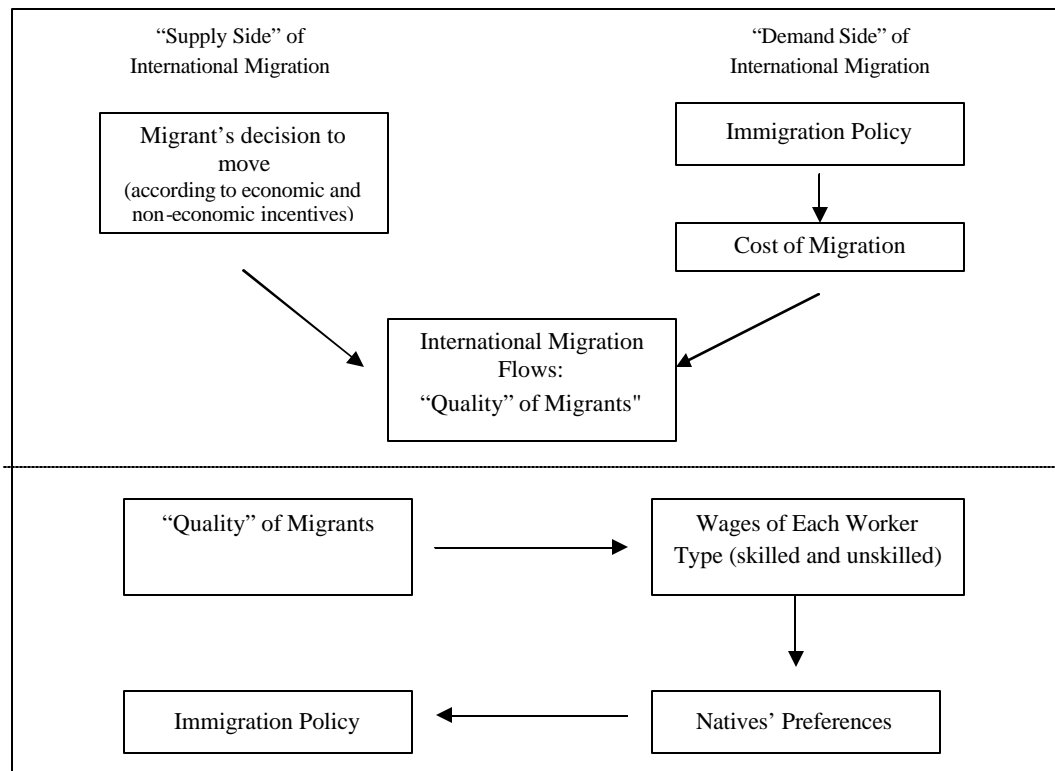
2.2.4 Immigration Policy and Self-Selecting Migrants, by Milo Bianchi (2005)

One of the main contributions of Bianchi's (2005) paper to the literature is to treat both immigrant quality and immigration policy as endogenous variables. The previous literature, instead, either treats the former or the latter variable as exogenous, or only

³⁹ Additionally, since the demand for a factor is more inelastic (elastic) if it has a complement (substitute), there will be a higher (lower) tariff for the factor than there would be without this cross effect.

focuses on immigration policy. For example, immigrant quality is assumed to be given in Scheve and Slaughter (2001), Mayda (2005a), and O'Rourke and Sinnott (2005), who analyze the economic drivers of individual attitudes towards immigrants (these papers are surveyed below in Section 2.4). As already pointed out, the literature on the determinants of the size and quality of immigrant flows has either ignored (Borjas 1987) or taken as exogenous (Mayda 2005b) the demand side of international migration, i.e., migration policy. Finally, the political-economy papers reviewed above (Benhabib 1996; Ortega 2005; Facchini and Willman 2005) only focus on endogenous migration policy, without considering migrants' decision to move. The paper by Bianchi (2005) combines these strands of the literature into a unified framework in which immigrant quality affects immigration policy (bottom part of Figure 5) and vice versa (top part of Figure 5), in a framework in which both supply and demand factors determine international migration flows.

Figure 5: Endogenous Quality of Migrants and Endogenous Migration Policy



In particular, the author jointly models the immigrant's decision to migrate and the formation of immigration policy in an economy composed of skilled and unskilled workers. Therefore, in this framework immigrant quality is defined as the skill composition of immigrants. On the one hand, when deciding to migrate, immigrants consider both the cost of immigration (*wealth-constraint channel*) as well as the

employment prospects in both origin and destination countries (*incentive channel*).⁴⁰ On the other hand, the cost of immigration, which is the government's immigration-policy tool, is a function of immigrants' skill composition, since the latter variable affects natives' utilities through its impact on wages. Therefore, both immigrant quality (who migrates) as well as the cost of migration are endogenous and related to each other. The resulting skill composition of immigrant flows depends on the wage differential between countries and the skill premium in each country, as well as on the destination country's immigration policy.

The details of the model follow below. The population is divided into high- and low-skilled workers, who are complements in the production of one good.⁴¹ Natives' views on immigration depend solely on the ratio of skilled to unskilled workers in the destination country's population, which affects wages. The government maximizes utility of both skilled and unskilled natives by choosing a cost that affects the size and quality of the immigrant flow. This cost is equal for skilled and unskilled migrants and is assumed to be less than the cross-country wage difference for both groups (in order to allow both types of immigration). In addition to this cost set by the government, immigrants face an individual specific cost (according to a specified distribution).⁴² Therefore, the supply of migrants of a particular skill category is determined by the fraction that can afford to move (*wealth-constraint channel*) times the fraction of those who want to move (*incentives channel*) times the source country's population of that skill type.

Building on the seminal paper written by Borjas (1987), the author finds that there is positive selection of immigrants if the wage premium (the difference between the wages of skilled and unskilled workers) is greater in the destination country than it is in the source country, since the wealth constraint affects quality in the same direction as the incentive channel does in this case (that is, it is less severe for the skilled than for the unskilled, which enables more high-skilled people to migrate). On the other hand, if this premium is smaller in the destination country, it is not clear who migrates, whether the skilled or the unskilled (since the incentive channel and the wealth-constraint channel work in opposite directions). This implies the second result: The quality of immigrants increases with cost if the wage premium is greater in the destination country than it is in the source country, otherwise the impact of cost on quality is ambiguous. The intuition for this result is that a higher cost makes the wealth constraint even more binding for unskilled immigrants; in addition the cost increase represents a higher fraction of an unskilled-immigrant's gain from migration if the wage premium is greater in the destination country than it is in the source country (i.e., skilled immigrants have more to gain from migration). Third, as average wealth in the origin country rises, the quality of immigrants declines. This follows directly from the fact that high-skilled immigrants are assumed to be wealthier, on average, than low-skilled immigrants. Therefore, if the

⁴⁰ The introduction in the model of the wealth constraint changes some of the traditional results in the literature.

⁴¹ This is the standard neoclassical production function (CRS, competitively inelastic labor market, etc.).

⁴² This individual specific distribution can be interpreted to represent individual specific tastes for immigration (for example, although the wage in the destination country may be high, I prefer to remain in my country; in this case, the individual specific cost of migration is too high).

wealth-constraint channel is binding, it is the low skilled who cannot afford to move. Finally, while an increase in source-country wealth inequality improves immigrants' quality, the opposite is true if wage inequality rises in the origin country. The latter effect is exactly as in Borjas (1987).

The second part of the paper focuses on the formation of policy. The model implies that the economic benefits of immigration are minimized when the post-immigration skill ratio equals the pre-immigration one. Intuitively, this says that if the skill composition of immigrants mirrors the skill mix of natives, wages are unaffected, and immigration provides no added value to wages. Holding immigration quality constant and focusing on the size effect of immigration, the destination country increases its welfare with more immigration of a contrasting skill composition to that of natives. The greater the difference between the skill composition of natives and that of immigrants, the greater is the welfare increase, a feature that resembles the "gains from trade" property. Therefore, the optimal policy would be to set the entry cost to zero (i.e., the optimal policy is an open-door policy). However, with endogenous quality, the model suggests that an open-door policy is optimal only when the ratio of skilled to unskilled workers (natives and immigrants) is increasing in the cost of immigration and the ratio of skilled to unskilled natives is higher than that of immigrants. This happens when migrants are positively self selected on account of either the dominance of the wealth effect and/or the skill premium being higher in the destination country than in the source country.

As the author points out, this model can be modified to capture the fact that a country with a high-skill premium might also have limited access to high-skill jobs, because of low levels of meritocracy (i.e., high-skilled workers get the high-skilled jobs with some probability smaller than one). Consequently, the destination country may not attract so many skilled workers. Similarly, the model can be modified to incorporate discrimination, reflected in the possibility that high-skilled immigrants do not get paid the same wages as high-skilled natives do.

To conclude, this paper is unique for two reasons: It incorporates both sides of immigration, the immigrant supply (through the decision to migrate) as well as the immigrant demand (through migration costs); and it considers the interaction between the wealth constraint channel and the incentive channel. The model (specifically the production function and the labor market) resembles the one in Benhabib (1996) and Ortega (2005) in that there are two inputs whose relative proportion drive wages of both groups. One important difference is the governments' objective function: In this paper the government takes into account the welfare of *both* high-skill and low-skill workers instead of only the group in the majority.

2.2.5 *Citizenship Laws and International Migration in Historical Perspective*, by Graziella Bertocchi and Chiara Strozzi (2005)

Bertocchi and Strozzi (2005) assess the formation, evolution, and impact on migration of citizenship policies in countries around the world during the nineteenth and twentieth centuries. Using a unique data set that the authors constructed on the citizenship policies of various countries, the paper shows that citizenship laws had a

negligible effect on immigration patterns during the late nineteenth century, the first phase of mass migration. However, reversing the direction of the empirical analysis, the authors find that half a century later, with matured political institutions and an established history of immigration, immigration flows seem to have affected the evolution of citizenship laws.

First, the authors discuss the history of citizenship policy for various countries. Next, the authors assess the impact of having a particular policy in 1870 on migration during 1870-1910, given that these policies mostly remained constant (and therefore econometrically exogenous) for these countries in this period. Finally, Bertocchi and Strozzi assess how migration flows, border stability, democracy, welfare burden, and colonial history affected the evolution of these policies during the post WWII period.

In particular, this paper focuses on laws associated with citizenship status by birth, abstracting from those regarding citizenship through marriage or naturalization. The world seems to be divided between nations that have either of two types of such citizenship laws: *jus soli* or *jus sanguinis*. Under *jus soli*, a child born in the country is a citizen of that country, despite having immigrant parents. Under *jus sanguinis*, a child inherits citizenship through parents regardless where he is born. *Jus soli* was dominant in Europe during the eighteenth century, but by the nineteenth century it was primarily replaced by *jus sanguinis*. By the twentieth century, during the post WWII period, when the vast majority of countries became independent and political systems matured, immigration and citizenship policies started to evolve.

The first exercise evaluates the effect of citizenship policies on migration flows during the age of mass migration (1870-1910) for 17 destination countries (12 OECD countries in Europe, plus Australia, Canada, the United States, Argentina, and Brazil). This period also marks the era of new political order in many European and North American countries, with new institutions and laws. Since none of the countries changed their citizenship laws during this time, they are assumed to be exogenous, potentially determining migration flows. However, the results indicate that, rather than citizenship laws, it is key economic variables that affected total migration inflows to a destination country during this period. The wage gap has a positive and significant effect on migration flows, while the agricultural share in national income (indicating the level of development) and the young adult share of the total population at the beginning of each decade have a significant and negative effect. These patterns are consistent with theoretical predictions, but the most striking result is that the type of citizenship law has an insignificant effect on immigration.

The authors next investigate the determinants of changes in citizenship laws after WWII. The evolution of these policies for different countries has been effected by the emergence of democracy (which brings about an inclusive attitude towards immigrants), border stability (a border change would favor a *jus sanguinis* policy in order to identify ethnic heritage), and the size of the welfare state (when spread across too thin a tax base, a generous welfare state may increase the importance of distinguishing between immigrants and natives, encouraging *jus sanguinis*), among other factors. Many former colonies have adopted the citizenship policies of their mother countries. The United

States has adhered to its *jus soli* policy since its inclusion in the U.S. constitution under the 14th amendment; Australia also inherited *jus soli* from the United Kingdom, but changed its law in 1986, requiring that children must have at least one Australian citizen or permanent resident parent to be citizens. Many other former UK colonies have abandoned *jus soli* and adopted *jus sanguinis* or a mix of the two (for example, double *jus soli*—whereby third-generation immigrants are automatically citizens). Even the United Kingdom has changed its citizenship laws. Originally, all subjects of the British Empire had equal access to British citizenship, but by 1948, six different forms of citizenship were created; then, in 1984, the British Nationality Act was enacted restricting the *jus soli* clause (a child born in the United Kingdom is a citizen if at least one parent is a citizen or resident). Most of Europe has a history of being *jus sanguinis*. France introduced *jus sanguinis* in 1804 but, in 1889, established double *jus soli*. Germany initially had *jus sanguinis*, but with border stability (reached after the fall of the Berlin wall) and the need to promote ethnic unification there was pressure to implement *jus soli* (a 1990 law introduced the requirement that one parent have lived in the country for at least eight years). Many European countries currently have a similar mixed policy. In Latin America, many countries chose *jus soli* upon independence as a way to protect the people born in their country. Mexico changed its law to *jus sanguinis* in 1997. Former USSR countries instituted *jus sanguinis* in order to reestablish links to their cultural roots. Many African countries remained *jus sanguinis*, even after independence, amidst political instability and border insecurity, as a way to control ethnic identity.

The following table (from the paper) illustrates the popularity of *jus sanguinis* and *jus soli* policies across the world after WWII.

Figure 6

	<u>1948</u>	<u>1974</u>	<u>2001</u>
<i>jus soli</i>	42% (US, Canada, Latin America, former British colonies in Africa and Asia), UK, Ireland.	31%	32% (US, Canada, New Zealand)
<i>jus sanguinis</i>	58%	62%	55% (of which 69% in Africa, 83% in Asia, 41% in Europe)
mixed	0%	6%	22%

The second exercise attempts to capture the impact of geopolitical and migration variables on such policy patterns. Data is collected on 159 countries for two periods: 1948-1974 (post war decolonization) and 1974-2001 (globalization of international migration flows). Countries are grouped by policy: least inclusive of immigrants (*jus sanguinis*), moderately inclusive of immigrants (mixed policy), most inclusive of immigrants (*jus soli*). The following are candidate variables that affect the law for a particular country during both time periods: whether the country was originally *jus soli* in 1948; country border changes; geopolitical position (whether a country was a former British colony, or located in either Latin America, sub-Saharan Africa, or Southern Europe, or whether it is a small oil or a socialist country); measure of democracy; cultural

characteristics (religion, ethno-linguistic factions, etc.); income per capita; and size of government/welfare state. Considering migration alone, migration has a negative impact on policy (i.e., the higher the migration, the less inclusive the policy is of immigrants—*jus sanguinis*). Considering geopolitical effects, originally having *jus soli* and being a Latin American country has a positive and significant effect on policy, while being a British colony has a significant negative effect. Border changes have an inconsistent effect, while government size is significant and positive (but is negative when limited to rich countries). Overall, net immigration consistently has a positive effect on the probability of a country being a *jus sanguinis* country and a negative one on the probability of a country having *jus soli*. Therefore, both legal tradition and migration explain the evolution of citizenship laws that are more inclusive of immigrants.

2.3 Historical Accounts of the Political Economy of Immigration Restrictions

The literature also offers historical accounts of the political economy of immigration policy—for example, Goldin 1994 and Timmer and Williamson 1996. Both papers are surveyed in more detail below.

2.3.1 The Political Economy of Immigration Restrictions in the United States: 1890-1921, by Claudia Goldin (1994)

Goldin (1994) summarizes and explains the changing patterns of immigration policy in the United States around the turn of the twentieth century. The author investigates the hypothesis that support for restrictive immigration policies in the 1890-1920 era was the result of declining low-skilled wages, particularly for laborers and artisans, and fluctuations in immigrant flows. The analysis finds that wage changes as well as the number of immigrants voting in each district are indeed reflected in voting patterns for one such immigration policy, the Literacy Act, debated in Congress during this time. The intent of this act was to screen the quality of new migrants by requiring them to take a test that would assess their ability to read and write in English. This act became an item for debate at the end of the 1800s, but was caught up in political deadlock until it was finally passed in 1917. With this general premise, the author first describes the political voting trends during this era. She notes that the popularity of the act in Congress was preceded by economic downturn. She then discusses related empirical studies that suggest that immigrants may reduce wages paid by the industry in which they are employed. Finally, using results from such studies and her own estimation, the author links this wage effect as well as the population density of immigrants in each district to attitudes about immigration reflected in Congressional voting patterns.

An influx of immigrants increases the demand for all goods and services, which puts an upward pressure on the demand for labor. But since immigrants are disproportionately distributed across industries, the upward pressure on the supply of labor is also disproportionate, having an industry-specific effect on wages. Therefore, it is important to consider both geographical location (city effect) as well as industry affiliation when considering wages. At the local level (industries that trade locally), immigrants were more represented in bakeries and less in printing, which requires more specific skills. At the national level (industries that trade nationwide), immigrants were more represented in the clothing sector and less in the foundries sector.

The first exercise assesses the impact of immigration on the (hourly) wages of native workers. The data, comprised of city level observations for two groups of workers (laborers and skilled workers) in two cities, suggest that immigrants were 1.4 times as likely to be employed in the manufacturing sector than natives, while new immigrants were 1.6 times as likely (particularly in clothing, mining, iron, and steel). The results indicate that in men's clothing manufacturing, the cities with substantial immigration experienced a significant drop in wages (over the ten year period 1899 to 1909). This pattern can also be seen in foundries (immigrants tended to work in the low-skill sector, however foundries had both skilled and unskilled workers). This implies that immigration affected the low-skilled sectors substantially, while high-skilled sectors had only a marginal depression of wages.

These wage fluctuations are empirically related to Congressional voting patterns, assuming that Congressmen accurately voice the sentiments of the people they represent. In general, both at the city and industry level, the paper finds that a decrease in the wage was associated with an increase in the proportion of votes to override an open-door policy in Congress (i.e., associated with a more restrictive stance). Furthermore, the greater the population, the more supportive the district was of an open-door policy, which may reflect immigrant votes in urban locales.

2.3.2 Racism, Xenophobia or Markets? The Political Economy of Immigration Policy Prior to the Thirties, by Ashley Timmer and Jeffrey Williamson (2004)

Timmer and Williamson (2004) explore the empirical determinants of community attitudes toward immigration, using a set of candidate variables from migration theory. The authors attempt to explain opinions about immigration during critical immigration episodes in five different countries between 1860 and 1930 by constructing an index based on this set of candidate variables. They find that people are, in general, interested in maintaining the skill composition of the population (the ratio of high-skilled to low-skilled workers).

In determining the candidate variables that influence attitudes toward immigration policy, the authors discuss several branches of the literature. The first distinguishes between two groups of people: capitalists/landowners and workers. The first group desires low wages, since this would raise rents and profits, while the latter prefers high wages. This suggests that business cycles, associated with fluctuations of these groups' relative power, affect policy. A second branch of the literature suggests that immigrants may cause inequality in the destination country (and less inequality in the source country), which may slow growth. Although it is unclear from the many empirical studies done in this area whether this is actually true, it might still have an impact on policy. Additionally, other papers argue that a free-trade policy and a free-immigration policy are expected to go hand in hand, since imposing restrictions on cheaper goods and services has the same economic effect as imposing restrictions on cheaper factors (such as labor). With these theories on immigration-policy formation in mind, the authors construct a "policy index" that can explain public opinion about immigration, composed of wages of unskilled workers, trends in inequality, the size or quality of immigration flows, and variables describing the state of the macroeconomy and ethnic/society concerns.

First, the estimation is done for the panel consisting of all five countries. Attitudes about policy are sensitive to labor market outcomes of unskilled workers, while they are not sensitive to the political environment (system). Wages and a measure for “threat” (impact of quantity and quality of immigrants on similar natives) have significant estimates (positive and negative, respectively). Macro effects (real wage growth, GDP, unemployment), as well as the percent of the population that is foreign born have no effect on attitudes. Relative income (unskilled wage/income per capita), which is a measure of the relative position of the unskilled in the economy, is a positive factor in determining policy, which reflects that the better paid the unskilled are, the happier they are about immigration.

These results are different when the five countries are considered individually. The restrictive immigration stance in Brazil of the 1920s is primarily attributed to rising inequality and the drop in real wages, as well as market forces. Canada is unique for having the variable “human capital of immigrants” significantly effect attitudes. More striking is that the index for Canada, during the “prairie boom” of 1899-1919, falls 6 points (due to rising inequality and to the threat variable). The threat variable was also significant in the United States, Australia, and Brazil. For the United States, the results are fairly consistent with Goldin (1993). In sum, economic variables (other than economic growth or unemployment) mattered the most.

2.4 Empirical Literature on the Determinants of Individual Preferences for Immigration

The empirical literature on immigration-policy preferences at the individual level includes a growing number of works focusing on the United States (for example, Citrin et al. 1997; Espenshade and Hempstead 1996; Kessler 2001; Scheve and Slaughter 2001) and on the United Kingdom (Dustmann and Preston 2000, 2001, 2004), as well as a few papers with a cross-country perspective (for example, Bauer et al. 2000; Brücker et al. 2001; Chiswick and Hatton 2003; Gang et al. 2002; Mayda 2005b; O'Rourke and Sinnott 2005).

The works focusing on the United States reach different conclusions. While Espenshade and Hempstead (1996) find mostly evidence in favor of non-economic explanations behind preference patterns, the results in Scheve and Slaughter (2001) and in Kessler (2001) draw attention to the importance of economic determinants. Finally, the results in Citrin et al. (1997) are presented as weak evidence for the role of personal economic circumstances.

Scheve and Slaughter (2001) analyze individual preferences on immigration policy in the United States using the 1992 National Election Studies survey. The focus of their work is on determinants of immigration preferences working through the labor market. Scheve and Slaughter (2001) closely relate the empirical analysis to the results of economic theoretical models. They test three main economic theories: the multi-cone Heckscher-Ohlin model, the factor-proportions-analysis model, and the area-analysis labor model. The main result of the paper is that less-skilled workers in the United States are significantly more likely to be anti-immigration. In addition, Scheve and Slaughter (2001) do not find any support for the hypothesis that the skill-preferences correlation is

more pronounced in high-immigration communities. Hence their results are consistent with a framework in which immigration affects the destination country by changing factors' prices in national (as opposed to only local) labor markets. Given that the United States receives immigrants who are on average less skilled than natives, their results are in line with the predictions of the multi-cone HO model (without factor-price-insensitivity) and of the factor-proportions-analysis model, but they are not consistent with the area-analysis model.

Mayda (2005a) uses the same methodological approach as in Scheve and Slaughter (2001)—individual-level data, empirical estimation following economic theoretical models—to estimate the economic and non-economic determinants of immigration attitudes, both within and across countries. The author finds robust evidence that economic determinants matter: Opinions about immigrants appear to be consistent with maximization of economic self-interest. This is true whether natives are hurt by immigrants in the labor market or, alternatively, whether they complement immigrants and their wages increase. In particular, in countries where immigrants are on average less skilled than natives, the higher an individual's level of skill, the higher the probability that he or she will be in favor of immigration. On the other hand, the data show the opposite pattern for countries where immigrants are as skilled or more skilled than natives (that is, a negative correlation between the level of individual skill and pro-immigration attitudes). These correlation patterns disappear for individuals out of the labor force. These results are completely consistent with a labor-market explanation of immigration attitudes. Non-economic determinants are also important. The probability that an individual is in favor of an increase in the number of immigrants is affected by the respondent's perception of the impact of immigration on crime rates and on the destination country's cultural openness. Political affiliation with right-wing parties as well as residence in more rural areas are associated with opposition to immigration. In addition, both national pride feelings and racist attitudes promote negative attitudes towards immigration. Finally, individual feelings towards political refugees and illegal immigration are important determinants of preferences as well. However, accounting for the impact of such non-economic factors, it is still true that economic determinants (in particular, labor-market ones) matter. In particular, the analyzed immigration attitudes are not consistent with a world in which only xenophobia explains immigration attitudes.

As in Mayda (2005a), Bauer et al. (2000) and Brücker et al. (2001) analyze immigration-policy preferences across countries. Bauer et al. (2000) present evidence on attitudes towards foreigners in twelve OECD countries. They first analyze the impact of different immigration policies on the composition and labor market assimilation of immigrants.⁴³ They next look at natives' sentiments towards immigrants and, in particular, at the impact of the specific type of immigration policy on these preferences.⁴⁴ In their

⁴³ In particular, Bauer et al. (2000) emphasize the cross-country differences in the proportions of non-economic immigrants (for example, asylum-seekers and political refugees) relative to economic immigrants. This variation is related to the type of immigration policy carried out by each government.

⁴⁴ However, as emphasized by the same authors, the direction of causality is not clear: "Although the direction of causality is hard to disentangle, i.e. if immigrant tolerance leads to an open policy or if an open policy leads to tolerance, it is informative to see if there is a relationship between immigration policy and sentiments" (Bauer 2000, 17).

work Bauer et al. (2000) use one of the two data sets employed in Mayda (2005a), the ISSP-NI data set, but they only focus on a subset of countries. Finally, Brücker et al. (2001)'s work, which contains a survey of the empirical literature on immigration preferences in Europe, focuses on the three following determinants of attitudes: racism, macroeconomic labor-market effects, and welfare benefit concerns.

A paper which is very closely related to this literature is Mayda and Rodrik (2005), which analyzes individual preferences on *trade policy* using the same data sources as in Mayda (2005a). O'Rourke and Sinnott (2001) also analyze individual-level attitudes towards free trade, using the first of the two data sets (the ISSP-NI data set).

Finally Mayda (2005c) carries out a comparative analysis of attitudes towards immigrants and preferences towards trade in goods and services. The main result of this paper is that individuals in the sample of countries analyzed tend to be, on average, more pro-trade than pro-immigration. Competition of foreign labor—implied by either trade or immigration—is a common driver of both sets of attitudes. One important difference is, instead, the individual's sector of employment: Respondents working in the non-traded sector tend to be more pro-trade while the sector of employment (whether traded or not) does not make a difference in terms of immigration attitudes.

3. AN EMPIRICAL MODEL OF THE DETERMINANTS OF MIGRATION POLICY

Based on the discussion of the previous literature, it is possible to design a research project that empirically tests the role of each determinant of immigration-policy outcomes and, more generally, the relative importance of factors on the supply and demand side of the international-migration model. Information on such variables, and in particular on data sources, is included in the Appendix at the end of the paper.

In light of the final goal of the CSIS project—a "driver-based" projection model—it is useful to restrict the attention to those drivers that are likely to explain most of the variation in immigration policy. We think that these variables are the "human-capital gap" between natives and immigrants (that is, the ratio between the average skill composition of natives and the average skill composition of immigrants) and interest-group politics.

The human-capital gap determines how immigration affects the relative supply of skilled to unskilled labor in the destination country and, therefore, incomes of individuals in the host economy. Each individual will vote on migration policy according to these economic effects of migration. If voting occurs according to majority rule, the human-capital gap information needs to be combined with information about the skill level of the median voter. So, for example, if in a given year the median voter is skilled and the human-capital gap between natives and migrants is high, migration policy will be open (because the skilled median voter favors migration characterized by a high human-capital gap).

For the United States, the human-capital gap can be measured using a few sources (for example, the U.S. Census and the U.S. Current Population Survey—see the

Appendix). For other destination countries, in particular OECD countries, it is possible to obtain data on skill composition of natives and immigrants from the International Migration Statistics dataset for OECD countries (again, see the Appendix). It is harder to measure the skill level of the median voter across countries. However, for the United States, detailed micro-level data from the U.S. Census or U.S. Current Population Survey make it possible to construct this type of measure.

Finally, one way to measure the effect of interest groups is to use data on union membership rates (from the U.S. Current Population Survey or from the U.S. Department of Labor), since unions have been vocal in lobbying the U.S. government on the topic of migration policy. More general information can be used to proxy the pressure of interest groups, such as data on political-action-committee (PAC) campaign contributions, which are available from the Federal Election Commission.

4. CONCLUSIONS

As this paper has discussed, a number of economic, social, political, and cultural variables affect immigration policy through any of the four channels represented in Figure 2 (individual preferences about immigration policy, interest groups, policymakers' preferences, and the institutional structure of government). It is difficult to rigorously assess the relative importance of each variable—this should be the goal of future empirical analysis—but it is possible to give a preliminary judgment on what such a research project might find.

First of all, out of all the drivers of migration policy identified by the previous literature, two in particular stand out: voters' preferences, which are affected by the "human-capital gap" between natives and immigrants; and interest-groups politics.

Let's first discuss the influence of public opinion and of all those factors that affect public opinion. In particular, can we explain migration policies based on voters' attitudes? The answer is yes, but only in part. The very low fractions of individuals in favor of immigration in advanced countries—as documented in Mayda (2005a)—are consistent with restrictive policies actually in place (and with the relatively small scale of international immigration).⁴⁵ Mayda (2005a) finds that individuals are, on average, very opposed to immigration in more than twenty high-income and middle-income countries. Based on the National Identity Module of the International Survey Programme (ISSP 1995), only 7.4 percent of respondents who gave an opinion about immigrants were, on average, in favor of increasing the number of immigrants in 1995. In the United States, for example, only 8.1 percent of the sample interviewed—which is chosen to be representative of the whole population—is in favor of an increase in the number of immigrants (by a lot or a little). However, given the extent of opposition to immigration revealed by such attitudes, it is a puzzle that migration flows take place at all. A median-

⁴⁵ As pointed out in the introduction, the small scale of international migration provides evidence for the constraining role of immigration policy. since, if international migration was only determined by supply factors, we would expect much higher flows.

voter model based on these values would probably predict close to zero flows.⁴⁶ One very likely explanation of this puzzle—the discrepancy between opinions and the actual size of migration flows—is that domestic interest groups play a dominant role in shaping migration-policy decisions (Facchini and Willman 2005).

Such an interpretation of the empirical evidence is consistent with similar observations in the political-science literature. Both Freeman (1995) and Joppke (1998) focus on the reasons behind the gap in liberal democracies between, on one side, restrictionist public opinion and stated policy goals and, on the other, expansionist volumes of immigration. In CSIS (2005), Thomas Espenshade discusses the dichotomy in U.S. immigration history between a restrictionist American public and policies enacted by Congress. In analyzing the extent of unwanted immigration, Joppke (1998) emphasizes the responsibility of interest group politics in the United States and the role of perceived moral obligation towards families of immigrants in European countries. In his paper, Freeman (1995) points out that, beyond differences due to dissimilar historical experiences (for example, the timing of the first considerable immigration intake), the main OECD receiving countries share a common pattern of immigration policy and politics. In general, they are characterized by an expansionary immigration bias, due to the combination of unorganized restrictionist public opinion and organized pro-immigration interest groups. (In addition, the poor management of postwar immigration policy by Western European governments had the consequence of making temporary labor programs sources of permanent immigration). In CSIS (2005), Espenshade offers a similar interpretation of the dichotomy between attitudes and policy in practice.

To conclude, this paper has pointed out many different channels through which immigration policy is formed. However, two in particular are likely to play a special role—voters' preferences (which are affected by the "human-capital gap" between natives and immigrants) and interest-group politics—and should be the focus of future quantitative research.

⁴⁶ In CSIS (2005), an alternative view is offered by Jeffrey Williamson, according to whom the reason for non-negligible migration flows to the United States is that immigrants do not compete with the U.S. median voter. While this may be true from a labor-market competition point of view—given that immigrants to the United States are on average less skilled than U.S. native workers—the data in Mayda (2005) show that the U.S. median voter is still very much against immigration, probably for welfare-state and non-economic reasons.

APPENDIX

Population Variables	Sources	Paper(s) Focusing on this Variable
Immigration	United States Citizenship and Immigration Services (USCIS) http://uscis.gov US Census: 1980, 1990, 2000 http://www.census.gov/ , http://www.ipums.umn.edu/ US Current Population Survey (CPS): annual data for 1994-2004 http://www.bls.census.gov/cps/cpsmain.htm International Migration Statistics (IMS) dataset for OECD countries	Timmer and Williamson (1996) Mayda (2005) Clark, Hatton, and Williamson (2002)
US Immigration Policy History	United States Citizenship and Immigration Services (USCIS) Immigration and Naturalization Legislation (1790-1996): http://uscis.gov/graphics/shared/aboutus/statistics/legishist/index.htm http://uscis.gov/graphics/cong106.htm (1999-2000) http://uscis.gov/graphics/cong107.htm (2001-2002) http://uscis.gov/graphics/cong108.htm (2003-2004)	Ortega (2005)
Population	US Census: 1980, 1990, 2000 http://www.census.gov/population/www/censusdata/hiscendata.html World Bank World Development Indicators (WDI) http://www.worldbank.org/data/wdi2005/	Clark, Hatton, and Williamson (2002) Mayda (2005)
Capital Variables	Sources	Paper(s) Focusing on this Variable
Capital Per Worker (destination and origin)	Penn World Tables: non residential capital stock per worker http://pwt.econ.upenn.edu/ Nehru-Dhareshwar data on capital perpopulation aged 15- 64. Easterly- Levine data on capital per worker.	Mayda (2005)
Capital-Labor Ratio of the Median Voter	Derived from data on changes in income inequality (see below)	Benhabib (1996) Dutt & Mitra (2002)

Political Economy Variables	Sources	Paper(s) Focusing on this Variable
Organized Factors of Production (share of factors that lobby)	Unionized workers: US Current Population Survey (CPS): annual data for 1994-2004 http://www.bls.census.gov/cps/cpsmain.htm US Department of Labor Political Action Committee (PAC) campaign contributions: Federal Election Commission	Facchini and Willmann (2005)
Voting Data	Congressional Record: 1994-2005 http://www.gpoaccess.gov/crecord/	Goldin (1993)
Political Structures and Regime Changes	Inter-university consortium for political and social research dataset # 9263 (ICPSR; Ann Arbor, 1990)	Timmer and Williamson (1996)
Wages & Employment Variables	Sources	Paper(s) Focusing on this Variable
High-Skilled and low-Skilled Workers	US Bureau of Labor Statistics Current Employment Statistics http://www.bls.gov/ces/home.htm International IPUMS http://www.ipums.umn.edu/	Bianchi (2005), Timmer and Williamson (1996)
Occupation and Union Status ("Union" research)	Non union: US Commissioner of Labor, Department of Commerce and Labor Union: (examples not found)	Goldin (1993)

Education Variables	Sources	Paper(s) Focusing on this Variable
Skill Composition of the Population (distinguishing between natives and immigrants)	US Census: 1980, 1990, 2000 http://www.census.gov/ , http://www.ipums.umn.edu/ US Current Population Survey (CPS): annual data for 1994-2004 http://www.bls.census.gov/cps/cpsmain.htm International IPUMS http://www.ipums.umn.edu/	Benhabib (1996)
Skill Composition of the Population (years of schooling)	Barro and Lee: International Data on Educational Attainment (dataset): http://www.cid.harvard.edu/ciddata/ciddata.html	Mayda (2005)
Skill Composition of Natives and Immigrants to OECD Countries	International Migration Statistics (IMS) dataset for OECD countries	Mayda (2005)
Macro Variables	Sources	Paper(s) Focusing on this Variable
Share of Young Population (origin)	United Nations: http://esa.un.org/unpp/index.asp?panel=2	Mayda (2005)
Income Inequality Data (absolute and relative)	World Bank World Development Indicators (WDI) http://www.worldbank.org/data/wdi2005/ Gini coefficient from Deininger and Squire dataset http://www.worldbank.org/research/growth/dddeisqu.htm	Bianchi (2005), Mayda (2005)
Per Worker GDP (destination and origin), PPP adjusted	Penn World Tables: http://pwt.econ.upenn.edu/	Mayda (2005)
Unemployment Rate (origin)	World Development Indicators	Mayda (2005)
Other Variables	Sources	Paper(s) Focusing on this Variable
Distance, Land Border, Common Language, Colony	Glick and Rose (2002) dataset	Mayda (2005)

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INEQUALITY AND MIGRATION: A BEHAVIORAL LINK

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ABSTRACT

We provide an analytical-behavioral explanation for the observed positive relationship between income inequality, as measured by the Gini coefficient, and the incentive to migrate. We show that a higher total relative deprivation of a population leads to a stronger incentive to engage in migration for a given level of a population's income; that total relative deprivation is positively related to the Gini coefficient; and that, consequently, the Gini coefficient and migration are positively correlated, holding the population's income constant.

1. Prelude

“A house may be large or small; as long as the surrounding houses are equally small, it satisfies all social demands for a dwelling. But if a palace arises beside the little house, the house shrinks into a hut.” Karl Marx. 1849. *Wage Labour and Capital*. Chapter 6. Quoted from the edition: New York: International Publishers, 1933, p. 30.

2. Motivation and a Stylized Fact

There are not many topics that have so attracted the attention and consumed the passion of economists as inequality (of incomes) and its interactions with other variables of interest. It is somewhat surprising then that the relationship between migration and inequality at origin or at destination has not been studied intensively. Certainly, key issues such as how the repercussions of migration, especially migrants' remittances, impinge on the inequality in the distribution of income by size at origin, or how the degree of income inequality at destination renders a destination differentially attractive to workers of different skill levels, were studied closely some time ago, both theoretically and empirically. (Several chapters in Stark (1993) address the first of these topics; Borjas (1987) studies the second.) Yet evidence as to whether, *ceteris paribus*, a higher degree of income inequality promotes or hinders migration is not easy to come by, and no analytical-behavioral foundation is at present available that could lead us to expect the evidence to unveil one type of a relationship or another.

A recent data set and a new study that builds on the data set contribute significantly to our sparse knowledge. The 1995 International Social Survey Programme (ISSP) conducted a survey of approximately 28,000 individuals in 23 countries that included the question “Would you be willing to move to another country to improve your work or living conditions?” Liebig and Sousa-Poza (2004) ingeniously related the responses to this question to a battery of country variables including income inequality, as measured by the standard Gini coefficient. An important finding of Liebig and Sousa-Poza's analysis is that “controlling for GNP per capita ..., the Gini coefficient always has a positive and highly significant impact [on the propensity to migrate]. A higher income inequality thus leads *ceteris paribus* to higher incentives to migrate” (Liebig and Sousa-Poza, 137). Why such a relationship? Why, *ceteris paribus*, would there be more migration from an economy where the incomes are 1 and 3 than from an economy where the incomes are 2 and 2? The notion that the incentive to migrate of the individuals whose incomes rise from 2 to 3 is attenuated by less than the incentive to migrate of the individuals whose incomes decline from 2 to 1 is amplified is a description, not an analytical-behavioral explanation. The purpose of this paper is to propose such an explanation.

3. An Explanation

In a series of articles, we have argued that relative deprivation impinges positively on the propensity to migrate. Briefly summarized, the argument is that individuals care about their relative position, and that a change in group affiliation is a response to a low relative position in a group (or in a population). Of course, this is not the only feasible response. Given the group of individuals with whom comparisons are made, discontent

that arises from having an income that is lower than the income of other members of the group could induce harder work without exiting the group (Stark 1990). Yet it could also induce a departure for work elsewhere where incomes are higher without changing the set of individuals with whom comparisons are made, or it could prompt severing of the ties with the offensive set, leaving it in order to associate with another set even if incomes are held constant. These latter two responses—holding the reference group constant with migration conferring a gain in income and thereby reducing relative deprivation, or holding incomes constant with migration conferring a lowering-of-relative-deprivation gain through a substitution of reference groups—have been modeled theoretically and tested empirically (Stark 1993; Stark and Wang 2000, 2005).

A measure of relative deprivation developed in our earlier work, indeed a definition of relative deprivation, is the proportion of those in the individual's group whose incomes are higher than the individual's times their mean excess income. It can be shown⁴⁷ that the relative deprivation of an individual whose income is w , is

$$RD(w) \equiv [1 - F(w)]E(x - w | x > w) = \int_w^{\infty} [1 - F(x)]dx,$$

where $F(x)$ is the cumulative distribution of income in the reference group of the individual whose income is w . Given that the propensity to migrate by an individual whose relative deprivation is high is stronger than the propensity to migrate by an individual whose relative deprivation is low, we would naturally anticipate that a group (a population) exhibiting a high aggregate level of relative deprivation will be more inclined to engage in migration (more likely to produce migrants) than a group (a population) exhibiting a low aggregate level of relative deprivation. It is possible to sum up the individual relative deprivations in order to obtain a measure of the population-wide level of relative deprivation, TRD . And it is further possible to show that this measure is *positively* related to the Gini coefficient of inequality of the distribution of income, G .⁴⁸ Specifically, it is shown in Appendix 2 that

$$G = \frac{TRD}{\sum_{i=1}^n w_i}$$

where w_i is the level of income of individual i , $i=1, \dots, n$.

In the example of two individuals whose incomes are (2,2), $TRD=G=0$, whereas if the incomes of the two individuals are (1,3), $TRD=1$ and $G = \frac{1}{4}$. When incomes are (1, 3), the individual whose income is 1 rather than 2 is relatively deprived while previously he or she was not, the individual whose income is 3 rather than 2 was not, and is not, relatively deprived, and the group as a whole exhibits more relative deprivation, a higher Gini coefficient, and, we expect, a stronger inclination to migrate.

⁴⁷ The proof is in Appendix 1.

⁴⁸ The proof is in Appendix 2.

Our finding is further exemplified upon considering a setting of three individuals wherein the total level of income of the group is constant. Let there be the following three configurations of income:

$$P_1 = (1/10, 45/100, 45/100);$$

$$P_2 = (1/10, 4/10, 5/10);$$

$$P_3 = (1/10, 3/10, 6/10).$$

Since $\sum_{i=1}^3 w_i = 1 \quad \forall P_i$, we have that $G=TRD=7/30$ for P_1 ; $G=TRD=8/30$ for P_2 ; and $G=TRD=10/30$ for P_3 . In all three configurations, the individual with income $1/10$ is equally relatively deprived and hence will have the same propensity to migrate. But the Gini coefficient is not equal across all configurations. As constructed, there is a higher Gini coefficient in P_3 than in P_2 and, indeed, a higher relative deprivation for the second individual in P_3 than in P_2 —hence a stronger inclination by him or her to migrate. Thus, we infer that a higher Gini coefficient is associated with a stronger inclination to migrate in order to reduce relative deprivation for the group as a whole, even though the higher TRD does not arise from a higher relative deprivation for all the individuals concerned. Since a higher TRD reflects a stronger incentive to engage in migration for a given level of a population's income, it follows that the Gini coefficient and migration will be positively correlated, holding the population's income constant.

4. A Testable Prediction

Controlling for per capita income, countries, regions, or villages that are characterized by a higher level of total relative deprivation—hence a higher Gini coefficient—are more likely to produce migration. Or, controlling for per capita income, the extent of migration from a country, a region, or a village rises in the magnitude of the country's, the region's, or the village's Gini coefficient. (Villages come readily to mind in the context of migration from the rural areas of developing countries, whether internally, say to a city, or across the border.)

5. Alternative Explanations and an Empirically Verifiable Distinction

The argument of this paper differs in its perspective and prediction from an argument that conditions the negative selectivity of migration on a comparison between the degree of income inequality at origin and the degree of income inequality at destination (cf. Borjas 1987). The present argument is that as a consequence of the prevalence of relative deprivation at origin, migration will be negatively selected, *independently* of the said comparison. Specifically, Borjas argues that if “the [destination country] has a more unequal income distribution than the home country” “[a] positive selection [will] take place” (551-552). The implication of the argument advanced in this paper, however, is that negative selection, prompted by relative deprivation at origin, will not be reversed upon the incorporation of such a ranking of the income distributions. Similarly, while Borjas maintains that “If the income distribution in the sending country is more unequal than that of the [destination country] ... emigrants will be chosen from the lower tail of the income distribution in the country of origin” (552, first emphasis

added), this paper advances the view that the negative selectivity arises from the inequality of the income distribution at origin *per se*, not from the inequality of the income distribution at origin being higher or lower than the inequality of the income distribution at destination.

An implication of the argument of this paper is that an observed negative selectivity will become more pronounced upon the income distribution at origin becoming more unequal *given* the destination country's income distribution. Or equivalently, that the income distribution at destination becoming more equal while the origin income distribution remaining as unequal as before will not dampen the relative deprivation inducement to migrate of low-income members of the origin population.

To illustrate, let the income distributions at origin and destination be $(1-e, 4+e)$, $e > 0$, $e \rightarrow 0$, and $(2, 8)$, respectively. Incomes at origin are more unequally distributed than incomes at destination (assuming that the degree of income inequality is measured by the Gini coefficient). The relative deprivation theory postulates an incentive to migrate for the individual whose income is $1-e$. Suppose that the incomes at origin are redistributed such that the new income distribution is $(1, 4)$. There is no difference now in the degrees of income inequality across the two distributions. The "conditional selectivity" theory is silent with regard to the sign of the selectivity; the relative deprivation approach is not: while in the wake of the substitution of a more equal income distribution for a less equal income distribution at origin the relative deprivation incentive of the low-income individual to migrate is weakened, migration will continue to be from the lower tail of the distribution (in spite of the income distribution at origin not being more unequal than the income distribution at destination).

Thus, there is an empirically verifiable distinction between the relative deprivation approach and the "conditional selectivity" theory.

6. The Underlying Research

The idea that externalities impinge *asymmetrically* on individuals' well-being and behavior has been with us for many years. Early proponents of this idea were of the opinion that the well-being of individuals rose in what they had and declined in what more prosperous people had. References of pioneering works that come readily to mind are Duesenberry (1949), who argued that individuals look up but not down when making comparisons; Stouffer et al. (1949), who, in spite of studying a quite different behavior, independently argued likewise; and Davis (1966), who observed that in choosing higher performance career fields, which generally require graduate training, students in colleges and universities in the United States were heavily influenced by their subjectively assessed relative standing in their college or university rather than by the subjective quality of the institution, and that they adjusted their career choices in a manner corresponding to their subjective (relative) standing in their college or university, tilting towards low performance fields as their relative standing declined.⁴⁹ (As social

⁴⁹ Notably, students judged themselves by their "local standing" in their own college or university (that is, standing within their reference group) rather than across colleges or universities (that is, across reference groups). This self-assessment and the resulting response implied that being a "big frog in a small pond" or a "small frog in a big pond" mattered even when the absolute size of the "frog" did not change.

psychologists, Stouffer et al. and Davis have carefully searched for the relevant set of individuals with whom comparisons are made—the reference group.) A recent manifestation of the asymmetric externalities idea takes the diametrically opposite view that while the utility of an individual rises in his own consumption, it declines in the consumption of any of his neighbors if that consumption falls below some minimal level; individuals are adversely affected by the material well-being of others in their reference group when this well-being is sufficiently lower than theirs (Andolfatto 2002). Our impression though is that in the course of the past five decades, the bulk of the theoretical work has held the view that individuals look up and not down, and that the evidence has overwhelmingly supported the “upward comparison” view.⁵⁰ (Helpful references are provided and reviewed in Frey and Stutzer (2002), in Walker and Smith (2002), and in Luttmer (2004)). The argument of this paper draws on this perspective.

Davis concluded that when parents who aspire for their son to opt for a higher-performance career field send their son to a “fine” college or university, “a big pond,” they face a risk of him ending up assessing himself as a “small frog,” thereby ending up not choosing a desirable career path.

⁵⁰ For example, it has been argued that given the set of individuals with whom comparisons are made, an unfavorable comparison could induce harder work. This idea is captured and developed in the literature on performance incentives in career games and other contests. (Early studies include Lazear and Rosen (1981), Rosen (1986), and Stark (1990).) Loewenstein, Thompson, and Bazerman (1989) provide evidence that individuals strongly dislike being in an income distribution in which “comparison persons” earn more. Clark and Oswald (1996) present evidence that “comparison incomes” have a significant negative impact on overall job satisfaction.

APPENDIX 1

We provide a proof that relative deprivation, RD , can be written either as

$$\int_w^{\infty} [1 - F(x)] dx \text{ or as } [1 - F(w)] \cdot E(x - w | x > w).$$

From integration by parts we obtain that

$$\int_w^{\infty} [1 - F(x)] dx = [1 - F(x)]x \Big|_w^{\infty} + \int_w^{\infty} xf(x) dx.$$

Since, as shown below, $\lim_{x \rightarrow \infty} [1 - F(x)]x = 0$ and since $f(x | x > w) = \frac{1}{1 - F(w)} f(x)$, it follows that

$$\begin{aligned} \int_w^{\infty} [1 - F(x)] dx &= -[1 - F(w)]w + [1 - F(w)] \int_w^{\infty} xf(x | x > w) dx \\ &= [1 - F(w)] \cdot [E(x | x > w) - w] \\ &= [1 - F(w)] \cdot E(x - w | x > w). \end{aligned}$$

In order to show that $\lim_{x \rightarrow \infty} [1 - F(x)]x = 0$, we note that

$$1 - F(x) = P(X \geq x) \leq P(|X| \geq x) \leq \frac{VarX}{x^2},$$

where the last inequality is Chebyshev's inequality. Upon multiplying the end sides by x and taking limits we obtain that for a finite variance:

$$0 \leq \lim_{x \rightarrow \infty} x[1 - F(x)] \leq \lim_{x \rightarrow \infty} \frac{VarX}{x} = 0. \quad \square$$

APPENDIX 2

We provide a proof that the aggregate, population-wide relative deprivation, TRD , is equal to the population's income times the Gini coefficient of inequality of the distribution of income. We refer to the discrete case.

Let the levels of income of the n individuals who constitute the population be ordered:

$$W = \{w_1 \leq w_2 \leq \dots \leq w_n\}.$$

Define the relative deprivation of an individual whose income level is w_i , $i = 1, 2, \dots, n-1$ as

$$RD(w_i) = \frac{1}{n} \sum_{j=i+1}^n (w_j - w_i)$$

where it is understood that $RD(w_n) = 0$.

Therefore, the aggregate relative deprivation is

$$TRD = \frac{1}{n} \sum_{i=1}^{n-1} \sum_{j=i+1}^n (w_j - w_i).$$

The Gini coefficient is defined as

$$G = \frac{\frac{1}{2n^2} \sum_{i=1}^n \sum_{j=1}^n |w_i - w_j|}{\bar{w}}$$

where $\bar{w} = \frac{1}{n} \sum_{i=1}^n w_i$.

Since

$$\sum_{i=1}^n \sum_{j=1}^n |w_i - w_j| = 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^n (w_j - w_i),$$

it follows that

$$\begin{aligned} \bar{w}G &= \frac{1}{2n^2} 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^n (w_j - w_i) \\ &= \frac{1}{n^2} \sum_{i=1}^{n-1} \sum_{j=i+1}^n (w_j - w_i), \end{aligned}$$

or that

$$\left(\sum_{i=1}^n w_i \right) G = \frac{1}{n} \sum_{i=1}^{n-1} \sum_{j=i+1}^n (w_j - w_i) = TRD. \quad \square$$

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