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Educational Attainment of Immigrants to the US 1988-1998

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Abstract

We investigate the impact of home country institutions on the skill level of immigrants to the United States over 1988-1998. Specifically, we explore the hypothesis that institutions are multidimensional and that the different dimensions have conflicting impacts on the migration of skilled labor. Using an exploratory factor analysis on fifteen institutional variables, we identify the following dimensions of institutional character: credibility; transparency; democracy; and the security of civil society. We find that credibility and transparency increase the magnitude of brain drain; security reduces it; and democracy has no significant impact.

Keywords: *Immigration, institutions, political instability, brain drain*

JEL Codes: F22, J24, J61, J64

1. Introduction

The migration of tertiary skilled labor or *brain drain* has come to be a central theme in the ongoing debate on globalization, and the last decade and a half has seen the emergence of a significant literature on the causes and consequences of the phenomenon, especially the latter. This paper investigates the impact of political institutions in the countries of origin on the skill levels of legal immigrants to the United States over the period 1988 to 1998. We emphasize the multidimensionality of political institutions and provide evidence that the various aspects of institutional structure have differing impacts on the migration of skilled labor from a country. Thus, the credibility and transparency of governance both increase the magnitude of brain drain; political stability reduces it; and democracy has no significant impact.

This paper bears on three distinct areas of inquiry. First, in looking at institutional determinants of skilled migration, it contributes to the literature that investigates the causes and consequences of brain drain. Given that the magnitude of brain drain has serious consequences for economies affected by the phenomenon, it also contributes to the more general literature that investigates the influence of institutions in determining the economic prospects of a nation. Lastly, it contributes to the literature that looks at the impact of sociopolitical instability on economic performance.

The onset of globalization has seen a rejuvenation of interest in the causes and consequences of brain drain (Commander *et al.* [2004]). Key determinants of the magnitude of the brain drain include the factors proposed in the more general literature on the selection of immigrants; namely, the wage differential between the source and the destination countries; poverty, inequality, and demographic structure in the source country; and dimensions of cultural similarity and geographical proximity between the source and the destination countries (Borjas [1994], Hatton and Williamson [2005]). To this list, this paper adds the institutional structure in

the country or origin, with the cautionary note that the different dimensions of institutional character differ in their impacts on the incentive to migrate.

There is a lack of consensus regarding the consequences of brain drain. Early studies argue that brain drain is detrimental for the economic development of a nation affected by it (Bhagwati and Rodriguez [1975], for example).¹ However, an emerging literature contends that brain drain is typically accompanied by a *brain gain* for the country of origin for several reasons. First, migration prospects raise the expected returns to investing in human capital in the country of origin (Beine *et al.* [2008a]). Further, highly skilled immigrant networks facilitate foreign direct investment (FDI) (Kugler and Rapoport [2007]) and the diffusion of technology to the countries of origin (Lodigiani [2008]). In addition, skilled diasporas contribute towards the adoption of institutional reforms in the home country (Li and McHale [2006]).² This paper contributes to the debate by pointing out the need for a more nuanced assessment of the consequences of brain drain: The magnitude of brain drain and, hence, its impact on the source country depends critically on the institutional structure in the source country; and different aspects of institutional structure have differing impacts on the migration of skilled labor.

A contribution closely related to our own is Beine *et al.* (2008b), who find that the adverse consequences of brain drain are particularly acute for small states. Interestingly, however, they find no robust relationship between political instability in the source country and the extent of skilled migration, even though it does impact the total migration rate. Our results,

¹See Fan and Stark (2007b) and Docquier and Rapoport (2007) for contemporary articulations of this position.

² Fan and Stark (2007a) attempts to synthesize the conflicting positions. While brain drain may indeed be detrimental in the short run, it may yield long term benefits if accompanied by a relaxation of migration policy.

based on a wider sample of countries; a longer sample period; explicit panel data analysis; and a finer conception of institutional structure, appear to indicate the reverse.³

The literature on institutional determinants of economic development comprises a distinct field of study and it is beyond the scope of this paper to attempt any review of the existing state of research. Referring the reader to a survey such as Lin and Nugent (1995) for an idea of the classic contributions, we provide a brief idea of the literature that investigates the consequences of political instability on economic outcomes, particularly economic growth.

A major impetus for the study of the economic consequences of institutional quality and political instability has been provided by studies that investigated the *growth tragedy* of Africa (Easterly and Levine [1997]) and the *growth collapse* of economies in South America or the Middle East from the seventies (Rodrik [1999]); and attributes these phenomena to social conflict engendered along one or more faultline in society. From this, a more general literature has emerged that investigates the effect of inequality on economic growth via its role in fostering conflict. Benabou (1996) identifies two types of studies in this area: The first constructs *indices of sociopolitical instability* using data on social unrest (Alesina and Perotti [1996], Perotti [1996], Sala-i-Martin [1997]); while the second uses *indices of insecure property rights* (Knack and Keefer [2002]). A contribution of our study is to point out that the two types of indicators used in the previous literature may in fact have differing impacts on certain economic outcomes; in our case, the migration of skilled labor.

Given the correlation between available institutional variables, most existing studies on the institutional determinants of economic outcomes either include the variables separately in regressions (Easterly and Levine [1997]) or construct unidimensional indices of institutional

³ Beine, *et al* (2008) focus on emigration rates for the years 1990 and 2000 in a sample of 46 developing countries with a population of less than 1.5 million. Their study is based on the Worldwide Governance Indicators (WGI) of Kaufman, *et al.* (2003). Unfortunately, these indicators are not available for the period we are interested in.

structure from the available indicators (Alesina and Perotti [1996], Perotti [1996]). The first method is limited by the fact that the estimates may fail to capture the full impact of an institutional variable due to omitted variable bias, whereas the second ignores the argument that institutions may have multiple dimensions. Highlighting this, recent study by Langbein and Knack (2010) undertakes a confirmatory factor analysis for the Worldwide Governance Indicators (WGI) to determine if these six measures are causally related to single latent variable good governance and are unable to confirm this hypothesis. Notably, Ghate, *et al.* (2003) and Jong-A-Pin (2009) explicitly account for the multidimensionality of political instability and document differing impacts of the various dimensions on the rate of growth. While methodologically similar to Jong-A-Pin (2009), our study embraces a more general idea of institutional structure, of which stability is one aspect.

Combining these areas of the literature, we investigate the separate impacts of institutional quality and institutional stability on the magnitude of the brain drain. By *institutional quality*, we refer to the efficiency and transparency of the organs of governance, such as the quality of bureaucracy, extent of corruption, and so on. *Institutional stability*, on the other hand, refers to factors that constitute threats to the continuity of the political environment, such as conflict. We explore the hypothesis that these different aspects of institutional structure have conflicting impacts on the educational attainment of immigrants.

In trying to distinguish between the quality and stability aspects of institutional structure, we are constrained by the fact that any prior classification of available institutional variables into indicators of quality and stability is innately problematic. Take, for example, the variable called *durability of a regime*, provided by the ICRG dataset: This variable purports to capture the *stability* of political institutions as measured by the years since the last change in government. However, a regime may be durable precisely because it ensures a high quality of public

institutions. Without further investigation, it is therefore difficult to classify the durability variable as an unambiguous measure of stability. Indeed, as we show in Section 4, there is reason to believe that it really captures the ability of the government to deliver a high quality of public services, and hence enjoy a greater perception of legitimacy.

In view of such problems, we perform an exploratory factor analysis on fifteen institutional variables commonly used in the literature. This allows us to identify the following aspects of institutional character: (1) *credibility of the government*; (2) *transparency of government operations*; (3) *democracy*; and (4) *security of civil society*. Of these, the first three are taken to stand for the quality of existing institutions, while the last is taken to capture the stability dimension. In line with the hypotheses laid out in the next section, high institutional quality, as captured by the credibility and transparency of government, is seen to increase the educational attainment of immigrants to the United States over the sample period, while high stability is seen to reduce it. Interestingly, democracy does not have a robust impact.

The paper is organized as follows: The next section describes our variables and data sources. Section 3 presents a preliminary exploration of our data and underlines the need for a more nuanced analysis of institutional variables, such as the one conducted in this paper. Section 4 reports the results of our exploratory factor analysis; and Section 5 uses the principal factors identified in the previous section to conduct a more rigorous analysis of the data. This section presents and interprets our major findings and performs a number of robustness checks on our results. Section 6 concludes the paper by providing a brief summary of our analysis and indicating directions for further research.

2. Empirical Model and Description of Data

We explore the hypothesis that the two characteristics of political institutions in a country, namely quality and stability, may have conflicting impacts on the educational attainment of migrants. Political instability reduces the expected future returns to educational investment. Hence, an individual who has invested in education will have a greater incentive to migrate if the political climate is unstable than if it is stable. The quality of political institutions may, however, impact the selection of migrants differently. To appreciate this, consider a pair of countries with a given differential in institutional quality. If this differential is large, then the marginal benefit of migration from the country with poor institutions is large across the skill distribution. Hence, both skilled and unskilled workers have an incentive to migrate. By contrast, if the country of origin has a relatively high quality of political institutions, the marginal benefit from migration is relatively lower. Thus, for a given cost of migrating, highly skilled workers have a greater incentive to migrate. This analysis leads to the following hypotheses:

1. Immigrants from countries with greater political stability tend to be less skilled on the average than immigrants from countries with more stable governments;
2. Immigrants from countries with higher institutional quality will tend to be more skilled than immigrants from countries with lower institutional quality.

We test the impact of institutions on the brain drain using data on immigrants to the United States over the period 1988-1998. The choice of this period allows us to avoid structural changes due to the two major immigration legislations in the United States, namely the Immigration Reform and Control Act (ICRA) of 1986 and the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) of 1996, which was not implemented until 1998. We employ the following fixed effects model to test our hypotheses:

$$Y_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + u_i + \varepsilon_{it}$$

The dependent variable Y_{it} represents the *skill intensity* of immigrants from country i in year t ; X_{it} is the vector of controls (including information about the immigrants from each country of origin, its GDP, and educational attainment of its population); Z_{it} is the vector of indices capturing the quality and stability of governance respectively; u_i is the fixed effect error term; and ε_{it} is the idiosyncratic error.

Given the relationship between the institutional structure of an economy and per capita GDP reported by the vast literature on institutional determinants of economic prosperity (Mauro [1995], Alesina and Perotti [1996], Perotti [1996], Knack and Keefer [1995]), our preliminary investigation of the data implements a two stage procedure to account for endogeneity. First, we estimate per capita GDP using per capita energy consumption in the source countries and the other explanatory variables as instruments. Then, we estimate the fixed effects model in (1) with skill intensity as dependent variable and the predicted value of per capita GDP.⁴

Measuring the Education of New Immigrants

Data on new immigrants to the United States over the sample period 1988-1998 come from the Immigration and Naturalization Service (INS). The *Immigrants Admitted to the United States Series* reports the following characteristics for each immigrant: year of admission; visa class; countries of birth, last residence, and quota chargeability; age; occupation; marital status; gender; intended state and city of residence in the United States; labor certification status; and

⁴We obtain the same results when per capita GDP is included directly as a control variable.

whether the particular case constitutes new admission or an adjustment in visa status for a non-immigrant foreign national already in the United States.⁵

One problem with the INS dataset is that it does not report the educational attainment of immigrants directly, so we must consider an alternative measure of skill for our dependent variable. To do this, we construct a *discrete measure of skill for each immigrant* skill based on their occupation. Then, we measure the *skill intensity of immigrants from each country* as the proportion of immigrants who are seeking employment in high-skill occupations. We briefly outline this technique below.

Our methodology for calculating the skill intensity of the immigrants from each country is a three-step process based on methodologies proposed by Topel (1994) and Polgreen and Simpson (2006). *First*, following Polgreen and Simpson (2006), we construct a predicted measure of educational attainment, based primarily on occupation, but also taking into account other demographic characteristics available from the INS dataset. Using data on the US population from the *Current Population Survey* (CPS), Polgreen and Simpson (2006) estimate the following equation for each occupation, k :

$$ed_{jk}^{\hat{}} = \beta_{0k} + \beta_{1k} age_{jk} + \beta_{2k} gender_{jk} + \beta_{3k} married_{jk} + \varepsilon_{jk}$$

The estimates of this equation are then used to obtain the predicted years of education of immigrants in each occupation k , based on the demographic characteristics reported in the INS dataset. While this measure of education may not be precise as a cardinal measure of education, it gives a sufficiently precise ordinal ranking of immigrants' skills based on their occupation, which is all we need to be able to construct our skill variable. *Second*, following Topel (1994), the predicted measure of educational attainment $ed_{jk}^{\hat{}}$ is averaged for each occupation k to obtain

⁵ The complete dataset covers the period 1972 – 2000 and is available at the Inter-University Consortium for Political and Social Research (ICPSR) website. See Polgreen and Simpson (2006) for a detailed description.

an ordinal ranking of the skill required for each occupation. Then, and also following Topel (1994), immigrants are identified as *highly-skilled* if their occupation falls in the top tertile of occupations; they are identified as *semi-skilled* if their occupation falls in the middle tertile; and they are identified as *unskilled* if their occupation falls in the bottom tertile. *Finally*, we calculate *skill intensity* for each *country* in each *year* as the fraction of all immigrants from that country whose occupations were identified as *highly-skilled*.

It should be mentioned that the predicted measure of immigrant education proposed by Polgreen and Simpson (2006) has its limitations. First, the predicted variable only captures the occupational skills for immigrants who report an occupation, which excludes children, retirees, students, homemakers, the unemployed, or immigrants who have not reported an occupation. However, they document that numbers of immigrants from these categories have been relatively stable over the period in question, so any bias introduced by their omission is also stable. Second, immigrants are less likely to be matched into their primary occupation than natives due to licensing and other barriers to entry, as documented by Chiswick and Miller (2008). However, while such mismatching may indeed affect the wages of immigrants after they arrive, it does not necessarily affect their educational attainment when they decided to leave. Last, constructed variables such as our measure of immigrant education may be subject to measurement error. However, this is less of a problem for us, since we are primarily concerned with the ordinal ranking of skill based on occupation. Still, we address this issue by using a bootstrap method to calculate the standard errors of our coefficients.⁶

Despite the caveats outlined above, we feel that the INS dataset is of greater use for the purpose of this study than the existing alternatives, which include the *Current Population Survey*

⁶ We replicated our bootstrap 100 times using stratified random sampling, where the strata were defined as the different countries of origin. This way, we also address the problem of heteroskedasticity across different countries' immigrants.

(CPS) and the *Census of Foreign-Born Population* from the U.S. Census Bureau; the New Immigrant Survey (NIS); and the OECD immigration databases compiled by Docquier and Marfouk (2006) and Brucker and Defoort (2006), among others. Although using these data may help to overcome some of the methodological problems described above, these datasets are based on total stocks of immigrants at a point in time rather than the flows of immigrants in a given year. For this reason, they do not provide information about the characteristics of immigrants at the time of their migration and do not answer our basic question of how the institutional structure of a country influences the skill composition of migrants from that country in that year. A second problem with these alternatives is that they include undocumented immigrants, whose selection may be influenced by factors other than what we are interested in. For example, it is plausible that illegal immigrants may be selected from the lower tail of the skill distribution because low skilled workers have less to lose from being detected and barred legal entry for life.

Controls and Institutional Variables

The first set of controls comes from the INS Series and includes (1) the proportion of "new entrant" visas awarded to immigrants from each country; (2) the proportion of a country's immigrants belonging to each of five broad visa classes; (3) the total number of immigrants from each country of origin; (4) year; and (5) region. The new entrant variable helps control for the fact that many high-skilled immigrants who eventually receive work visas have already entered under a temporary "non-immigrant" student visa. The proportions of immigrants belonging to each visa class control for how binding the quota restrictions are.⁷ In particular, family members of US permanent residents and refugees are not counted in the same in the quota allocation for their home country (and, as we find later, they have lower skill levels on average).

⁷ Classification 29.

The second set of controls used in our model consists of *source country characteristics*. For each country, we consider (6) the population of the country in each year and (7) the per capita GDP in each year from the World Development Indicators published by the World Bank; and (8) the average years of education in the country in each year of the sample period from Barro and Lee (2001). We also include (9) the average years of education in the country in 1960 in order to distinguish between the effect of historical levels of educational attainment in a country and the effect of current changes in educational attainment. As shown in Table 2, the sample mean of the population variable (6) taken over all countries and all years in the sample is approximately 45.2 million people. Given the discrepancy in sizes of the countries in our sample, the standard deviation is rather large at about 115 million and ranges between 0.7 and 982 million. The mean of GDP per capita, is \$7,513, has a standard deviation of \$9,047, and ranges between \$100 and 36,800. Lastly, the mean of the education variable over the entire sample period is approximately 6.2 years, has a standard deviation of 2.6 years, and ranges between 1.2 and 11.8 years.

Information on institutional characteristics comes from the Polity IV project provided by the Center for Systematic Peace, the International Country Risk Guide (ICRG) published by the Political Risk Services (PRS) Group, and the Database of Political Institutions compiled by Beck *et al.* (2001) and published by the World Bank. The Polity IV database provides 30 variables relating to the extent of democratization and durability of the political system in a wide sample of countries.⁸ Of these variables, we select the (13) *Polity IV Index*, which aims to quantify the extent to which a country's system is democratic as opposed to autocratic, based on the openness and competitiveness of executive recruitment; constraints on the executive; and the regulation

⁸ A complete description of the variables and methodology for the Polity database can be found at: <http://www.systemicpeace.org/inscr/p4manualv2007.pdf>.

and competitiveness of participation in the government.⁹ We also consider the variable called (14) *Regime Durability*, which is calculated as the number of years since the last regime change. In the context of our hypotheses, democracy is interpreted as a measure of institutional quality and regime durability is interpreted as a measure of institutional stability.

The ICRG dataset provides information on 22 variables relating to political, financial and economic risk in 161 countries of the world from 1980 to the present.¹⁰ We include the following indices from the ICRG data as measures of institutional quality: (15) the *corruption index*, which seeks to assess the *lack* of corruption within the political system; (16) the *index of bureaucratic quality*, which captures the extent of autonomy and expertise of the bureaucracy; (17) the *investment profile index*, which captures the viability of contractual agreements, repatriation of profits, and delays in payments receivable; (18) the *democratic accountability index*, which measures the responsiveness of the government to the people.¹¹

Four other variables from the ICRG dataset appear to capture institutional stability and are included in our analysis: (19) the *government stability index*, which uses information on unity within the government, legislative strength, and the level of popular support to assess "the government's ability to carry out its declared programs and its ability to stay in office"; (20) the *index of internal conflict*, constructed based on the *absence* of civil wars, coups, terrorism, other forms of political violence, and civil disorder;¹² (21) the *index of external conflict*, which assesses the extent to which a country is free from "risk to the incumbent government from

⁹ The index itself ranges from -10 for countries that are very autocratic to +10 for countries that are very democratic.

¹⁰ See http://www.prsgroup.com/ICRG_Methodology.aspx for a complete description of the ICRG variables and the methodology used to construct them.

¹¹ While indices (13) – (15) employ a scale of 0-6; (16) and (17) employ a scale of 0-4 to assess the relevant dimension of institutional quality. Countries receiving higher scores are ones with stronger institutions (i.e. *low* levels of corruption or conflict); countries receiving lower scores have weaker institutions.

¹² There are other measures of political instability, such as the one constructed by Alesina and Perotti (1996) for example. Most of these measures are highly correlated with each other. See Jong-A-Pin (2009) for a detailed discussion of the different measures of political instability used in the economic literature.

foreign action, ranging from non-violent external pressure ... to violent external pressure";¹³ and (22) the *index of ethnic tensions*, which inversely measures the degree of latent social conflict in a country on the lines of race, language and geographical location.

The Database of Political Institutions records and tracks 123 attributes of the political systems for 178 countries during the years 1975-2006.¹⁴ We include three variables from the DPI that appear to be measures of institutional quality: (23) *the legislative index of electoral competitiveness*, which measures the extent to which the multiple parties are able to compete for seats; (24) *the executive index of electoral competitiveness*, which assesses the extent to which the selection of the chief executive is made by the people; and (25) *checks*, which counts the number of veto points, or governmental checks that exist within the government. In addition, we include two variables that appear to capture institutional stability: (26) *political fractionalization*, which is the probability that two members of the legislature will be from different parties; and (27) *political polarization*, which takes the values zero, one, or two, and measures the maximum distance between the executive's party and the four main parties in the legislature on the 'Left-Center-Right' scale.

As a practical concern, it is difficult to account for multiple dimensions of institutional quality in the same empirical model due to the fact that the institutional variables tend to be highly correlated (see Table 2). Thus, Section 3 begins our analysis by introducing each element of institutional quality and stability into our empirical model separately to get a preliminary picture of the extent to which these institutional characteristics differ in determining the education of immigrants. Once we have some idea of the importance of the individual variables,

¹³ Alternative measures of external conflict include the ones provided by the Political Instability Taskforce (PITF) and the Uppsala Conflict Data Program (UCDP). For the most part, existing datasets on external conflict focus on civil wars exclusively. We have used the ICRG measure because it captures different forms of external conflict.

¹⁴ See Beck *et al.* (2001) for a description of the methodology behind the DPI variable construction.

we perform a factor analysis to isolate the four key dimensions of institutions in Section 4, and test their impacts on the educational attainment of immigrants in Section 5.

3. A Preliminary Exploration of the Data

As is clear from the correlation matrix presented in Table 2, the individual components of institutional structure are highly correlated with each other. Hence, we include the components individually in our second stage regression equation. The results of this preliminary investigation are presented in Table 3. Consistent with our first hypothesis, Table 3 shows that *internal conflict*, *external conflict*, and *ethnic tension* in the country of origin increase the skill intensity of immigrants, all three variables being significant at the 1% level. The *durability of a regime* is seen to have a significant positive impact on skill intensity at the 1% level. At first sight, this variable would appear to relate to the stability dimension of institutional structure, and therefore be expected to have a negative impact on the selection of immigrants. However, a regime may be durable precisely because it ensures the security of property rights; provides necessary public goods and services; and thereby allows no scope for the formation of grievance that would lead to regime change.¹⁵ Hence, regime durability may, in fact, relate more to the quality dimension of institutional structure than the stability dimension. As we will discuss in the next section, the factor analysis reported in Table 4 confirms this argument by grouping regime durability with the ICRG corruption and bureaucratic quality indices as a measure of transparency.

Reinforcing this argument, the *government stability index* is also seen to have a positive impact on skill intensity at the 1% level of significance. As with durability, this index would *a priori* appear to be an indicator of stability and have a negative predicted sign. Note, however,

¹⁵ Alternatively, if one believes political instability to be motivated more by *greed* than *grievance*, a high quality of governance reduces the incentive for predatory behavior. See the influential study by Collier and Hoeffler (2004) on the primacy of greed as the dominant motive for conflict as opposed to grievance.

that the index measures the ability of a government to implement declared policies, based on the level of popular approval; the extent of unity within the government; and its strength in the legislature. In light of this definition, it may be more accurate to think of it as capturing the government's credibility. Since credibility depends to a great extent on its ability to ensure a high institutional quality, it is not unreasonable to conclude that the government stability index relates more to the quality dimension of institutional structure than the stability dimension. As before, the factor analysis reported in Table 4 validates this argument. The government stability index combines more with the investment profile index, which measures the credibility of a government in terms of its ability to provide an environment favorable to private and especially, foreign direct investment.

Of the two measures of fragmentation within the government, the index of *political polarization* is positively significant at the 1% level, while the *political fractionalization index* turns out to be insignificant at any level. The polarization index captures the presence of ideological differences within the incumbent government. Since differences in political ideology may potentially lead to instability, the positive sign on this variable is exactly what intuition would lead us to expect. The insignificance of the fractionalization index is not particularly problematic. The fractionalization index uses information on the difference in party affiliations within the ruling government to capture the degree to which a country is governed by a coalition of small parties. Insofar as coalitions are expected to be less stable than single party governments, greater fractionalization in the elected legislature may be expected to contribute to greater instability and hence, improve the selection of immigrants. However, mere differences in party affiliation are a far coarser measure of potential instability than more serious differences in ideology that underlie the polarization index. As such, it is hardly surprising that the latter turns out to have a stronger impact on skill intensity.

Interestingly, the only apparent measure of institutional quality that appears to be significant in Table 3 is the *investment profile index*, which is seen to have a positive impact on skill intensity at the 1% level. Recall that this index captures the ability of the government to provide a favorable environment for private enterprise and so it reflects the quality of institutions that affect domestic investment and FDI. As such, our second hypothesis would lead us to expect a positive impact of this variable on the selection of migrants. This is consistent with existing evidence, which reports a dynamic complementarity between FDI and skilled migration. As argued by Kugler and Rapoport (2007), Docquier and Lodigiani (2008), or Beine, *et al.* (2010), not only do skilled migrants act as a source of information for investment opportunities in their countries of origin, they also help develop trade networks between their home and host countries.

Lastly, the statistical insignificance of the other indicators of institutional quality could simply be due to the fact that including the variables individually in the regression equation introduces an omitted variable bias in our estimates. In fact, once we account for this by including principal factors of the institutional variables, we see a quite different picture emerging.

4. Multi-Dimensionality of Institutional Structure

In view of the conceptual and statistical problems associated with measuring the impact of institutional variables individually on the education of immigrants, it may help to get a more general sense of the overall impact of institutional structure. Following Alesina *et al.* (1996), Perotti (1996), Knack and Keefer (1995), Jong-a-Pin (2009), and others, we therefore try to identify combinations of variables that explain some aspect of institutions and can be interpreted more broadly than a single institutional variable.

One simple method for doing this would be to perform a principle component analysis on the institutional variables described in section 4, and interpret the first component as *institutions*.

This is the essence of what Alesina and Perotti (1996), Perotti (1996), and Keefer and Knack (1997) do in the context of investigating the influence of institutional quality on economic growth.¹⁶ Alternatively, following Alesina *et al.* (1996), one could construct a unidimensional index of institutional quality by using logit analysis. However, it is well documented that institutions have multiple dimensions (Jong-A-Pin [2009]), and it is our hypothesis that these dimensions of institutional quality and stability have different impacts on immigrant selection. Hence, a unidimensional index would fail to capture the true impact of institutional structure.

This raises the question as to why we do not construct two such indices for institutional quality and stability respectively. The problem is that this would require a prior classification of available variables into ones that capture stability and ones that stand for quality. Having undertaken such a task in our preliminary exploration of the data, we are convinced that many of the available variables are not perfect measures of one dimension of institutional character as opposed to another.

An alternative to principle component analysis, and one that is used by Jong-a-Pin (2009) in the context of the relationship between political stability and economic growth, is *factor analysis*. Factor analysis is related to principle component analysis, but while principle component analysis aims to extract the *maximum* source of variation in the variables possible, factor analysis only seeks to capture the *common* sources of variation among the variables. Also, whereas in principle component analysis the components are linear combinations of the observed variables, in factor analysis the observed variables are actually linear combinations of the constructed underlying factors. These features allow us to interpret the predicted factors and attach theoretical meaning to them. Principle components do not lead to any such interpretation

¹⁶ The first two papers investigate the impact of income inequality on economic growth via its role in fomenting social discontent. As such, they focus on constructing indices of sociopolitical instability rather than general institutional structure. Keefer and Knack (1997), on the other hand, consider more general measures of institutions.

in the sense that they do not capture any underlying commonalities between the variables as factor analysis does. As a result, factor analysis proves more useful in our investigation.

The factor loadings from our factor analysis of the fifteen institutional variables described in section 4 are reported in Table 4. These loadings come from a maximum likelihood exploratory factor analysis using an oblimin rotation method.¹⁷ From these results, we are able to interpret four important common factors underlying the observed institutional variables: Democracy, security, transparency, and credibility. To help see where these interpretations come from, we have highlighted cells represent variables whose loading weight for that factor is greater than 0.5.

For the *democracy* factor, the variables that carry factor loadings greater than 0.5 are: the executive index of electoral competitiveness (0.8801); the legislative index of electoral competitiveness, (0.8703); political fractionalization, (0.8453); the polity index, (0.8371); democratic accountability (0.7037); and political polarization (0.5869). With the exception of polarization, each of these is a measure of the extent to which a country's political leaders are determined by free and fair elections as opposed to being determined by dictate. In the case of polarization, countries that have divided governments (in which the executive and the legislature are from separate sides of the political spectrum) are less likely to be autocratic (or, countries that are autocratic are extremely likely to not be divided).

For *security*, the variables with factor loadings greater than 0.5 are: internal conflict (0.7809); ethnic tensions (0.6765); and external conflict (0.6122). Of these, internal conflict and ethnic tensions are likely to be the most correlated with the internal stability of the institutions of

¹⁷ We also constrained the model to return a maximum of four common factors. When we relaxed this assumption, the number of factors returned by the model was seven, the first four of which had a similar interpretation as described here, and the last three of which did not have any single variable that stood out with a factor loading greater than 0.3.

a country, since they capture the effects of conflict and tensions occurring within a country's borders. In the case of external conflict, countries might be engaged in external conflict for a wide variety of reasons. For example, during our sample period the United States was involved with conflicts in Bosnia, Kuwait, and Somalia, although this did not seem to have a substantial impact on the quality or stability of the United States' institutions.

The variables with high weights in the *transparency* factor are: bureaucratic quality (0.6069); corruption (0.5696); and regime durability (0.5204). The first two are clearly related to the transparency and efficiency of the government and its bureaucracy, and these variables factor somewhat highly into the construction of the democracy and security factors as well. While playing less of a role, political durability may be regarded a reflection of the institutional transparency of a country in the sense that the duration of the government is a function of its perceived legitimacy, which in turn is directly impacted by the absence of corruption and waste.

Finally, *credibility* is determined by: government stability (0.6696) and investment profile (0.6379). The investment profile index relates to government credibility in terms of enforcing contracts and protecting private property rights. The government stability index shows how credible the announced policies are expected to be, and how secure those policies are against radical shifts within the government. Together, they combine to proxy for the overall credibility of the government.

Table 5 presents descriptive statistics for these principle factor variables, and Table 6 gives an idea of how countries in our sample rank with respect to the four institutional principal components. Note that Israel, for example, ranks second with respect to the extent of democracy, but comes in at number 56 with respect to the security of property rights, and not surprisingly given the experience of political turmoil in that part of the world, at number 111 out of 114 with respect to political stability. All this points to the validity of distinguishing between multiple

dimensions of institutional character and provides at least preliminary justification for our hypothesis that these dimensions may differ in their impact on the educational attainment of immigrants. Lastly, a critical advantage of using factor analysis is that the resulting factors are relatively uncorrelated with one another.¹⁸ This will allow us to include all of the components in the same specification of the model and reduce the possibility for omitted variable bias. The results from this specification of our empirical model are reported in the next section.

5. Results and Robustness

Results

Our final analysis again implements a two stage procedure, where we first instrument for per capita GDP by per capita energy consumption in the source countries, and subsequently estimate a fixed effects model with the principal factors obtained in Section 4 as our explanatory variables. The results of this exercise are reported in Table 7. The principal factor reflecting the *security of civil society* is seen to have a significantly negative impact on the skill intensity of immigrants. To see why the coefficient on the security factor is negative, recall that this factor reflects the *absence* of external conflict, internal conflict, and ethnic tension in the country of origin. As hypothesized, an increase in sociopolitical stability would reduce the incentive for skilled migration; and this is precisely what we observe. On the average, a one standard deviation increase in the security factor is seen to reduce the fraction of highly skilled immigrants by a factor of approximately 0.02.

Also in line with our hypothesis, an increase in the *transparency of government operations* is seen to have a positive and significant impact on the skill intensity of immigrants. Recall that a high value of the transparency factor reflects a high level of bureaucratic quality, a

¹⁸ Principle component analysis actually forces the resulting components to be completely orthogonal, and explain 100% of the variation in the observed variables. With common factor analysis the factors are typically not completely orthogonal, but the correlation between them is usually low, as is the case with the factors we construct.

low level of corruption, and a greater perception of legitimacy of the government by virtue of its ability to deliver public services. In other words, a high value of the transparency factor reflects a high quality of existing institutions. As per our hypothesis, this should predict a higher skill intensity of immigrants, since workers at the upper tail of the indigenous skill distribution would have a greater incentive to migrate relative to workers at the lower tail, which is precisely what we observe. A one standard deviation increase in transparency is seen to increase the fraction of highly skilled immigrants by a factor of 0.011 approximately.

The second factor reflecting institutional quality is the *credibility of the government*, as determined by its ability to prevent delays in payments receivable; ensure a low level of expropriation risk; and equally importantly, ensure the continuity of government policies, particularly towards private investment and FDI. A high value of the credibility factor, therefore, reflects a more favorable political climate for private enterprise and may thus be expected to correlate with a high average return to skill investment.¹⁹ Hence, if a worker has an incentive to migrate, it is more likely that he or she is from the upper tail of the indigenous skill distribution. As such, we would expect the credibility factor to have a positive impact on the skill intensity of immigrants; and this is exactly what we observe in Table 7: A one standard deviation increase in the credibility factor increases the fraction of skilled immigrants by a factor of 0.012. While the credibility factor does appear to have a marginally stronger impact on skill intensity than transparency, none of the two factors relating to quality appear to compare with the security factor in its impact on skill intensity. This raises the question as to whether the stability dimension of institutional character is more important in determining the magnitude of brain drain than the quality dimension.

¹⁹ This, of course, is in addition to the dynamic complementarity between FDI and skilled migration, mentioned in Section 3.

Interestingly, the *democracy* factor turns out to be insignificant at any acceptable level. Democratic governments are typically less repressive and more responsive to popular concerns. As such, they may be regarded as creating lower incentives for the construction of grievance, which may act as a key motive for skilled migration (Docquier and Rapoport [2003]). At first sight, therefore, the level of democracy may be expected to have a negative impact on the incentive to migrate. On the other hand, if the existence of democracy is taken to correlate with a higher quality of institutions, we may expect a positive impact on the selection of migrants for reasons explained earlier. Theoretically, therefore, it is not clear what the sign on this factor should be. In fact, the vast empirical literature that seeks to assess the economic consequences of democracy has typically failed to establish a robust impact of democracy on economic outcomes, notably growth (Feng [2003]). In fact, scholarly opinion on the topic remains divided; and the only consensus that seems to be emerging is that it is not the character of a regime as a democracy or autocracy but the quality of public institutions and policies associated with it that have a perceptible impact on economic outcomes.²⁰ For example, two democracies may differ significantly in economic performance if one closes itself to international trade and FDI and the other does not. In addition, the extent of democratization may itself depend on other factors, such as the level of ethnic diversity in an economy (Akdede [2010]).

Robustness

This subsection reports a number of robustness checks performed on our results. First, it is clear from Table 6 that our results are not sensitive to whether we include all four dimensions of institutional quality or introduce them individually. It is also noteworthy that the results are not just robust in terms of significance, but that the magnitudes are also nearly identical.

²⁰ There are, of course, exceptions: Jamali, *et al.* (2007), for example, find that democracies significantly outperform other types of regimes.

We have earlier defended our decision to instrument for per capita GDP in the countries of origin. It may however be asked if this procedure affects our results to any degree. To address this issue, we include per capita GDP directly as a control variable in our fixed effects model. While the results of this exercise are not included in the paper, the security factor remains negatively significant at the 1% level; the credibility factor retains its positive impact at the 1% level; and democracy remains insignificant at any level. The only difference is in the significance of the transparency factor, which now has a positive impact at the 5% level instead of at the 1% level. We obtain the same results when per capita GDP is included directly as a control variable.

It is also natural to inquire if our results are sensitive to aggregation in the way we construct the skill intensity variable. To address this question, we run an ordered logit model in the second stage of our estimation, retaining the first stage instrumentation of per capita GDP. We have already described the procedure followed in assigning immigrants to occupational skill tertiles in Section 4. Now, instead of aggregating by country-year the individual occupational skill tertiles are used as the dependent variable in the second stage ordered logit regression. As reported in Table 8, the security factor remains negatively significant at the 1% level. The marginal effect reported in the last column shows that a unit increase in the value of this variable scales down the probability that a randomly selected migrant belongs to the highest skill tertile by a factor of 0.02 approximately. Also, the credibility and transparency factors retain positive significance at the 1% level. A unit increase in the transparency of governance increases the probability of a random immigrant belonging to the highest skill tertile by a factor of about 0.026 and the marginal effect of the credibility factor is about 0.025.

Interestingly, however, the democracy factor turns out to have a significant positive impact at the 1% level. In fact, a unit increase in the democracy factor is seen to scale up the probability of a random immigrant belonging to the highest skill tertile by 0.065 approximately.

Note that this does not say that the sheer existence of democracy in a country plays an important role in the selection of immigrants. Given the composition of the democracy factor, it appears to be the quality of public institutions more likely to be associated with a democratic regime than an autocratic one that plays a role in determining the occupational skill endowment of immigrants. Also, the largeness of the sample size in this estimation relative to the country-averaged panel might play a role in augmenting the impact of this variable.

Lastly, as an alternative to the fixed effect model employed in our analysis, we implement a feasible generalized least square model (FGLS) with skill intensity as dependent variable. While the results of this exercise are not included in the paper, it appears to confirm our general findings, both when we instrument for GDP and when we do not: Security, credibility, and transparency retain their respective impacts at the 1% level, while democracy stays insignificant at any acceptable level of significance.

6. Conclusion

This paper investigates the role of institutions in determining the magnitude of brain drain. Specifically, it explores the hypothesis that institutions have multiple dimensions and the different aspects of institutional structure may have conflicting impacts on the migration of skilled labor. Using an exploratory factor analysis on fifteen institutional variables commonly used in the literature, we are able to identify the following aspects of institutional character: (1) credibility of the government; (2) transparency of government operations; (3) democracy; and (4) the security of civil society. Of these, the first three pertain to the quality of existing institutions, while the last pertains to stability. In line with our hypothesis, high institutional quality, as captured by the credibility and transparency of government, is seen to increase the magnitude of

brain drain, while high stability was seen to reduce it. Interestingly, democracy is not seen to have a robust impact on the migration of skilled labor.

We conjecture that the quality and stability dimensions of institutional character have conflicting impacts on the magnitude of brain drain because they influence the incentive to migrate differently. Political stability reduces the expected domestic returns to human capital investment. Having made this investment, therefore, individuals have less incentive to migrate from a country with a stable political environment than one experiencing political turmoil. Hence, greater stability reduces the magnitude of brain drain. By contrast, higher institutional quality in a country provides high skilled workers with a greater incentive to migrate than the low skilled. Hence, higher institutional quality in the country of origin increases the magnitude of brain drain.

In addressing the multidimensionality of institutional structure, this paper provides a more nuanced analysis of the institutional determinants of brain drain. Further, our results have an interesting policy implication: Institutional reform and investment in educational infrastructure are viewed as necessary preconditions for sustained economic growth. If a small developing economy fails to take these steps, it is unlikely that it will be able to grow. If, however, it pursues needed liberalization programs; improves the quality of governance; and increases access to education; it risks losing its investment to migration. If brain drain is detrimental to growth, this confronts a developing economy with a policy conundrum. However, recent research on brain drain suggests that it is not necessarily detrimental in the long run since highly skilled diasporas provide greater incentives for skill investment in the country of origin; send remittances; create networks that stimulate trade and inflows of FDI; and may even act as agents for needed institutional reform. If this is indeed the case, then liberalization programs should be pursued without regard to their impact on emigration decisions.

Lastly, while this paper contributes towards a better understanding of the causes of brain drain, much remains unresolved on the topic, even with respect to the role of institutions. An immediate question in this regard is whether the different dimensions of institutional structure have similar impacts on the migration of male and female labor? The question is particularly important in light of recent findings by Docquier, *et al.* (2009) that the emigration rate of skilled women tends to be higher on the average than that of skilled men. A second set of questions relate specifically to the stability dimension: There is reason to believe that political instability may itself be multidimensional (Jong-A-Pin [2009]). In this case, it may well be asked if different forms of instability differ in their impacts on the skilled migration. Specifically, does ethnic conflict differ in its consequences on brain drain than other forms of conflict? There is an emerging literature in political science which finds that ethnic conflict tends to last longer; is more resistant to third party intervention; and exhibits a greater intensity of violence than other forms of conflict (Eck [2009]). As such, it may well differ in its impact on migration than other forms of conflict. These and other questions will be important areas for exploration in subsequent research on institutions and the migration of skilled labor.

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Tables

Table 1: Variables and Descriptive Statistics

| Variable | Source | Mean | Standard Deviation | Maximum | Minimum |
|-----------------------------------|-------------|----------|-----------------------|---------|---------|
| Skill Intensity | INS | 0.678 | 0.175 | 0.115 | 0.937 |
| Controls | | | | | |
| Year | INS | 1993.210 | 3.072 | 1988 | 1998 |
| Number of Immigrants (1,000) | INS | 2.297 | 4.587 | 0.100 | 40.740 |
| New Immigrant | INS | 0.570 | 0.191 | 0.083 | 0.967 |
| Employment Visas | INS | 0.190 | 0.171 | 0.000 | 0.713 |
| Population (1,000,000) | WDI | 45.200 | 115.000 | 0.673 | 982.000 |
| GDP per Capita (\$1,000) | WDI | 7.513 | 9.047 | 0.103 | 36.792 |
| Average Education in 1960 | Barro & Lee | 3.859 | 2.518 | 0.210 | 9.560 |
| Average Education | Barro & Lee | 6.237 | 2.637 | 1.150 | 11.820 |
| Distance (1,000 km) | CEPII | 8.008 | 3.702 | 0.548 | 16.180 |
| English | CEPII | 0.529 | 0.500 | 0 | 1 |
| Colony | CEPII | 0.047 | 0.211 | 0 | 1 |
| Institutional Stability | | | | | |
| Government Stability | ICRG | 6.765 | 2.051 | 1 | 12 |
| Internal Conflict | ICRG | 8.924 | 2.985 | 0 | 12 |
| External Conflict | ICRG | 10.342 | 2.067 | 2 | 12 |
| Ethnic Tensions | ICRG | 4.256 | 1.572 | 0 | 6 |
| Political Durability | Polity IV | 26.210 | 30.697 | 0 | 150 |
| Political Fractionalization | DPI | 0.568 | 0.263 | 0 | 1 |
| Political Polarization | DPI | 0.735 | 0.872 | 0 | 2 |
| Institutional Quality | | | | | |
| Corruption | ICRG | 3.674 | 1.379 | 0 | 6 |
| Bureaucratic Quality | ICRG | 2.431 | 1.229 | 0 | 4 |
| Investment Profile | ICRG | 6.109 | 1.781 | 1 | 11 |
| Democratic Accountability | ICRG | 4.096 | 1.424 | 0 | 6 |
| Polity | Polity IV | 5.101 | 5.969 | -10 | 10 |
| Executive Electoral Competition | DPI | 6.274 | 1.612 | 1 | 7 |
| Legislative Electoral Competition | DPI | 6.495 | 1.316 | 1 | 7 |
| Government Checks | DPI | 3.417 | 2.010 | 1 | 18 |
| Fixed Effects | | | | | |
| Asia | INS | 0.261 | 0.439 | 0 | 1 |
| Europe | INS | 0.278 | 0.448 | 0 | 1 |
| Africa | INS | 0.126 | 0.332 | 0 | 1 |
| Oceania | INS | 0.031 | 0.174 | 0 | 1 |
| South America | INS | 0.148 | 0.355 | 0 | 1 |
| North America & Carribean | INS | 0.156 | 0.363 | 0 | 1 |

Table 2: Matrix of Correlation Coefficients

| | Skill | New | Emp. Visa | Num-ber | GDP p.c. | Ave. Educ. | Gov. Stab. | Int. Conf. | Ext. Conf. | Eth. Tens. | Pol. Dur. | Pol. Frac. | Pol. Polar. | Cor-rupt | Bur. Qual. | Inv. Prof. | Dem. Acc. | Polity | Exec. Elec. Comp | Leg. Elec. Comp |
|-----------------|--------|--------|-----------|---------|----------|------------|------------|------------|------------|------------|-----------|------------|-------------|----------|------------|------------|-----------|--------|------------------|-----------------|
| New | -0.002 | | | | | | | | | | | | | | | | | | | |
| Employ. Visa | 0.355 | -0.292 | | | | | | | | | | | | | | | | | | |
| Number | -0.311 | 0.224 | -0.078 | | | | | | | | | | | | | | | | | |
| GDP per Cap. | 0.367 | -0.087 | 0.242 | -0.081 | | | | | | | | | | | | | | | | |
| Ave. Educ. | 0.330 | 0.051 | 0.262 | 0.061 | 0.736 | | | | | | | | | | | | | | | |
| Gov. Stability | 0.217 | -0.006 | 0.237 | -0.068 | 0.289 | 0.305 | | | | | | | | | | | | | | |
| Int. Conflict | 0.302 | -0.085 | 0.299 | -0.003 | 0.524 | 0.598 | 0.481 | | | | | | | | | | | | | |
| Ext. Conflict | 0.170 | -0.032 | 0.362 | 0.101 | 0.384 | 0.489 | 0.365 | 0.674 | | | | | | | | | | | | |
| Ethnic Tension | 0.038 | 0.037 | 0.155 | 0.021 | 0.443 | 0.488 | 0.382 | 0.697 | 0.548 | | | | | | | | | | | |
| Pol. Durability | 0.283 | -0.046 | 0.129 | -0.088 | 0.665 | 0.535 | 0.211 | 0.320 | 0.179 | 0.225 | | | | | | | | | | |
| Pol. Frac. | 0.030 | 0.192 | 0.181 | 0.085 | 0.343 | 0.459 | 0.218 | 0.349 | 0.365 | 0.287 | 0.187 | | | | | | | | | |
| Pol. Polariz. | 0.128 | 0.030 | 0.187 | -0.070 | 0.456 | 0.430 | 0.177 | 0.308 | 0.342 | 0.259 | 0.213 | 0.563 | | | | | | | | |
| Corrupt | 0.327 | -0.092 | 0.243 | -0.048 | 0.671 | 0.677 | 0.328 | 0.609 | 0.459 | 0.512 | 0.499 | 0.327 | 0.366 | | | | | | | |
| Bur. Quality | 0.435 | -0.060 | 0.295 | -0.042 | 0.708 | 0.659 | 0.371 | 0.591 | 0.418 | 0.403 | 0.530 | 0.349 | 0.365 | 0.762 | | | | | | |
| Inv. Profile | 0.185 | 0.076 | 0.148 | -0.033 | 0.367 | 0.388 | 0.706 | 0.477 | 0.372 | 0.365 | 0.265 | 0.241 | 0.260 | 0.373 | 0.457 | | | | | |
| Dem. Acct. | 0.267 | -0.009 | 0.232 | 0.039 | 0.649 | 0.677 | 0.336 | 0.629 | 0.546 | 0.475 | 0.514 | 0.501 | 0.489 | 0.717 | 0.705 | 0.445 | | | | |
| Polity | 0.024 | 0.115 | 0.202 | 0.109 | 0.466 | 0.585 | 0.139 | 0.422 | 0.457 | 0.410 | 0.297 | 0.638 | 0.515 | 0.491 | 0.443 | 0.302 | 0.681 | | | |
| Ex. El. Comp. | -0.009 | 0.146 | 0.173 | 0.158 | 0.291 | 0.418 | 0.205 | 0.369 | 0.375 | 0.320 | 0.208 | 0.702 | 0.408 | 0.346 | 0.352 | 0.319 | 0.545 | 0.706 | | |
| Leg. El. Comp. | 0.024 | 0.211 | 0.153 | 0.132 | 0.253 | 0.406 | 0.255 | 0.412 | 0.391 | 0.338 | 0.210 | 0.734 | 0.375 | 0.322 | 0.314 | 0.322 | 0.502 | 0.609 | 0.836 | |
| Gov. Checks | 0.155 | 0.095 | 0.191 | 0.074 | 0.344 | 0.361 | 0.142 | 0.350 | 0.335 | 0.229 | 0.211 | 0.637 | 0.576 | 0.318 | 0.399 | 0.220 | 0.524 | 0.582 | 0.585 | 0.519 |

Highlighted cells indicate a correlation greater than 0.3.

Table 3: Impacts of individual institutional stability variables on the average skill of immigrants to the US with country fixed effects. (Dependent Variable: Skill intensity)

| Variable | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat |
|--------------------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|-------------|--------------------|
| Skill Intensity _{t-1} | 0.3328 | 9.02 [‡] | 0.3260 | 8.72 [‡] | 0.3059 | 8.37 [‡] | 0.3231 | 8.71 [‡] | 0.3194 | 8.58 [‡] | 0.3217 | 8.54 [‡] | 0.3169 | 8.43 [‡] |
| Year | 0.0028 | 2.19 [†] | 0.0061 | 5.04 [‡] | 0.0063 | 5.58 [‡] | 0.0054 | 4.84 [‡] | 0.0043 | 4.01 [‡] | 0.0048 | 4.14 [‡] | 0.0045 | 4.06 [‡] |
| New Immigrant | 0.1806 | 11.33 [‡] | 0.1730 | 10.14 [‡] | 0.1807 | 11.48 [‡] | 0.1824 | 11.20 [‡] | 0.1869 | 11.28 [‡] | 0.1853 | 11.19 [‡] | 0.1845 | 11.18 [‡] |
| Employment Visas | 0.1492 | 8.90 [‡] | 0.1451 | 8.97 [‡] | 0.1551 | 9.30 [‡] | 0.1466 | 8.89 [‡] | 0.1470 | 8.83 [‡] | 0.1423 | 8.67 [‡] | 0.1396 | 8.55 [‡] |
| GDP per Capita | -0.0096 | -2.27 [†] | -0.0124 | -2.60 [‡] | -0.0121 | -2.59 [‡] | -0.0117 | -2.53 [†] | -0.0124 | -2.66 [‡] | -0.0103 | -2.30 | -0.0097 | -2.25 [†] |
| Average Education | -0.0038 | -0.77 | -0.0040 | -0.77 | -0.0057 | -1.20 | -0.0017 | -0.33 | -0.0022 | -0.43 | -0.0054 | -1.09 | -0.0052 | -1.06 |
| Num of Immigrants | -0.0032 | -2.17 [†] | -0.0036 | -2.35 [†] | -0.0033 | -2.20 [†] | -0.0039 | -2.58 [†] | -0.0038 | -2.53 [†] | -0.0037 | -2.53 [†] | -0.0037 | -2.56 [†] |
| Population | -0.0008 | -2.79 [‡] | -0.0006 | -1.95 [*] | -0.0007 | -2.54 [†] | -0.0006 | -2.27 [†] | -0.0007 | -2.59 [‡] | -0.0007 | -2.39 [†] | -0.0007 | -2.34 [†] |
| Gov. Stability | 0.0035 | 2.49 [†] | | | | | | | | | | | | |
| Internal Conflict | | | -0.0050 | -3.11 [‡] | | | | | | | | | | |
| External Conflict | | | | | -0.0075 | -5.08 [‡] | | | | | | | | |
| Ethnic Tensions | | | | | | | -0.0091 | -3.50 [‡] | | | | | | |
| Political Durability | | | | | | | | | 0.0008 | 2.83 [‡] | | | | |
| Pol. Fractionalization | | | | | | | | | | | -0.0053 | -0.44 | | |
| Pol. Polarization | | | | | | | | | | | | | 0.0069 | 2.11 [†] |
| Constant | -5.1252 | -2.04 [†] | -11.6354 | -4.89 [‡] | -11.9873 | -5.41 [‡] | -10.1745 | -4.68 [‡] | -8.2051 | -3.85 [‡] | -9.1722 | -3.99 [‡] | -8.4196 | -3.90 [‡] |
| Observations | 659 | | 659 | | 659 | | 659 | | 659 | | 659 | | 659 | |
| σ_u | 0.1893 | | 0.2089 | | 0.2153 | | 0.1995 | | 0.1957 | | 0.1960 | | 0.1901 | |
| σ_e | 0.0457 | | 0.0457 | | 0.0452 | | 0.0457 | | 0.0460 | | 0.0460 | | 0.0458 | |
| ρ | 0.9450 | | 0.9543 | | 0.9578 | | 0.9501 | | 0.9476 | | 0.9478 | | 0.9451 | |

Two-stage least squares with energy consumption as an instrument for GDP per capita. First stage results available on request.

* Significant at the 0.10 level; [†] Significant at the 0.05 level; [‡] Significant at the 0.01 level.

Table 3 (continued): Impacts of individual institutional stability variables on the average skill of immigrants to the US with country fixed effects.
(Dependent Variable: Skill intensity)

| Variable | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat | Coeffi- cient | t-stat |
|--------------------------------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|------------------|---------|
| Skill Intensity _{t-1} | 0.3193 | 8.47 ‡ | 0.3202 | 8.56 ‡ | 0.3292 | 8.75 ‡ | 0.3203 | 8.51 ‡ | 0.3221 | 8.54 ‡ | 0.3238 | 8.49 ‡ | 0.3239 | 8.29 ‡ | 0.3183 | 8.49 ‡ |
| Year | 0.0046 | 4.25 ‡ | 0.0047 | 4.31 ‡ | 0.0033 | 2.83 ‡ | 0.0048 | 4.40 ‡ | 0.0051 | 4.35 ‡ | 0.0051 | 4.38 ‡ | 0.0049 | 4.28 ‡ | 0.0046 | 4.16 ‡ |
| New Immigrant | 0.1821 | 11.12 ‡ | 0.1844 | 11.14 ‡ | 0.1799 | 11.20 ‡ | 0.1841 | 11.15 ‡ | 0.1851 | 11.20 ‡ | 0.1858 | 11.39 ‡ | 0.1850 | 11.34 ‡ | 0.1841 | 11.19 ‡ |
| Employment Visas | 0.1463 | 8.51 ‡ | 0.1419 | 8.55 ‡ | 0.1518 | 9.20 ‡ | 0.1418 | 8.65 ‡ | 0.1411 | 8.50 ‡ | 0.1411 | 8.54 ‡ | 0.1412 | 8.52 ‡ | 0.1412 | 8.65 ‡ |
| GDP per Capita | -0.0105 | -2.31 † | -0.0098 | -2.23 † | -0.0095 | -2.23 † | -0.0099 | -2.27 † | -0.0110 | -2.40 † | -0.0110 | -2.35 † | -0.0105 | -2.26 † | -0.0093 | -2.17 † |
| Average Education | -0.0050 | -0.98 | -0.0055 | -1.13 | -0.0041 | -0.84 | -0.0056 | -1.14 | -0.0048 | -0.96 | -0.0051 | -1.04 | -0.0051 | -1.03 | -0.0053 | -1.07 |
| Num of Immigrants | -0.0038 | -2.58 † | -0.0037 | -2.50 † | -0.0031 | -2.22 † | -0.0037 | -2.54 † | -0.0037 | -2.53 † | -0.0037 | -2.49 † | -0.0037 | -2.50 † | -0.0036 | -2.49 † |
| Population | -0.0007 | -2.38 † | -0.0007 | -2.41 † | -0.0007 | -2.38 † | -0.0007 | -2.39 † | -0.0007 | -2.48 † | -0.0007 | -2.44 † | -0.0007 | -2.43 † | -0.0008 | -2.51 † |
| Corruption | -0.0047 | -1.33 | | | | | | | | | | | | | | |
| Bur. Quality | | | -0.0004 | -0.08 | | | | | | | | | | | | |
| Inv. Profile | | | | | 0.0041 | 3.06 ‡ | | | | | | | | | | |
| Dem. Account. | | | | | | | -0.0010 | -0.39 | | | | | | | | |
| Polity | | | | | | | | | -0.0015 | -1.18 | | | | | | |
| Ex. Elec. Comp. | | | | | | | | | | | -0.0024 | -0.93 | | | | |
| Leg. Elec. Comp. | | | | | | | | | | | | | -0.0014 | -0.53 | | |
| Gov. Checks | | | | | | | | | | | | | | | 0.0012 | 0.85 |
| Constant | -8.6895 | -4.08 ‡ | -8.9380 | -4.15 ‡ | -6.1140 | -2.68 ‡ | -9.1123 | -4.23 ‡ | -9.6992 | -4.20 ‡ | -9.7152 | -4.24 ‡ | -9.3488 | -4.13 ‡ | -8.6544 | -4.00 ‡ |
| Observations | 659 | | 659 | | 659 | | 659 | | 659 | | 659 | | 659 | | 659 | |
| σ_u | 0.1985 | | 0.1846 | | 0.1935 | | 0.1927 | | 0.2024 | | 0.2011 | | 0.1972 | | 0.1913 | |
| σ_e | 0.0459 | | 0.0456 | | 0.0459 | | 0.0459 | | 0.0460 | | 0.0460 | | 0.0460 | | 0.0459 | |
| ρ | 0.9491 | | 0.9424 | | 0.9466 | | 0.9462 | | 0.9508 | | 0.9502 | | 0.9484 | | 0.9456 | |

Two-stage least squares with energy consumption as an instrument for GDP per capita. First stage results available on request.

* Significant at the 0.10 level; † Significant at the 0.05 level; ‡ Significant at the 0.01 level.

Table 4: Rotated Factor Loadings for Institutional Variables

| Variable | Democracy | Security | Transparency | Credibility | Uniqueness |
|-----------------------------------|-----------|----------|--------------|-------------|------------|
| Government Stability | 0.1536 | 0.316 | 0.0059 | 0.6696 | 0.4281 |
| Investment Profile | 0.2723 | 0.3056 | 0.1806 | 0.6379 | 0.393 |
| Internal Conflict | 0.2895 | 0.7809 | 0.188 | 0.1823 | 0.2378 |
| External Conflict | 0.3867 | 0.6122 | 0.0466 | 0.048 | 0.4712 |
| Corruption | 0.4012 | 0.3936 | 0.5696 | -0.0351 | 0.3585 |
| Ethnic Tensions | 0.2556 | 0.6765 | 0.0885 | 0.1239 | 0.4539 |
| Bureaucratic Quality | 0.397 | 0.3553 | 0.6069 | 0.168 | 0.3196 |
| Democratic Accountability | 0.7037 | 0.2735 | 0.4363 | 0.0437 | 0.2377 |
| Polity | 0.8371 | 0.1232 | 0.1539 | -0.0699 | 0.2556 |
| Political Durability | 0.1144 | 0.1595 | 0.5204 | 0.0956 | 0.6815 |
| Legislative Electoral Competition | 0.8703 | 0.0469 | -0.1161 | 0.0742 | 0.2215 |
| Executive Electoral Competition | 0.8801 | 0.0451 | -0.0506 | 0.0326 | 0.2197 |
| Political Fractionalization | 0.8453 | 0.0201 | -0.0283 | 0.0635 | 0.2803 |
| Political Polarization | 0.5869 | 0.075 | 0.2421 | 0.0235 | 0.5907 |
| Government Checks | 0.087 | 0.0785 | -0.0533 | -0.0142 | 0.9832 |

Highlighted cells represent variables with a factor loadings greater than 0.5 (in absolute value). These variables are used to interpret what each factor represents. Principle factor method has been used to calculate the factor loadings, and the rotation method is oblimin.

Table 5: Descriptive Statistics for Institutional Principle Factor

| Variable | Mean | Std. Dev. | Min | Max |
|--------------|-----------|-----------|--------|-------|
| Democracy | 5.56E-10 | 0.962 | -2.057 | 1.201 |
| Security | -2.45E-10 | 0.859 | -3.225 | 1.629 |
| Transparency | -4.21E-10 | 0.830 | -2.559 | 2.423 |
| Credibility | 5.45E-10 | 0.780 | -2.251 | 2.031 |

Table 6: Selected Rankings of Countries by Institutional Principle Factor

| | Democracy | Security | Transparency | Property Rights |
|----------------|---------------|-----------|---------------------|-----------------|
| Top Five | | | | |
| 1 | Belgium | Singapore | United States | Morocco |
| 2 | Israel | Hungary | Switzerland | Saudi Arabia |
| 3 | Denmark | Finland | Canada | Singapore |
| 4 | Netherlands | Denmark | New Zealand | Taiwan |
| 5 | Norway | Oman | Sweden | Qatar |
| First Quartile | | | | |
| 29 | Australia | Australia | Saudi Arabia | South Africa |
| 30 | United States | Syria | India | Senegal |
| Middle Five | | | | |
| 56 | Mexico | Namibia | Burkina Faso | Israel |
| 57 | Romania | Brazil | Nigeria | Malawi |
| 58 | Bulgaria | Congo | Botswana | Sri Lanka |
| 59 | Guyana | Malawi | Colombia | Finland |
| 60 | Namibia | Iran | Serbia & Montenegro | Slovakia |
| Third Quartile | | | | |
| 85 | Indonesia | Cyprus | Indonesia | Argentina |
| 86 | Ghana | Indonesia | Malawi | Colombia |
| Bottom Five | | | | |
| 110 | UAE | Congo, DR | Bangladesh | Romania |
| 111 | Oman | Israel | Mali | Sierra Leone |
| 112 | Bahrain | Iraq | Panama | Nicaragua |
| 113 | Saudi Arabia | Sudan | Haiti | Liberia |
| 114 | Qatar | Sri Lanka | Paraguay | Haiti |

Table 6: Impacts of institutional principle factors on the average skill of immigrants to the US with country fixed effects. (Dependent Variable: Skill intensity)

| Variable | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat | Coefficient | t-stat |
|--------------------------------|-------------|---------|-------------|---------|-------------|---------|-------------|---------|-------------|---------|
| Skill Intensity _{t-1} | 0.3236 | 8.45 ‡ | 0.3164 | 8.71 ‡ | 0.3275 | 8.63 ‡ | 0.3365 | 9.09 ‡ | 0.3413 | 9.24 ‡ |
| Year | 0.0050 | 4.15 ‡ | 0.0060 | 5.30 ‡ | 0.0053 | 4.63 ‡ | 0.0021 | 1.75 * | 0.0041 | 2.91 ‡ |
| New Immigrant | 0.1855 | #### ‡ | 0.1706 | #### ‡ | 0.1896 | #### ‡ | 0.1753 | #### ‡ | 0.1678 | #### ‡ |
| Employment Visas | 0.1418 | 8.59 ‡ | 0.1522 | 9.31 ‡ | 0.1395 | 8.52 ‡ | 0.1595 | 9.38 ‡ | 0.1663 | 9.86 ‡ |
| GDP per Capita | ##### | -2.30 † | -0.0121 | -2.62 ‡ | ##### | -2.55 † | ##### | -2.38 † | ##### | -2.90 ‡ |
| Average Education | ##### | -1.06 | -0.0026 | -0.51 | ##### | -0.75 | ##### | -0.49 | 0.0020 | 0.39 |
| Num of Immigrants | ##### | -2.51 † | -0.0035 | -2.30 † | ##### | -2.26 † | ##### | -1.97 † | ##### | -1.57 |
| Population | ##### | -2.43 † | -0.0005 | -1.90 * | ##### | -2.35 † | ##### | -2.70 ‡ | ##### | -2.21 † |
| Democracy | ##### | -0.60 | | | | | | | ##### | -0.43 |
| Security | | | -0.0221 | -4.56 ‡ | | | | | ##### | -4.19 ‡ |
| Transparency | | | | | 0.0132 | 2.70 ‡ | | | 0.0126 | 2.66 ‡ |
| Credibility | | | | | | | 0.0156 | 4.30 ‡ | 0.0149 | 4.12 ‡ |
| Constant | ##### | -4.00 ‡ | ##### | -5.15 ‡ | ##### | -4.48 ‡ | ##### | -1.57 | ##### | -2.78 ‡ |
| Observations | 659 | | 659 | | 659 | | 659 | | 659 | |
| σ_u | 0.1996 | | 0.2046 | | 0.1959 | | 0.1868 | | 0.2074 | |
| σ_e | 0.0460 | | 0.0452 | | 0.0459 | | 0.0454 | | 0.0449 | |
| ρ | 0.9495 | | 0.9534 | | 0.9479 | | 0.9444 | | 0.9553 | |

Two-stage least squares with energy consumption as an instrument for GDP per capita. First stage results available on request.

* Significant at the 0.10 level; † Significant at the 0.05 level; ‡ Significant at the 0.01 level.

Table 7: Impacts of institutional principle factors on the skill of immigrants to the US. (Ordered Logit, Dependent Variable: Immigrant Skill)

| Variable | Coefficient | t-stat | Marg. Effect | Coefficient | t-stat | Marg. Effect | Coefficient | t-stat | Marg. Effect | Coefficient | t-stat | Marg. Effect | Coefficient | t-stat | Marg. Effect |
|-------------------------|-------------|--------|--------------|-------------|--------|--------------|-------------|--------|--------------|-------------|--------|--------------|-------------|--------|--------------|
| Year | -0.0070 | -6.05 | -0.0017 ‡ | 0.0129 | 10.33 | 0.0032 ‡ | -0.0014 | -1.20 | -0.0003 | -0.0093 | -7.44 | -0.0023 ‡ | -0.0098 | -6.92 | -0.0024 ‡ |
| New Immigrant | -0.0028 | -0.43 | -0.0007 | 0.0168 | 2.58 | 0.0042 † | 0.0134 | 2.04 | 0.0033 † | 0.0095 | 1.46 | 0.0024 | -0.0060 | -0.91 | -0.0015 |
| Employment Visas | 1.3628 | ##### | 0.3239 ‡ | 1.3870 | ##### | 0.3290 ‡ | 1.3755 | ##### | 0.3265 ‡ | 1.3869 | ##### | 0.3289 ‡ | 1.3744 | ##### | 0.3264 ‡ |
| GDP per Capita | 0.0137 | 25.60 | 0.0034 ‡ | 0.0232 | 42.35 | 0.0058 ‡ | 0.0160 | 27.42 | 0.0040 ‡ | 0.0178 | 35.16 | 0.0000 ‡ | 0.0132 | 19.54 | 0.0033 ‡ |
| Average Education | -0.0899 | -25.61 | -0.0223 ‡ | -0.0294 | -8.51 | -0.0073 ‡ | -0.0455 | -13.12 | -0.0113 ‡ | -0.0528 | -16.09 | -0.0131 ‡ | -0.0498 | -12.75 | -0.0124 ‡ |
| Ave. Educ. in 1960 | -0.0138 | -3.36 | -0.0034 ‡ | -0.0230 | -5.31 | -0.0057 ‡ | 0.0033 | 0.78 | 0.0008 | 0.0164 | 4.07 | 0.0041 ‡ | -0.0447 | -9.89 | -0.0111 ‡ |
| Num of Immigrants | -0.0141 | -19.96 | -0.0035 ‡ | -0.0056 | -7.81 | -0.0014 ‡ | -0.0105 | -15.08 | -0.0026 ‡ | -0.0074 | -9.97 | 0.0000 ‡ | -0.0059 | -7.42 | -0.0015 ‡ |
| Population | 0.0003 | 12.49 | 0.0001 ‡ | 0.0005 | 27.51 | 0.0001 ‡ | 0.0006 | 33.93 | 0.0001 ‡ | 0.0007 | 36.67 | 0.0000 ‡ | 0.0003 | 12.52 | 0.0001 ‡ |
| Distance | 0.0281 | 9.11 | 0.0070 ‡ | 0.0322 | 10.41 | 0.0080 ‡ | 0.0405 | 12.37 | 0.0101 ‡ | 0.0273 | 8.70 | 0.0000 ‡ | 0.0373 | 11.45 | 0.0093 ‡ |
| English | -0.0780 | -9.88 | -0.0194 ‡ | -0.0328 | -4.26 | -0.0081 ‡ | -0.0136 | -1.72 | -0.0034 * | -0.0303 | -3.85 | -0.0075 ‡ | -0.1659 | -18.87 | -0.0412 ‡ |
| Colony | 0.2132 | 11.45 | 0.0532 ‡ | 0.3043 | 16.74 | 0.0759 ‡ | 0.3531 | 19.69 | 0.0881 ‡ | 0.3409 | 18.96 | 0.0850 ‡ | 0.1996 | 10.67 | 0.0498 ‡ |
| Democracy | 0.3178 | 32.02 | 0.0789 ‡ | | | | | | | | | | 0.2642 | 25.87 | 0.0656 ‡ |
| Security | | | | -0.1245 | -23.87 | -0.0309 ‡ | | | | | | | -0.0791 | -14.89 | -0.0196 ‡ |
| Transparency | | | | | | | 0.0596 | 8.15 | 0.0148 ‡ | | | | 0.1060 | 14.09 | 0.0263 ‡ |
| Credibility | | | | | | | | | | 0.1020 | 19.20 | 0.0253 ‡ | 0.1009 | 18.56 | 0.0251 ‡ |
| Cut 1 | -14.994 | 0.00 | | 25.071 | 0.00 | | -3.340 | 0.00 | | -19.331 | 0.00 | | -20.538 | 0.00 | |
| Cut 2 | -13.646 | 0.00 | | 26.418 | 0.00 | | -1.994 | 0.00 | | -17.985 | 0.00 | | -19.189 | 0.00 | |
| Observations | 518,015 | | | 518,016 | | | 518,017 | | | 518,018 | | | 518,019 | | |
| Adjusted R ² | 0.0574 | | | 0.0569 | | | 0.0565 | | | 0.0567 | | | 0.0581 | | |

Two-stage least squares with energy consumption as an instrument for GDP per capita. First stage results available on request.

Marginal Effects represent the change in the probability of being an immigrant from a "highly-skilled" occupation for a given change in x .

* Significant at the 0.10 level; † Significant at the 0.05 level; ‡ Significant at the 0.01 level.