Rewards of Reforms:

Can Economic Freedom and Reforms in Developing Countries Reduce the Brain Drain?

by

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ABSTRACT: The objective of this paper is to investigate the impact of economic freedom on brain drain from developing countries to rich countries. Previous literature on brain drain has examined social, political, and economic determinants. However, no study in the literature so far has studied this proposed relationship. We employ the *Economic Freedom Index* sourced from the Fraser Institute as a proxy for economic freedom and the rate of moderately skilled and highly skilled emigration functions as a proxy for brain drain. Our sample consists of 142 countries covering the period 1990–2010. We estimate the results using a two-way fixed effects regression estimator. The results show that an increase in economic freedom is strongly associated with lower levels of brain drain from developing countries to rich countries. In addition, we find that long-term benefits associated with more economic freedom outweigh short-term costs of economic reforms when it comes to restricting brain drain.

Key words: Brain drain, economic freedom, economic reforms, migration theory, developing countries

1. Introduction

In this paper, we examine the impact of economic freedom and reforms on brain drain. Is economic freedom a prime determinant of brain drain rates from developing countries**,** holding other things constant? If so, does more economic freedom in poor countries reduce the likelihood of brain drain to rich countries? Previous studies on migration and brain drain have looked at the relationship between emigration rates and economic development (Gibson and McKenzie 2012; Portes and Celaya 2013), income (Rooth and Saarela 2007), labour market and unemployment (Harris and Todaro 1970; Hatton and Williamson 2002). Others have looked at the relationship between migration and democracy (Solimano 2009), conflict and human rights (Naude 2010). Furthermore, there has been some literature examining the social and cultural determinants in migration patterns (Munshi 2003; Belot and Ederveen, 2012). Lastly, there are also studies that identify demographic determinants of brain drain (Fargues 2004; Mayda 2010). It is noteworthy that large numbers of these studies focus on socio-economic and political determinants of emigration. However, whether increasing economic freedom and introducing reforms in developing countries reduces brain drain remains unexplored in the literature.[1] To our knowledge there is no comprehensive empirical study so far that examines the relationship between economic freedom and brain drain.

Our theoretical arguments identify two mechanisms in which economic freedom negatively affects brain drain. First, the direct effects of economic freedom are expected to lead to market liberalization, more innovation, better business opportunities and increased job opportunities. In turn, this should reduce the brain drain. Second, we identify indirect effects

[1] Chau (2012) is the only study, which comes close by investigating the impact of economic reform on emigration in the case of Malaysia.

as externalities of economic freedom such as increased income and political—and economic stability. We apply the neoclassical migration theory assumption on the global labour market's mechanisms and its cost-benefit analysis to capture the motivation to emigrate.

Using panel data on 142 countries covering the years 1990–2010 we subject our theoretical arguments to an empirical test by using the ordinary least squares two-way fixed effects estimator. The dependent variable is *brain drain* and captures both medium – and highly skilled emigration. The former is measured as percentage share of emigrants with moderate skills, that is, emigrants with secondary education or the equivalent. The latter is measured as percentage share of emigrants with higher education, that is, a university degree or the equivalent. The main independent variable *Economic Freedom Index*, (EFI) is coded on a scale 0–10, with 10 meaning absolute economic freedom. The summary of our findings is as follows: holding other things constant, we find a negative correlation between EFI and medium skilled emigration. Interestingly, the negative effect of EFI is strongest on highly skilled emigration. The results lend support to our argument that increasing economic freedom should reduce the brain drain. Finally, we control for short-term effects of economic reform against the long-term effects of more economic freedom. The results show that the costs associated with economic reforms are marginal compared to the benefits of greater economic freedom when it comes to retaining possible emigrants. These results survive a variety of robustness checks. The substantial results from these models do not differ notably from our main models.

2. Theory and Hypotheses

Here we identify two causal mechanisms. First, the direct effects and second the indirect effects of economic freedom.

2.1 Unpacking economic freedom

The fundamentals of economic freedom are personal choice, voluntary exchange, security of private property and freedom to enter markets. It can be defined as the right of every individual to freely administer its resources, labour and private property with minimal government intervention beyond securing the rule of law. Economic freedom allows for freedom of choice and for individuals to engage in voluntary transactions. In a broader sense, economic freedom capture how closely institutions and policies of a country corresponds with a limited government ideal (Gwartney et al. 2015). Less government regulations means more economic freedom. The concept of economic freedom captures several interrelated underlying factors such as; taxation policies, public spending, monetary policies, rule of law, credit market—and labour market regulations and freedom of trade[2]. Given the multi-dimensional nature of economic freedom the question needs to be asked whether these factors act independently or work together. Capturing and measuring the individual factors that the concept of economic freedom encompass will undoubtably lead to valuable insights in the respective areas and in further discerning the economic drivers of our societies. However, to fully appreciate the impact of economic freedom on brain drain one needs to appreciate the synergy of these factors. Gwartney (IBID) use the analogy of a moving car as an example. It is the interconnection of the "wheels, motor, transmission, driveshaft and frame of the car" that makes it move, just as "it may be a combination of interrelated factors that bring about economic freedom (p.7). Ensuring economic freedom is the process of deregulatory measures across the economy. In other words, increasing economic freedom should be understood as undertaking market friendly reforms. As such economic freedom offer a broad measure across factors in the sending countries local economic context that may help explain brain drain

[2] For a full overview of the sub-components of Economic Freedom see chapter 3.

emigration. To our knowledge no such contribution to the brain drain discussion has yet been made. In the following section we theorize how reforms promoting economic freedom may lead to less brain drain.

2.2 Direct effects of economic freedom on brain drain

In *The Wealth of Nations* ([1776] (1999)), Adam Smith argues for a free market operating by its own self-regulating mechanisms. According to Smith the free market will ensure that resources are allocated where they are the most beneficial and efficient, leading to increased productivity. This view is supported elsewhere (e.g. Bjørnskov and Foss 2008). The presumption is that government intervention in the market leads to inefficient allocation of resources thus creating distortions and discrimination. Such discretion occurs through government favoritism, protection and/or monopoly in certain sectors or industries. By cutting government intervention through economic liberalization, discretion, nepotism and favoritism towards inefficient firms and groups is eliminated. The result is a market operating by its own mechanisms in which the most talented individuals and companies are rewarded. In this 'market Darwinism' overall efficiency will increase as the unproductive are weeded out. In turn, the reward for talent will provide an incentive for potential emigrants to stay, especially the highly skilled. Neoclassical migration theory's microeconomics emphasize that potential emigrants are rational individuals making the decision to emigrate based on a cost-benefit calculation (Borjas 1989). Liberalizing the market, thus creating a conducive environment for business and investment, and the subsequent reward for talent should lead to lower emigration rates of the highly skilled in particular.

The second point is dependent on the former but captures a more specific direct effect following more economic freedom, namely innovation. In a free market economy where

talent, efficiency and productivity are rewarded, the highly skilled would recognize this and make effort to innovate. A free market economy based on merit gives the highly-skilled an incentive to apply their skills in the home countries as returns to innovation and work increases. In fact, more economic freedom is likely to result in more innovation (Nystrom 2008). Furthermore, an innovation-friendly environment is expected to result in technological advance, increasing productivity. New technologies are a necessity for – and are a fundamental feature of economic growth. Perhaps more importantly for emigration rates and for highly skilled emigrants in particular, is the human capital accumulation following an innovation – and business friendly environment. The link between economic reforms and social and human capital development has been captured in existing literature (Goldsmith 1997; Dawson 1998; Norton 2003). With a prosperous business environment and more innovation following greater economic freedom, the incentive to acquire an education will persist. However, the highly-skilled are expected to be channeled into new businesses and innovation industries in the sending countries rather than move abroad. As business and industrial clusters emerge, the potential human capital return is likely to increase. Economic freedom is therefore expected to reduce skilled emigration of highly-skilled labour in particular.

Economic freedom ensuring a free market, property rights and access to credit creates a better business environment and attracts investment, both from abroad and domestically. Moreover, economic liberalization stimulates trade which in turn creates capital accumulation to be reinvested in new businesses. This brings us to the third direct way in which more economic freedom impacts brain drain rates, namely through increased jobs, business and economic opportunities. There is a substantial body of literature linking unemployment in the labour market and international migration (Potts 2000; Kates and Dasgupta 2007). The implication of this theoretical underpinning is as follows: a better business environment

resulting from liberalization of the market and sound economic policies would in turn create new job opportunities as new investments flow in, resulting in the establishment of new businesses. In fact, Feldmann (2008) argues that anticompetitive business regulations lead to higher unemployment rates. Deregulation, easing the process of doing business, investment, making credit accessible, making the labour market flexible, among others, increases job opportunities for the middle classes in particular, thus reducing their incentive to look for employment elsewhere. In the same way, the incentive for potentially highly-skilled emigrants to emigrate should be reduced as they acquire the opportunity to start businesses and new innovative ventures with smart economic policies and less government intervention. Feldman (2007) concludes that more economic freedom is likely to substantially reduce unemployment. Hence, the logic of neoclassical migration theory suggests that more job opportunities in the migrant-sending country following an increase in economic freedom should lower skilled emigration rates substantially. Having now identified three ways in which more economic freedom directly impacts skilled emigration, we turn to the indirect effects.

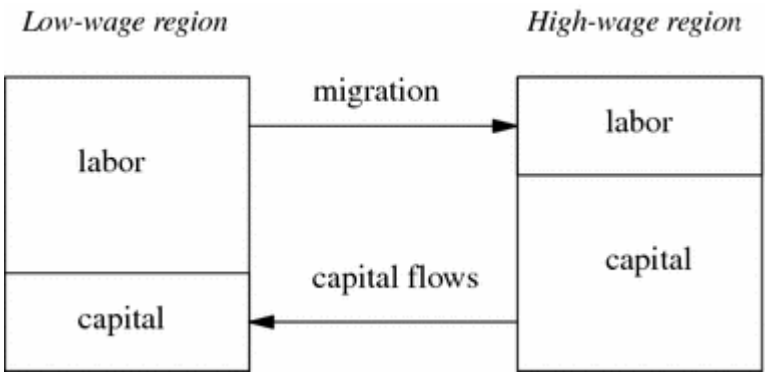
2.3 Indirect effects of economic freedom on brain drain

By indirect effects we mean the effects on brain drain explained through externalities of more economic freedom. The first indirect impact is through increasing income in the medium to long term. There is a well-established literature showing a positive relationship between economic freedom and economic growth. For instance, Easterly and Levine (1997), Gwartney et al. (1999) and de Haan and Sturm (2000) all find a strong positive correlation between EFI and economic growth and development.[3] Similarly, there is an apparent correlation between

[3] See Rodriguez and Rodrik (2001) for the argument of the debate.

level of economic freedom and increased per capita income (Easton and Walker 1997; Economic Freedom of the World 2015). Indeed, by committing to economic reforms, countries will improve the business environment which in turn attracts investment and creates job opportunities that should result in lower emigration rates. China, India, and Vietnam all represent important examples of having undergone economic liberalization reforms over the recent decades, dramatically increasing their respective general levels of income. As noted above, neoclassical migration theory highlights wage differentials as one of the fundamental mechanisms behind migration (Hatton and Williamson 2002; Rooth and Saarela 2007). The difference in wages is expected to give rise to two different scenarios. One is labour flows from low-wage regions to high-wage regions; the other is capital flows from high-wage regions to low-wage regions (Öberg 1997; Jennissen 2006).

Exhibit 1: Relationship between wage, labor and migration (from Öberg, 1997 p.24)



When wage equilibrium[4] is achieved, the theory expects migration to stop. However implausible this assumption may be, the general link between income levels and emigration is

[4] This suggests that over time the two flows will create a stance in which wages are equally distributed across regions. In this view, migration is a temporary phenomenon since migration flows are expected to stop when wage equilibrium is reached. See Öberg (1997) for a more detailed explanation.

important, and has been established through a number of studies, also for brain drain (Carr et al. 2005; Connell et al. 2007). Thus, if higher wages are among the chief determinants of brain drain, a general increase in wages in the medium to the long term following an increase in economic freedom should reduce incentives for emigration among the skilled from developing countries.

The second indirect impact is through preventing reoccurring economic crises. Good economic policies are expected to prevent economic crisis. In fact, some go even further to argue that more economic freedom promotes peace (e.g. Tures 2003). On the other hand, should economic crisis occur in developing economies with less economic liberalization, this may actually have a positive effect on economic freedom in the long run. The third indirect way in which more economic freedom impacts high-skilled emigration is through political stability. There is an extensive amount of literature documenting how crisis and political instability leads to higher levels of emigration (Solimano 2009; Naude 2010). Implementing economic reforms might initially lead to higher levels of political instability as groups in the population not benefiting from the reforms are likely to oppose them. However, over a longer period, more economic freedom is expected to lead to higher levels of income and a general increase in living standards. Furthermore, an overall increase in living standards and income is expected to reduce the public's incentive to revolt, leading to political stability and social harmony (de Soysa and Fjelde 2010). In fact, Gans-Morse and Nichter (2008) argue that undertaking economic reforms aimed at more economic freedom should lead to more democratization in the long-term. Some of the best examples supporting this argument include South Korea, Taiwan, the Philippines, and Indonesia, all of which became democracies in the 1990s after following marked-oriented long-term economic reforms for a period of two decades. Consequently, we expect more economic freedom to result in political stability, harmony, and democratization, leading to lower levels of brain drain over time. Summing up,

we theorize that increasing economic freedom will directly reduce the brain drain rates by providing job opportunities for the medium-skilled and incentives to stay through innovation, – and business opportunities for the highly-skilled. Indirect effects of more economic freedom are also expected to negatively impact brain drain through a general increase in income, and political and economic stability. Based on the above discussion we arrive at the following hypothesis:

H1: *Holding other things constant, undertaking economic policy reforms in developing countries reduces the likelihood of 'brain drain' to rich countries.*

3. Methods and data

3.1 Model specification

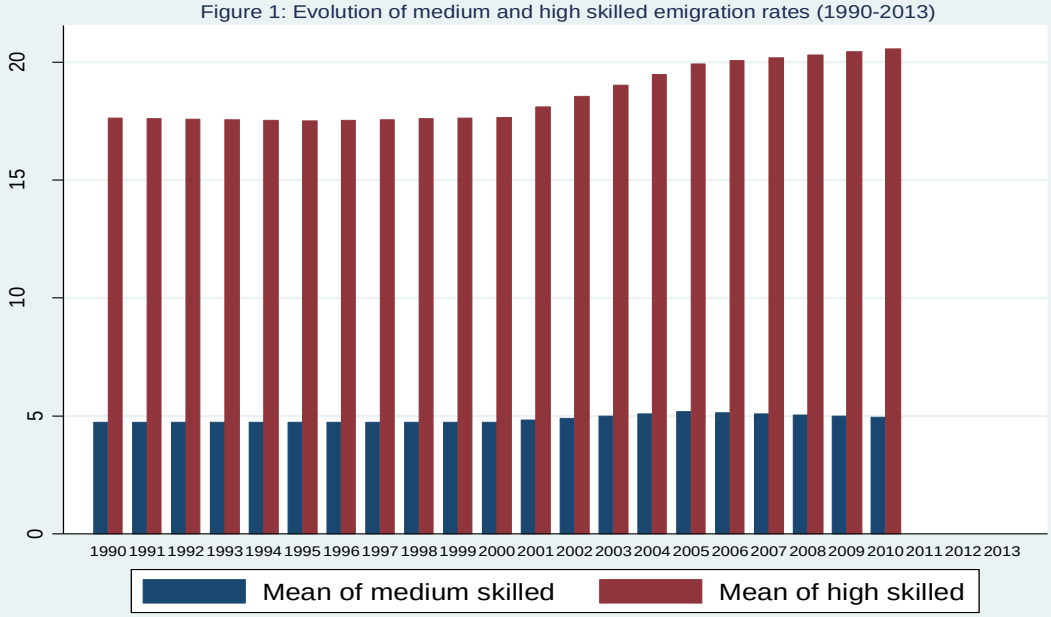
We employ panel data containing 142 countries (see Appendix 1 for list of countries) covering the period 1990–2010 to examine whether undertaking economic policy reforms in developing countries reduces the likelihood of brain drain from developing countries to rich countries. We thus estimate:

$$Y_{it} = \phi_1 + \psi_2 H_{it} + \psi_3 Z_{it} + \upsilon_t + \eta_i + \omega_{it} \qquad (1)$$

where, $\boldsymbol{Y_{it}}$ is the dependent variable for country ***i*** at year ***t.*** This study has *brain drain* as its dependent variable. To define *brain drain* we use two different measures. First, the percentage share of highly-skilled native workers (university degree or equivalent) with home-country education emigrating to rich countries seeking economic and business opportunities. Second is the percentage share of moderately skilled native workers (with secondary education) emigrating to rich countries seeking economic and business

opportunities.[5] The *brain drain* variable measures the total number of skilled emigrants divided by total emigration rate, migrating to the top 20 OECD countries.[6] The data on brain drain is taken from the dataset developed by Brücker et al. (2013),[7] where migrants are defined by country of origin. The data is available for five year intervals over the period 1980–2010, and as with the emigration rate variable we estimate data for the interim years of each period through interpolating.[8] Figure 1 presents the evolution of medium and highly skilled emigration rates by countries over time, covering the period 1990–2010. Looking at medium-skilled emigration we find the emigration rates to be almost constant over time. However, looking at the high-skilled emigration rate there is a slight increase from 1990 to 2010.

Figure 1: Evolution of medium and high skilled emigration rates (1990-2013)



[5] Note that the low-skilled (primary or limited education) migration category is dropped as it is captured by our total emigration rate variable and can hardly be defined as brain drain.

[6] The OECD countries include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, The United Kingdom, and The United States of America.

[7] For a more detailed methodology see Brücker et al. (2013), http://www.iab.de/en/daten/iab-brain-drain-data.aspx

[8] 1980–1985, 1985–1990, 1990–1995, 1995–2000, 2000–2005, 2005–2010.

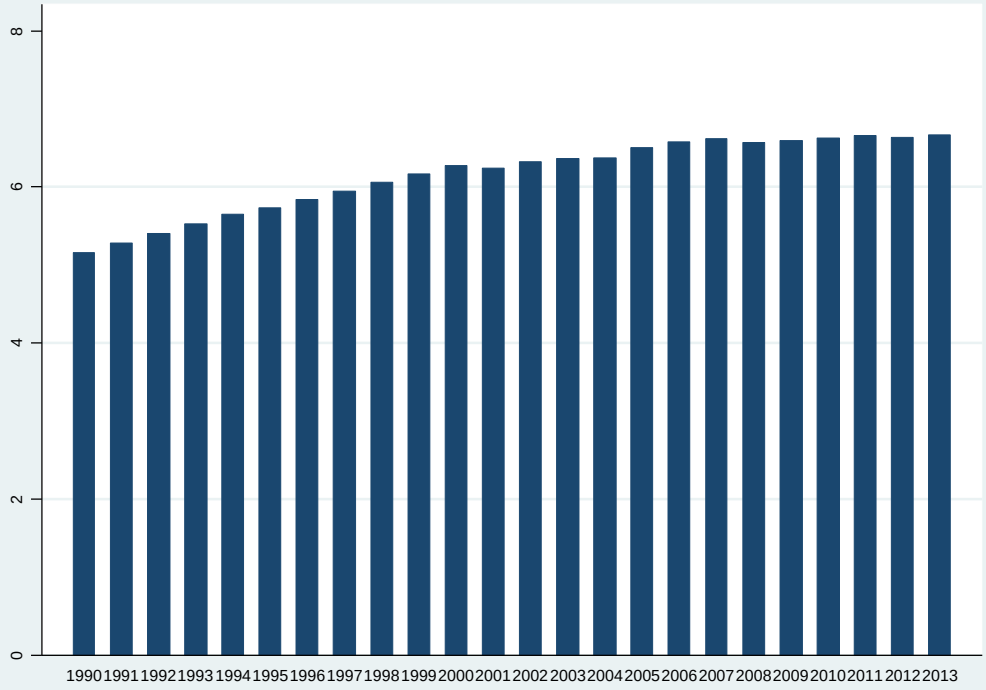
Note that there is a jump after the year 2000. This has also been noted by Docquier and Rapoport (2012) who draws attention to a slight increase in highly-skilled migration in the last decade. The explanation as to why highly-skilled emigration experience a marginal increase over the last couple of years may be attributed to several factors. For those choosing to emigrate there is likely to be a number of determinants affecting the decision. One factor could be pull-factors of developed countries actively targeting highly-skilled immigrants in certain sectors. The desire for highly-skilled immigrants in the recipient countries is likely to be higher than for medium or unskilled immigrants. In fact, neoclassical migration theory expects emigration flows from low – to high-wage regions to be dominated by the highly-skilled (Rooth and Saarela 2007). Furthermore, the increase in highly skilled emigration might not be the case for all countries in the sample but attributed to outliers driving the results.

$\boldsymbol{H_{it}}$ captures the main hypothesis variable – *Economic Freedom Index* (Gwartney et al. 2015). For measuring economic freedom we use the Fraser Institute *EFI* designed by Gwartney and Lawson (2008) as an indicator of economic policy reforms.[9] In this study we use *EFI* as a proxy for economic freedom. Data on *EFI* is available in five year-intervals for the period 1970–2000, and thereafter on an annual basis. The *EF*I contains the most objective measures of both economic and institutional reform in a country. The index is a wide-ranging measure made up of five sub-indices capturing the following: expenditure and tax reforms; property rights and legal reforms; trade reforms; reforms related to access to money; labour, business and credit reforms. These five sub-indices are in turn made up of 35 components of objective indicators under each sub index. The final index is ranked on a scale from 0 (not free) to 10 (totally free). Lastly, missing years between the quintiles for the EFI variable are

[9] See the list of studies that use Fraser Institute's EFI measure as a proxy for reforms: http://www.freetheworld.com/papers.html

interpolated.[10] Figure 2 shows the evolution of EFI by country over time. Notice that over the period covered (1990–2013), the mean value of EFI has increased, pointing to an overall trend towards economic liberalization in the sample of countries.

Figure 2: Evolution of Economic Freedom Index (1990-2013)

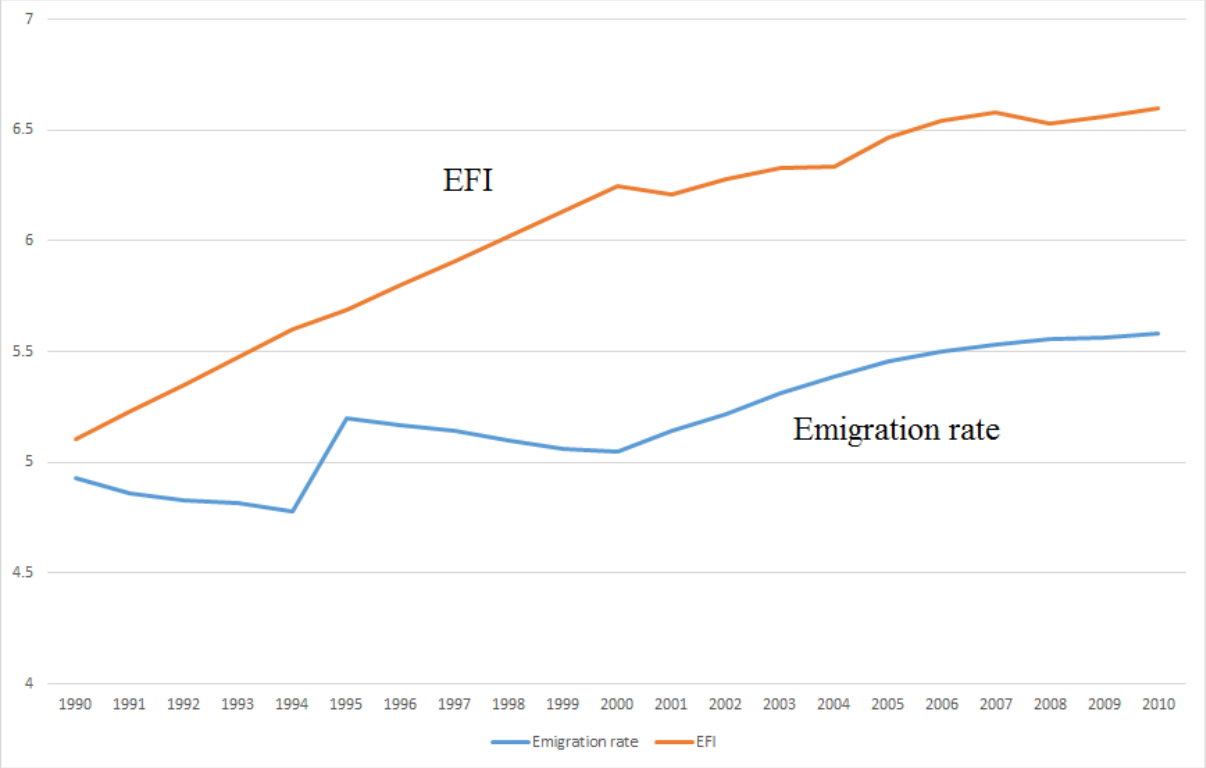


Comparing Figure 1 and 2 we find both economic freedom and high-skilled emigration has increased. Apparently contradicting our argument that increasing levels of economic freedom should reduce brain drain. However, the increase is marginal for both *EFI* and highly-skilled emigration. Nevertheless, undertaking and implementing economic reforms resulting in more economic freedom takes time. Thus, we have yet to see the impact of the increase in *EFI* on highly-skilled emigration. Following our argument, the tables should show that an increase in *EFI* over time leads to lower levels of emigration. However, there is a third implication. To capture the effects of economic freedom on brain drain we hold other things constant, meaning isolating EFI from other possible determinants in the regressions. This is, however,

[10] For detailed methodology on the EFI, see: http://www.freetheworld.com/datasets_efw.html

not the case for either Figures 1 or 2. Hence, another possible explanation to the trend found in Figures 1 and 2 may be the effect of other determinants not captured in our analysis. We also present a figure showing how mean emigration rate evolves around EFI levels (Figure 3).

Figure 3: Mean emigration and EFI



Finally, $\boldsymbol{Z_{it}}$ includes the vector of control variables, discussed below. υ_t are time dummies, η_i are country dummies and ω_{it} is the error term for country ***i*** at time ***t***. The vector of control variables $\boldsymbol{(Z_{it})}$ includes other potential determinants of brain drain. The list of potential control variables is extensive. We control for the level of development by including *per capita income* (log) at US$ 2000 year in constant prices, sourced from the World Development Indicators (World Bank 2014). Then we include the Polity IV index (Marshall and Jaggers 2002) capturing the nature of the political regime in power. The index goes from -10 (representing full autocracy) to +10 (meaning full democracy). Previous literature has

argued that a link exists between democratic preference and emigration (Solimano 2009). This is also the case for the highly-skilled (Chimanikire 2005). In fact, some argue that the role of democratic institutions is even more important to the highly-skilled potential emigrants (Ariu et al. 2014). We also include *civil conflict*, coded as a dummy variable where 1 is active civil conflict and 0 is absence of active civil conflict. Active civil conflict is defined as a conflict in which at least one party is the government and with battle deaths exceeding 25 in any year **(**Gleditsch et al. 2002). Furthermore, *economic crisis* is also added as a control variable. This is coded as a dummy variable capturing whether or not a country has faced one or more of the following crises: debt, currency and banking (Laeven and Valencia 2013). Political Terror Scale (PTS) human rights index is also included. The *PTS human rights index* is coded on a scale from 1 to 5 where 1 is proper rule of law, absence of human rights violations, torture or illegal detention. The data is sourced from Gibney et al. (2012). Existing literature argues that human rights abuses leads to increased emigration (e.g. Naude 2010). Lastly, we include workers' rights scoured from Cigranelli and Richards (2010). The variable is coded on a scale from 0-2, where 0 means severely restricted workers rights and 2 means fully protected workers' rights. All variables in the regression models, including the dependent variables are lagged by one year. The descriptive statistics are provided in Appendix 2 and the details on definitions and data sources are provided in Appendix 3.

3.2 Estimation Technique

All the regressions are estimated using the ordinary least squares (OLS) two-way fixed effects estimator. We use an OLS estimator as both dependent variables are continuous. The fixed effects in equation (1) is denoted as υ_t which is the time fixed effects, and η_i which is the country fixed effects. We control for time and country fixed effects as various unobserved

time invariant factors including culture, geography and similar such factors remaining constant over time and countries and which can explain variations in the dependent variable.

4. Empirical Analysis

In Table 1, the negative relationship between *EFI* and *medium skilled emigration* is captured. Interestingly, *EFI* is insignificant with *per capita income* (log) as the only control variable and the correlation between *EFI* and emigration is rather weak. Again, *per capita income* (log) insignificance may be attributed to the costliness of migration for medium-skilled emigrants. Adding *democracy* in column 2, we find this variable to be insignificant. However, when including this control we see that the negative relationship between EFI and medium-skilled emigration becomes statistically significant. The substantial effects suggest that increasing one standard deviation of EFI above the mean is associated with a 17% decline in medium skilled emigration rate. In fact, these results might actually underreport the impact of EFI on medium-skilled emigration, as the medium skilled emigration variable only captures location-specific emigration to the richest OECD countries. If the remaining medium-skilled emigrants migrating elsewhere were to be included, the effect is likely to be stronger.

In other words, economic freedom is an important determinant for explaining medium skilled emigration when holding other things constant. The results presented in Table 1 support our hypothesis that undertaking economic policy reforms by developing countries reduces the likelihood of brain drain to rich countries. Furthermore, our findings are in line with arguments made by Arouri et al. (2014) that economic development should lower emigration rates for brain drain.

Table 1: Impact of Economic Freedom Index on medium skilled emigration rate in developing countries

	(1) MSER	(2) MSER	(3) MSER	(4) MSER	(5) MSER	(6) MSER	(7) MSER
EFI (t-1)	-0.0193	-0.163***	-0.169***	-0.166***	-0.165***	-0.153***	-0.141***
	(0.0669)	(0.0582)	(0.0586)	(0.0576)	(0.0587)	(0.061)	(0.061)
lnGDPpc (t-1)	-0.264	-0.142	-0.143	-0.147	-0.129	-0.113	-0.190
	(0.199)	(0.202)	(0.202)	(0.202)	(0.210)	(0.207)	(0.247)
Democr. (t-1)		0.00568	0.00412	0.00388	0.00494	0.0281	0.0060
		(0.0108)	(0.0107)	(0.0107)	(0.0108)	(0.039)	(0.0107)
Conflict (t-1)			-0.199**	-0.198**	-0.223**	-0.229**	-0.228**
			(0.0976)	(0.0976)	(0.108)	(0.107)	(0.112)
Ec. Crisis (t-1)				0.0804	0.0798	0.078	0.069
				(0.118)	(0.118)	(0.119)	(0.123)
HRI (t-1)					0.0329	0.034	0.029
					(0.0565)	(0.056)	(0.059)
EFI*Polity						-0.0004	
						(0.0066)	
CIRI Workers							0.109*
							(0.064)
Constant	5.214***	1.371	1.582	1.569	1.489	2.461*	3.797
	(1.915)	(0.986)	(0.993)	(0.993)	(1.129)	(1.435)	(2.678)
Estimation	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,873	1,833	1,833	1,833	1,830	1,830	1,777
R-squared	0.972	0.969	0.969	0.969	0.969	0.969	0.969

Note MSER: Medium skilled emigration rate

(1) Robust standard errors in parenthesis

(2) Statistical significant: ***p<0.01 **p<0.05*p<0.10

In columns 3–5, we include the following variables, *civil conflict*, *economic crisis*, and *human rights*, of which only *civil conflict* is statistically significant. Results for the civil conflict variable show a quite surprising negative correlation to medium-skilled emigration which is statistically significant at the 5% level. Meaning, active civil conflict actually leads to less emigration which is contrary to Naude's (2010) findings. In order to explain the surprising results on the civil conflict variable we look at the interplay between the control variables. In fact, civil conflict, human rights and democracy are strongly interrelated and

may capture similar effects. For example, wherever there is conflict there is likely to be human rights violations. Equally, where there are human rights violation there is likely to be conflict. Where democracy scores high there is usually less conflict and human rights abuse. Thus, the variables may interact in ways that lead to unexpected outcomes in the regression results, pointing to a possible spurious correlation between the civil conflict variable and medium-skilled emigration. We then control for worker rights conditions and find that the effect is negative and significant at the 10% level. Suggesting that increasing workers' rights should lead to lower emigration rates. A rather unsurprising result as our medium skilled category will be the typical middle-class employee. Furthermore, it must be noted that although controlling for workers' rights slightly moderates the negative effect of EFI it remains negative and statistically significant. This supports the assumption that economic freedom is an important determinant in explaining medium skilled emigration, holding other things constant. Overall, the findings in Table 1 are in line with previous arguments suggesting that undertaking economic policy reforms should lead to declining emigration rates (Kule et al. 2002), including brain drain (Arouri et al. 2014). As such, our hypothesis is supported by the data.

In Table 2 (column 1), we find a substantial negative correlation between *EFI* and *high skilled emigration*, a result that is continuous throughout all columns in Table 2. The substantial effects of column 1 suggest that an increase in one standard deviation above mean of EFI would result in a 65% decline in highly-skilled emigration. When adding the relevant control variables in a stepwise manner from columns 1 to 5, *EFI* remains negatively correlated with highly-skilled emigration. Note that from columns 2 to 5, *EFI* is statistically significant at the 5% level. Moreover, including the control variables does have some effect on *EFI*'s substantial effects. Substantial effects in column 5, where all possible control variables are included, suggest that an increase in one standard deviation above the mean of

EFI leads to a 75% reduction in the high-skilled emigration rate. Once again, these results might actually be underreporting the true negative effects of *EFI* on highly-skilled emigrants as discussed previously. Regardless, results support our hypothesis and seem to suggest that undertaking economic policy reforms by developing countries may reduce levels of brain drain to rich countries. The results are in line with existing literature and theory on brain drain. Arouri et al. (2014) argue that economic reforms leading to economic freedom do reduce brain drain. This suggestion is broadly supported by other literature making similar arguments **(**Chimanikire 2005; Ngoma and Ismail 2013). In fact, compared to the previous table there is see an even stronger correlation between *EFI* and *high skilled emigration*. There are two implications that may explain the lower correlation between *EFI* and *medium skilled emigration* compared to that of *highly skilled emigration*. First, isolating medium skilled emigrants in the sample excludes the high skilled emigrants which are expected to drive the strong correlation between *EFI* and emigration up as highly skilled tend to have stronger economic motivation for emigrating because of potential higher financial gains (McKenzie and Gibson 2010). Second, the emigration process is costly as emphasized by neoclassical migration theory (Borjas 1989). This usually restricts the outflow of people especially from the middle classes and lower middle classes, who form our medium skilled emigration category.

Undertaking economic policy reforms is thus likely to have an even greater impact on high skilled emigration rate, than on medium skilled emigration rates. Furthermore, EFI can have an indirect effect on high skilled emigration rate too. Since financial liberalization leads to economic growth and economic growth has a negative effect on high skilled emigration, then financial liberalization should lead to lower levels of highly skilled emigration. Furthermore, it should be noted that high skilled emigration affects sending countries in several ways. Beine et al. (2001) argue that brain drain might actually lead to a higher

investment in human capital and education in the sending countries, as the potential benefits of emigration are high and coin the term 'beneficial brain drain'. Having said that, there are winners and losers of brain drain, of which the latter are countries where high skilled emigration rate is above 20% (Beine et al. 2003). It is highly likely that these countries, suffering from human capital flight, would benefit the most from undertaking economic policy reforms.

Table 2: Impact of Economic Freedom Index on high skilled emigration rate in developing countries

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	HSER	**HSER**	**HSER**	**HSER**	**HSER**	**HSER**	**HSER**
EFI (t-1)	-0.620*	-0.722**	-0.716**	-0.730**	-0.707**	-1.071***	-0.687**
	(0.334)	(0.338)	(0.340)	(0.341)	(0.338)	(0.351)	(0.344)
lnGDPpc (t-1)	-3.735***	-3.444***	-3.443***	-3.426***	-3.275***	-3.762***	-3.385***
	(0.879)	(0.875)	(0.876)	(0.872)	(0.849)	(0.860)	(0.997)
Democr. (t-1)		0.125***	0.127***	0.128***	0.136***	-0.587***	0.137***
		(0.0290)	(0.0294)	(0.0294)	(0.0306)	(0.163)	(0.031)
Conflict (t-1)			0.195	0.189	-0.0104	0.180	-0.065
			(0.306)	(0.307)	(0.321)	(0.310)	(0.323)
Ec. Crisis (t-1)				-0.400	-0.396	-0.339	-0.396
				(0.396)	(0.396)	(0.384)	(0.412)
HRI (t-1)					0.262	0.244	0.558***
					(0.173)	(0.174)	(0.256)
EFI*Polity						0.133***	
						(0.029)	
CIRI Workers							0.014
							(0.175)
Constant	47.19***	21.52***	21.31***	21.38***	19.08***	63.200***	46.387***
	(8.903)	(4.520)	(4.569)	(4.569)	(4.456)	(6.996)	(11.474)
Estimation	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,873	1,833	1,833	1,833	1,830	1,830	1,777
R-squared	0.975	0.969	0.969	0.969	0.969	0.970	0.069

Note: HSER = High skilled emigration rate
(1) Robust standard errors in parenthesis
(2) Statistical significant: ***p<0.01 **p<0.05*p<0.10

In columns 1 to 5 we include to following control variables, *income per capita* (log), *democracy*, *civil conflict*, *economic crisis*, and *human rights*. Starting with per capita income (log) we find the variable to be negatively associated with high skilled emigration rate and statistically significant at the 1% level. In column 2 *democracy* is added. This is seen to be positively correlated with high-skilled emigration and is statistically significant at the 1% level. Substantial effects suggest that increasing democracy's standard deviation above the mean (1.89) would lead to an increase of 89% in high-skilled emigration. Democracy's importance for high-skilled emigrants is captured in much existing literature. Ariu et al. (2014) demonstrate how highly skilled emigrants tend to have stronger preferences for governance quality. Furthermore, Chimanikire (2005) and Ngoma and Ismail (2013) both highlight political unrest and the failure of democratic development as one of the prime determinants of brain drain. As highly-skilled emigrants are likely to be either intellectuals or business-people, protecting both physical and intellectual property rights are crucial. However, an increase in democracy is likely to lead to a free and more open society with looser emigration restrictions and should increase emigration rates in the short term (Fargues 2004), hence the positive correlation. Also interesting is that recent studies suggest that openness to emigration actually leads to democratic development in the sending country (Docquier et al. 2015). It should be noted that comparing the effects of democracy in both tables, different results are observed. The implication is that different variables seemingly impact categories of emigrants differently. We find the civil conflict, economic crisis,human rights and workers' rights variables included in columns 3 to 5 to be statistically insignificant and apparently fail to explain high-skilled emigration. Similar to the finding from Table 1, we see in column 7 of Table 2 that the inclusion of workers' rights moderates the effect of EFI, however, it is still significant at the 5% level-

Overall, our findings are in line with existing literature claiming that economic policy reform leads to lower high skilled emigration rates (Arouri et al., 2014). Our hypothesis is supported by the data.

4.1 Short versus long-term effects

In this section, we examine the short- versus the long-term effects of economic reform and economic freedom on various forms of emigration rates. Following Dreher et al. (2009) and de Soysa and Vadlammanati (2011), we use year-on-year change in *EFI* as a proxy for economic reforms. Economic reforms captures the yearly policy changes made by governments in expenditure, taxation, property rights, legal reforms, trade reforms, access to money, and labour, business and credit reforms. Economic reforms thus capture the short-term effects of economic freedom. A positive value signifies movement towards a more market-oriented economic model, whereas a negative value denotes movement towards more restrictive economic policies. The *EFI*, on the other hand, captures the long-run effects of economic reforms, whereby the accumulation of economic reforms will translate into economic freedom over time.

Table 3: Effects of economic reforms and economic freedom on emigration and brain drain

	(1)	(2)	(3)	(4)
	MSER	**HSER**	**MSER**	**HSER**
Economic Freedom Index (t-1)	-0.168***	-0.578*	-0.132**	-0.421
	(0.0623)	(0.352)	(0.065)	(0.356)
Economic Reforms (t-1)	0.187	0.486	1.166	1.473
	(0.153)	(0.652)	(0.161)	(0.682)
Per capita GDP (log) (t-1)	-0.00760	-2.954***	-0.103	3.094***
	(0.232)	(0.890)	(0.280)	(1.065)
Polity Democracy Index (t-1)	0.00138	0.139***	0.00239	0.140***
	(0.0108)	(0.0310)	(0.0106)	0.013)
Civil Conflict (t-1)	-0.265**	-0.0484	-0.268**	-0.067
	(0.109)	(0.330)	(0.113)	(0.334)
Economic Crisis (t-1)	0.231**	-0.0415	0.223*	-0.033
	(0.112)	(0.413)	(0.116)	(0.431)
Human Rights Index (t-1)	0.102*	0.336*	0.097*	0.347*
	(0.0562)	(0.182)	(0.058)	(0.188)
CIRI Workers' Rights (t-1)			-0.153**	-0.070
			(0.063)	(0.169)
Constant	1.139	35.46***	1.903	31.125***
	(2.494)	(10.29)	(2.945)	(11.920)
Estimation Technique	OLS-FE	OLS-FE	OLS-FE	OLS-FE
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,738	1,738	Yes	Yes
R-squared	0.972	0.972	0.972	0.972

Notes: Emm Rate= total emigration rate
MSER = Medium skilled emigration
HSER= High skilled emigration
(1) Robust standard errors in parenthesis
(2) Statistical significant: ***p<0.01 **p<0.05*p<0.10

Table 3 shows the results of long and short-term effects of economic reform and *EFI* on *brain drain*. Columns 1 and 3 captures *medium skilled emigration*, while *highly skilled emigration* is included in column 2 and 4. We test the effects both with and without the variable *workers' rights*, as this in an important control variable, while, at the same time reduces N in our models. As seen in column 1, the *EFI* has a negative effect on *medium skilled emigration*, which is statistically significant at the 1% level. The substantial effects

suggest a 17% reduction in medium skilled emigration following a one standard deviation increase over the mean value of the *EFI*. As for highly skilled emigration in column 2, the impact of *EFI* is negative and is significant at the 10% level. Furthermore, substantial effects for highly-skilled emigration indicate that an increase in one standard deviation above the mean of *EFI* should result in 61% reduction of high-skilled emigration. Inclusion of *workers' rights* moderates the effects of EFI somewhat, both for the MSER and the HSER models. The negative results imply that more economic freedom following an accumulation of economic reforms over time reduces emigration, a notion supported both by the results in the previous tables, and theoretical expectations. As in the previous tables, the effect of *EFI* impacts most on highly-skilled emigration.

Moving on to the short-term effects, we look at the relationship between *economic reforms* and the dependent variables. In both columns 1 and 2 we find *economic reforms* to be statistically insignificant with both medium- and highly-skilled emigration. However, it is worth commenting on the fact that it is positively correlated in all columns, suggesting that the short-term effects of economic reforms lead to higher levels of skilled emigration. So why do short term effects lead to higher levels of skilled emigration? Undertaking economic reform is usually contentious and governments often shy away from this due to the accompanying political costs. As costs are up-front while benefits are in the distant future, advocating reformist policies often proves problematic for politicians. This notion has also been identified by Bonfiglioli and Gancia (2012) who argue that politicians tend to shy away from reforms in order to increase their chances of re-election. Similarly, Alesina et al. (2006) as well as Conconi et al. (2011**)** find that electoral proximity reduces the prospects of economic reforms. The important point as to why there are political costs of undertaking such ventures is that reforms may create short-term negative economic shocks. Politically, this may cause domestic tension where groups in society not benefiting from the reforms are likely to

oppose them. Economically, changes in the structural makeup of the economy may, in fact, restrict economic growth initially as sectors and markets adapt to new policies. Hence, due to the negative economic shocks, economic reforms may lead to more emigration in the short-term. Another explanation could be the lag effect of implementing economic reforms. Reforms often take time to materialize. Therefore, much of the population may not see the immediate benefits of economic reform, forcing them to emigrate in order to seek better economic, business and job opportunities. In fact, over time the process of reforms is likely to accelerate. Comparing the results on the EFI and economic reforms it is evident that the negative impact of EFI is substantially greater than the positive impact of economic reforms. This indicates that the long-term gains of economic freedom (and reforms) in terms of retaining skilled emigrants outweigh the short term costs of reform. As for the control variables, the results are largely in line with previous tables. The exception is economic crisis which is now statistically significant at the 5% level in column 2, and the human rights variable, which for medium- and high-skilled emigration is now statistically significant at the 10% level.

We have also tested the robustness of our results in several ways, including removing extreme outliers, and running other estimation techniques. The substantial results from these models do not differ essentially from our main models.

5. Conclusions

This paper employs an empirical test of the relationship between economic freedom and brain drain. Our objective was to examine the impact of economic freedom on brain drain. Can an increase in economic freedom reduce the likelihood of skilled emigration from developing countries to rich countries? Is economic freedom a determinant of brain drain from developing countries, holding other things constant? Using panel data on 142 countries for the

period 1990–2010, and using the OLS two-way fixed effects estimator, we find economic freedom to be statistically significant with brain drain. The effect is strongly negative indicating that economic freedom is indeed a prime determinant of emigration, holding other variables constant. The empirical results show that undertaking economic reforms leading to more economic freedom in the long-term are expected to lower levels of brain drain emigration rates in developing countries.

Based on the results presented in the paper we derive the following policy implications for developing countries: Our findings suggest a need for economic reform to retain brain drain emigration in sending countries. Moreover, we find that undertaking such reforms might come at short-term political cost. However, the long-term economic gains outweigh the short-term political costs. Accordingly, this paper may offer some insight into possible measures for developing countries to retain emigrants. Further studies may want to look more specifically at certain economic reforms which are considered as being the most efficient in terms of retaining emigration from developing countries.

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Appendix 1: List of Countries under study

Afghanistan	El Salvador	Mauritius	Tanzania
Albania	Equatorial Guinea	Mexico	Thailand
Algeria	Eritrea	Moldova	Togo
Angola	Estonia	Mongolia	Trinidad and Tobago
Argentina	Ethiopia	Morocco	Tunisia
Armenia	Fiji	Mozambique	Turkey
Azerbaijan	Gabon	Myanmar	Turkmenistan
Bahrain	Gambia	Namibia	Uganda
Bangladesh	Georgia	Nepal	Ukraine
Barbados	Ghana	Nicaragua	Uruguay
Belarus	Grenada	Niger	Uzbekistan
Belize	Guatemala	Nigeria	Venezuela
Benin	Guinea	North Korea	Vietnam
Bhutan	Guinea-Bissau	Oman	Yemen
Bolivia	Guyana	Pakistan	Zambia
Botswana	Haiti	Panama	Zimbabwe
Brazil	Honduras	Papua New Guinea	
Brunei	Hungary	Paraguay	
Bulgaria	India	Peru	
Burkina Faso	Indonesia	Philippines	
Burundi	Iran	Poland	
Cambodia	Iraq	Romania	
Cameroon	Israel	Russia	
Cape Verde	Jamaica	Rwanda	
Central African Republic	Jordan	Sao Tome and Principe	
Chad	Kazakhstan	Saudi Arabia	
Chile	Kenya	Senegal	
China	Kuwait	Seychelles	
Colombia	Kyrgyz Republic	Sierra Leone	
Comoros	Laos	Singapore	
Congo, Democratic Republic	Latvia	Slovakia	
Congo, Republic	Lebanon	Slovenia	
Costa Rica	Lesotho	Solomon Islands	
Cote d'Ivoire	Liberia	South Africa	
Croatia	Libya	South Korea	
Cuba	Lithuania	Sri Lanka	
Cyprus	Macedonia	Sudan	
Czech Republic	Madagascar	Suriname	
Djibouti	Malawi	Swaziland	
Dominican Republic	Malaysia	Syria	
Ecuador	Mali	Taiwan	
Egypt	Mauritania	Tajikistan	

Appendix 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Observations
Medium Skilled Emigration Rate	4.862173	7.95546	0	47	2982
High Skilled Emigration Rate	18.57646	20.68143	0	100	2982
Economic Freedom Index	6.173011	1.068557	2.75	8.9	2282
Economic Reform	0.0663753	0.1834058	-1.14	1.31	2185
Per Capita Income (log)	7.50481	1.391429	4.328407	11.0064	3413
Polity Democracy Index	1.899661	6.573647	-10	10	3249
Civil Conflict	0.1856895	0.3889122	0	1	3452
Economic Crisis	0.0582103	0.2341745	0	1	3453
Human Rights Index	2.703796	1.070742	1	5	3398
Workers' Rights Index	0.906	0.731	0	2	3717

Appendix 3: Variables List and Definitions

Variables	Data definition and sources
Brain Drain	Brain Drain is made up of two sub-categories: Medium and high skilled emigration. Medium skilled emigrants are defined as percentage share of emigrants holding secondary education or equivalent. High-skilled emigrants are defined as percentage share of emigrants with a university degree or equivalent. The brain drain variable is sourced from Bücker, Capuano and Marfouk (2013).
Economic Freedom Index (EFI)	EFI is made up of five sub-indices capturing: expenditure and tax reforms; property rights and legal reforms; trade reforms; reforms related to access to sound money; labour, business and credit reforms. These five sub-indices are made up of 35 components of objective indicators. The final index is ranked on the scale of 0 (not free) to 10 (totally free)
Economic Reform	Economic reforms shows the year-by-year changes in the economy. To capture this short-term effect EFI's value in the current years is subtracted by last year's EFI value. A positive value means movement towards more economic freedom while a negative value means the opposite.
Per capita GDP (log)	GDP per head in 2000 US$ constant prices sourced from World Development Indicators 2014, World Bank.
Polity Democracy index	Based on Polity IV index coded on the scale of -10 to +10 wherein -10 represents complete autocracy and +10 denotes complete democracy sourced from Marshall and Jaggers (2002).
Civil Conflict	Dummy coding 1 if there is a civil conflict and 0 otherwise in which at least one party is the government and with battle deaths of over 25 in a year. Sourced from UCDP dataset (Gleditsch et al. 2002).
Economic crisis	Coded the value 1 if country *i* in year *t* faced with either/or debt, currency and banking crises and 0 otherwise sourced from Laeven and Valencia (2013).
PTS Human rights index	Coded on 1-5 scale wherein 1 means proper rule of law, no illegal detentions, and torture is exceptional and extra judiciary murders are extremely rare sourced from Gibney et al. (2012)
CIRI Worker's Rights Index	The index range from 0 severely restricted workers rights to 2 fully protected workers' rights Sourced from Cigranelli and Richards (2010).