A cross-country analysis of the roles of border openness, human capital and legal institutions in explaining economic development*

Ọláyínká Oyèkọ́lá
E-mail: o.oyekola@exeter.ac.uk
URL: https://www.olayinkaoyekola.com
INTO University of Exeter, Stocker Road, Exeter, EX4 4PY, UK

ABSTRACT

Globalisation, human capital, and institutions have been widely recognised in the literature to be causally important for economic development. Most of the available studies, however, treat measures of these determinants either separately or as substitutes. In this paper, we study the income effects of border openness to migration, education, and the rule of law (our proxies for globalisation, human capital, and institutions, respectively). Using cross-country data covering all regions of the world, and employing instrumental variables for all three factors, we establish that they each have a robust, positive, and strong association with economic development. We then consider whether there are any useful interrelations between the three factors in explaining income. On the interaction effects, the results show that the impact on income of: (i) migration can be materially affected by cultivating good institutions but this effect is not dependent on the education level; (ii) education is important irrespective of the levels of migration and institutions; and (iii) institutions is significantly improved by raising the level of education but is not influenced by migration level. Our paper makes a significant contribution as the first investigation into the effects of migration, education, and institutions jointly and as complements.

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1. Introduction

Almost 250 years have passed since the publication of *An Inquiry Into the Nature and Causes of the Wealth of Nations* (Smith, 1776) and economic development remains an elusive quest for many countries worldwide.[1] For the majority of developing countries, beyond a gloomy economic outlook, there are also the unwanted effects of low economic outcome on society; including inadequate capital infrastructures, lack of technological innovations, political instability, institutional delinquencies, and low educational and health aftermaths (Lipset, 1959; North and Thomas, 1973; North, 1981, 1990; Aoki, 1996). In these countries, low national income levels have a significant, adverse impact on quality of life; including, extreme poverty and hunger, higher mortality, generally, but in particular in childbirth, gender inequality and female oppression, higher incidences of HIV/AIDS, malaria and other diseases, and larger proportion of the population not having access to safe drinking water or dwelling in slums (United Nations Millennium Declaration, 2000; Easterly, 2002; Collier, 2008).

At the forefront of the debate regarding this enormous challenge facing the world, namely that of delivering a rapid and sustained increase in income and quality of life for *all* global citizens, is the need to understand *why* there continues to be a chasm between the national incomes of developed and developing countries, and *what* can be done to close the gap.[2] The literature addressing the causes of the differences in socio-economic outcomes across countries has increasingly emphasised the role of history.[3] Another line of influential research, possessing exogenous features for explaining the diverse patterns of economic performance, highlights the key roles that cultural (e.g., language and religion) and geographical (e.g., biophysical and geophysical) characteristics of countries play, both in creating the initial economic conditions and in orchestrating present-day economic activities, thereby predisposing countries toward economic miracle or debacle.[4]

The impact of history, culture and geography on current economic performance is widely endorsed and has received extensive attention in the literature. However, whilst acknowledging the significance of these factors, we consider it crucial to recognise that they do not necessarily compute to destiny. In this paper, we argue that there is further scope for research which focuses on what will close the income gaps amongst nations; or, in other words, what can be done through *policy* in the here and now.[5] Against this backdrop

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[1] In this paper, "economic development", "economic prosperity", and "economic progress" are used interchangeably to refer to increases in national income, which we represent by real gross domestic product (GDP) per capita—and is the outcome measure of interest. Whereas "economic performance" or "economic outcome" are used to capture the level of national income.

[2] In our discussion here, the *why* and *what* questions capture, respectively, the notions of "fundamental" and "proximate" causes of economic development (North and Thomas, 1973; Acemoglu et al., 2014).

[3] See, for example, North and Thomas (1973), North (1981, 1990), Kremer (1993), Engerman and Sokoloff (1997, 2002), La Porta et al. (1997, 1998), Galor and Weil (2000), Acemoglu et al. (2001, 2002) Nunn (2008), Comin et al. (2010), Putterman and Weil (2010), Jones (2013), Easterly and Levine (2016), and Oyèkọ́lá (2021).

[4] See, for example, Banfield (1958), Kamarck (1976), Putnam (1993), Guiso et al. (2006), Diamond (1997), Gallup et al. (1999), Tabellini (2008, 2010), and Nunn and Puga (2012).

[5] It is necessary to underline that the use of "policy" or "policies" in this paper is liberally construed, purely descriptive and utilized largely to capture the idea of the "right choices" implied in Sachs (2005, pp. 1-2) or that of "human choices" mentioned

and taking seriously the critique by Rodriguez and Rodrik (2001),[6] we seek to explain the degree to which policies at an individual country level can account for differences in economic performance around the world.

Our enquiry into the proximate causes of economic development is focused on three endogenous determinants: border openness to migration, human capital, and legal institutions.[7] Our premise is that a country can experience economic development by selecting some level of socio-economic and political integration; through, for example, trade, migration and active membership in global and regional organisations, such as the World Trade Organisation, the European Union, and Economic Community of West African States (Dollar, 1992; Sachs and Warner, 1995; Frankel and Romer, 1999; Kaufmann et al., 2003; Alcalá and Ciccone, 2004; Docquier et al., 2008; Bouët et al., 2018). Additionally, countries can dictate how much investment goes into promoting a strong educational system and, at the same time, shape the building, facilitation and protection of institutional environments which, amongst other factors, have been identified in the existing literature to be productivity-enhancing and crucial to the way an economy performs (Lipset, 1959; North and Thomas, 1973; Easterlin, 1981; Acemoglu et al., 2001; Djankov et al., 2003; Glaeser et al., 2004).

Our objective, therefore, is to explore the following questions empirically: Does economic development derive from an increase in migration? To what extent is having a more educated population indispensable to achieving higher economic performance? Do good legal institutions beget more income? While these factors have been examined in the existing literature, either singularly or as dual combinations, as part of the central determinants of income levels (e.g., Acemoglu et al., 2001, 2014; Gao, 2004; Glaeser et al., 2004; Rodrik et al., 2004; Chang et al., 2009; Ortega and Peri, 2014), we observe that they are yet to be investigated as a triad. To our best knowledge, this is the first study to stress jointly these three determinants of economic progress. A further objective of our paper is to assess whether, or not, there are any germane complementarities between migration, education, and institutions in activating economic prosperity. In doing this, our approach borrows from Freund and Bolaky (2008) and Chang et al. (2009), who studied what complementary reforms were needed to reap the benefits of trade openness. We posit that shedding lights on the above-stated research questions will yield important insights to guide policy makers moving forward.

Our hypothesis is that cross-country differences in migration, education and institutions, as well as their interactions, are related to the cross-country differences in national income levels. As we discuss in section

by Rodrik et al. (2004, p.133). In this paper, therefore, man-made decisions, factors, or choices should be read similarly to invoke variables *largely* within a policy maker's sphere of control.

[6] This implies that we explicitly control for cultural, geographical, historical, and regional characteristics in our model; see McCord and Sachs (2015) for a similar interpretation.

[7] For convenience, henceforth we will use 'migration' for border openness to migration, 'education' for human capital, and 'institutions' for legal institutions. We review the literature that informs our choice of these three variables (i.e., determinants) in the next section and provide detailed definitions of variables in section 3.

2, the literature on the role of migration for causing economic prosperity lacks a consensus. Nevertheless, we expect to find a positive relationship between migration and income per capita. For example, the economic outputs of destination countries are likely to rise because of the preponderance of skill-selective immigration policies (e.g., points-based system for targeting skilled persons) in developed countries. Additionally, it has been suggested that the economic outputs of many source countries are also likely to rise because of the prospective 'brain gain' (Mountford, 1997; Stark et al., 1997). Many citizens, given the possibility that they may someday emigrate to a coveted higher-wage country, are incentivised to invest in the accumulation of human capital appropriate for their intending destination country.[8]

As already alluded to, and further reviewed in section 2, economic performance is expected to increase with improvements in both education and institutions. The economic literature universally attributes differences in economic outcomes around the world to disparities in physical capital, human capital, and total factor productivity (Solow, 1956; Lucas, 1988; Romer, 1990; Galor, 2011).[9] As an example, Hall and Jones (1999) stress that capital (physical and human) and technology fundamentally determines economic growth. However, they observe that the deeper questions are why countries accumulate different levels of physical and human capital and why some countries are more productive than others.[10] Given this, Hall and Jones (1999) explore the role of differences in social infrastructure (institutions and government policies) in accounting for the cross-country differences in the accumulation of capital and productivity, and as a result, differences in output per worker. Utilising a different measure of institution (protection against expropriation risk) and introducing their powerful instrument (settler mortality rate), Acemoglu et al. (2001) confirm that institutions have a substantial impact on income per capita.[11]

Further, we expect to have meaningful interactions between migration, education, and institutions in causing cross-country income differences for at least two reasons. First, education and institutional reforms within a country are made almost solely independent of other countries, while immigration policies are almost always interdependent in nature, albeit as a sovereign state (e.g., Hollifield, 2004; Malchow-Møller and Skaksen, 2014; Pecoud, 2021). Second, the immigration policies of developed countries are intrinsically pro-workers, designed to attract the more educated, who will probably be more likely to appreciate the workings of their new home's social, legal and political institutions (Glaeser et al., 2007).[12] It is also plausible to imagine the opposite happening in the case of a developing country; this is the concept

[8] But, as Sassen (1996, p. 59) puts it, 'there is a growing consensus in the community of states to lift border controls for the flow of capital, information, and services and, more broadly, to further globalisation. But when it comes to immigrants... the national state claims all its old splendour in asserting its sovereign right to control its borders.' In this sense, there has been a benefit for the developing countries whose citizens aspired to resettle and up-skilled themselves but ended up working in their mother nations (Clemens, 2011).

[9] Pritchett (2001) and Clemens (2007) cast doubt on the degree of human capital's positive externalities in development.

[10] See also Acemoglu and Robinson (2010) and Acemoglu et al. (2014) for similar elucidations.

[11] In line with the above, it is easy to imagine how the frontier of research in comparative economic development became that of identifying *fundamentals*, as opposed to *proximates*, in the process of income determination.

[12] See also Borjas (2015).

of 'brain drain'. Therefore, we argue that the effects of migration, education and institutions on the economic performance of a country are importantly shaped by the interactions between the factors. The interactions between these three factors, and the roles played by each, for ascertaining cross-country differences in economic outcome has not previously been empirically investigated. This indicates the significance of our approach, as discussed further in section 2.

We test our hypothesis and confirm, using large cross-country data and both ordinary least squares (OLS) and two-stage least squares (2SLS) regressions, that each of migration, education, and institutions is strongly positively correlated with real GDP per capita, even when we have controlled for standard additional regressors in related literature (Rodrik et al., 2004; Acemoglu et al., 2014; Ortega and Peri, 2014). In terms of identification,[13] we follow the approach of Rodrik et al. (2004, p. 135): 'of unravelling the cause-and-effect relationships involved,' by employing instruments that have been passed "good" in explaining our endogenous variables, although under different empirical frameworks. The instruments that we use are: predicted migration for migration, the number of protestant missionaries for education, and the fraction of the population speaking a European language and legal origins for institutions (Hall and Jones, 1999; Woodberry, 2004, 2012; La Porta et al., 2008; Acemoglu et al., 2014; Ortega and Peri, 2014). This is a chief contribution of our research. We also contribute to the research on policy complementarities (Freund and Bolaky, 2008; Chang et al., 2009; Fortunato and Panizza, 2015; Cervellati et al., 2018). In terms of the interactions between the endogenous variables, our results reveal that the income effect of: (i) migration can be substantially raised by improving the quality of institutions but does not depend on the education level; (ii) education appears to be important regardless of ranks on immigration and institutions; and (iii) institutions is significantly improved by raising the level of education but is not affected by migration level.

The outline of the rest of the paper is as follows. Section 2 discusses the background to our study and elaborates on the plausible interactions between our main explanatory variables. Section 3 describes the data employed in the empirical analysis and contains some descriptive statistics. Section 4 presents the estimating framework and explains our identification strategy. Section 5 documents our findings and relates the results to existing studies. Section 6 gives concluding remarks and policy implications.

2. Background

In remarks given at World Economic Forum in 2000, Bill Clinton stated that:[14]

[13] See section 3 for the description of the instruments and section 4 for details of the econometric framework.
[14] https://1997-2001.state.gov/travels/2000/000129clinton_wef.html.

> Globalization is revolutionizing the way we work, the way we live and, perhaps most important, the way we relate to each other across national boundaries. It is tearing down doors and building up networks between nations and individuals, between economies and cultures… we have got to reaffirm unambiguously that open markets… are the best engine we know of to lift living standards, reduce environmental destruction and build shared prosperity… Worldwide, open markets do create jobs. They do raise incomes. They do spark innovation and spread new technology—they do[.]

The belief that openness to trade and international mobility of people are apposite for shrinking rent-seeking activities, introducing competitions from foreign firms, enlarging the pool of consumers for a country's products, allocating resources more efficiently, diffusing ideas and knowhow, propagating advances in technology, and improving societal welfare, is not new to economic thinking. These two vehicles of globalisation formed the core of Smith's assessment of specialisation and Ricardo's opposition to protectionism sanctioned by the *Corn Laws*. Thus, when economic and institutional machineries of a nation operate exclusive of domestic distortionary policies and efficiency costs, globalisation will enhance economic progress (e.g., Freund and Bolaky, 2008; Chang et al., 2009; Delogu et al., 2018). As a result, the existence of imperfections in markets and/or institutions around the world suggests why globalisation may yield sub-optimal outcomes; see, for example, Grossman and Helpman (1991), Sachs and Warner (1995), and Rodriguez and Rodrik (2001).[15]

In addition, it appears to us that these imperfections, and the attending uncertainties (e.g., incomplete information and security concerns), may be leading candidates for explaining why higher walls are erected against people, relative to goods, at cross-national borders. Meanwhile, since World War II, but in particular over the past 30 years, there has been a greater upsurge in international migration. With this has emerged a new impetus in policy debates and academia, with a renewed curiosity to probe into the role of migration in the determination of cross-country variations in economic progress. If trade liberalisation led to higher incomes, are there any such gains to be expected from border liberalisation? Or to paraphrase Borjas (2015): If decades of implementing various free trade policies failed to achieve the much-anticipated huge effects of equalising global income/wage differentials, would free borders do it?

Many studies have found support for eliminating barriers to immigration, claiming that higher globalisation via labour migration would raise the global income level and reduce worldwide inequality. In particular, results from theoretical models attempting to forecast global efficiency gains from open borders

[15] While the literature on the income effects of trade and migration mostly developed parallel to each other, their paces have been different. There exists a vast literature exploring the links between trade and cross-country variations in economic performance (e.g., Kormendi and Meguire, 1985; Grossman and Helpman, 1991; Dollar, 1992; Sachs and Warner, 1995; Frankel and Romer, 1999; Alcalá and Ciccone, 2004; Gao, 2004; Rodrik et al., 2004; Lucas, 2009; Melitz and Redding, 2014). The results have been mixed because of differences in the economic and institutional mechanisms of individual countries and due to various reasons already raised in the relevant literature (e.g., Rodriguez and Rodrik, 2001; Rodrik et al., 2004; Ortega and Peri, 2014). Our focus in this paper however is migration.

indicate that this could raise world GDP by between 50-150%. See Clemens (2011) for a review of this literature. According to Clemens (2011), these values dwarf the equivalent efficiency gains that would derive from moving to complete free trade in goods (0.3-4.1%) and in capital (0.1-1.7%). These results are borne out by static and dynamic models, as well as by data (e.g., Iranzo and Peri, 2009; Klein and Ventura, 2009; Andersen and Dalgaard, 2011; Benhabib and Jovanovic, 2012; De La Croix and Docquier, 2015; Delogu et al., 2018).[16]

In an empirical investigation that we borrow from in our work, Ortega and Peri (2014) evaluate the migration-development nexus in a framework that also systematically controlled for trade openness. In pitting migration against trade to account for long-run income per capita and finding that the effects of migration strongly and robustly dominate the ones of trade, these authors interpret this to mean that sufficient information is present in the data's cross-section to elicit the development effects of migration.[17] This bolsters our confidence in the use of cross-sectional data on migration for our study.

In the human capital literature, considerable research has been undertaken to investigate the proposition that more education is a prerequisite for achieving economic growth (e.g., Lucas, 1988; Romer, 1990; Barro, 1991; Mankiw et al., 1992; Benhabib and Spiegel, 1994; Temple, 1999; Glaeser et al., 2004; Gennaioli et al., 2013; Baser and Gokten, 2019). This literature emphasises the importance of education as a precondition for making growth-enhancing choices, such as promoting good governance, amassing social capital, nurturing democracy, strengthening political engagement, and eliminating inequality (e.g., Lipset, 1959; Galor and Zeira, 1993; Knack and Keefer, 1997; Barro, 1999; Glaeser et al., 2004, 2007; Gennaioli et al., 2013; Fortunato and Panizza, 2015).[18]

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[16] It is not, however, all a walk in the field of gold. Apart from the frictions apparent between the economic and globalisation forces—pushing for open borders—and legal and political forces—pushing for closed borders (Hollifield, 2004), De Haas (2010) gives a review of both an optimist's and a pessimist's perceptions regarding the migration-development nexus. In a no-holds-barred review essay on immigration and globalization, which touches on the remarkable trillion-dollar bills that Clemens (2011) indicated might be lying on the sidewalk, Borjas (2015) stated that the reason 'nobody ever bothers to pick them up … is easy to summarize: those bills are probably fake' (p. 967).

[17] In comparison, panel data may be required if one were to be interested in the income effects of trade (Feyrer, 2019). Also, a growing body of work now examines the factors impacting on the size and structure of the flow of migrants (e.g., Beine et al., 2011; Grogger and Hanson, 2011; Belot and Hatton, 2012; Bertoli and Fernández-Huertas Moraga, 2013; Beine and Parsons, 2015; Razin and Wahba, 2015; Uprety, 2017). This literature stresses the roles that cultural, geographic, and linguistic distances play in determining who leaves, where to, and whence from. Further, another strand of the literature investigating the role of migration focuses on the historical immigration patterns of countries in accounting for differences in their present-day socio-economic outcomes. In a recent study, for example, Easterly and Levine (2016) argued and presented evidence that European colonial migration pattern has a strong and robust positive impact on current national income per capita. Utilising the same migration data of Easterly and Levine, Oyèkọ́lá (2021) finds that European migration during colonisation also has a direct effect on contemporary health outcomes (e.g., life expectancy and fertility rate). A review of the early theories of international migration is given by Massey et al. (1993). A recently edited volume, *International Handbook on Migration and Economic Development*, by Robert Lucas (2014) is also very relevant here.

[18] Just as in the migration literature noted above, there is also a thriving strand of human capital research focused on the colonial, cultural, geographic, and linguistic determinants of human capital accumulation in the distant past (e.g., North, 1981; Engerman and Sokoloff, 1997, 2002; Glaeser et al., 2004; Lindert, 2004; Galor et al., 2009). As an example, Crayen and Baten (2010) use age-heaping method to construct global trends in numeracy over the 1820-1949 period for 165 countries; they find that numerical skills mattered for the patterns of long-term growth observed around the world. Beginning with Becker (1960), a sizeable part of the human capital literature also examines the relevance of fertility choice for human capital formation.

When these and other outcomes of an educated society are sustained, they in turn will have significant implications for economic development; including, a new generation of skilled workers, raising labour market participation rates, reducing the size of the underground economy, having a healthier population, and increasing the capacity to develop, adopt and apply new technologies (Pritchett and Summers, 1996; Dollar and Kraay, 2003; Cervellati and Sunde, 2005; Currie, 2009). Higher educational attainment levels in a country are thus crucial, having wide-ranging impacts on a country, including on its economic performance (Kalemli-Ozcan et al., 2000; De La Fuente and Domenech, 2006). Moreover, education is also emphasised in theories of international specialisation (e.g., Ventura, 1997, 2005; Romalis, 2004). The implications go beyond its direct effects; it also holds significance for migration and institutions, as will be discussed further below. The provision of higher quality education should therefore be seen as a key factor to kick-start, and maintain, a virtuous cycle for economic growth.

Likewise, institutions have been hailed by many economists as one of the most important sources of difference in economic prosperity across countries (e.g., North, 1990; Hall and Jones, 1999; Acemoglu et al., 2001, 2002). These authors contend that institutions are embedded in history: a country's colonial history, for example, is a vital determinant of its colonial period institutions, which were either extractive or inclusive by design of the colonial masters.[19] These early institutions have endured, influencing differences in the present qualities of economic, legal, and political institutions around the world (Acemoglu et al., 2001, 2002; Jones, 2013). Consequently, nations with good institutions invest more in their citizens (building strong education and health systems) and in different types of physical capital (providing greater public infrastructure services).[20] As a result, the ensuing contemporary institutional arrangements determine the extent to which growth-stimulating or growth-stunting policies are introduced and successfully implemented (North, 1981, 1990; Acemoglu et al., 2001, 2002, 2014).

[19] Acemoglu et al. (2001, 2002) show that settlement conditions in the colonies informed the settlement strategies of the European colonisers. Given favourable settlement conditions (e.g., low settler mortality rates and low indigenous population density), Europeans were more likely to favour mass permanent settlement and seek to recreate inclusive institutions (e.g., protection of private property and constraints on the executive powers) akin to their home countries. In comparison, unfavourable settlement conditions indicate that Europeans were more unlikely to favour permanent relocation; hence, they put in place extractive institutions with the primary task of mass looting of the resources in the colonies. Accordingly, these two colonial institutional legacies are argued as the fundamental reasons behind present-day differences in cross-country income per capita.

[20] The primacy of institutions over human capital, or the other way round, in the development process remains one of the most debated areas of economic research, being driven by leading scholars. In presenting their finding that 'human capital is a more basic source of growth than are institutions,' for example, Glaeser et al. (2004) wrote: 'It is important to note that, even if one agrees that mortality risk or indigenous population density shaped the European settlement decisions, it is far from clear that what the Europeans brought with them when they settled is limited government. It seems at least as plausible that what they brought with them is themselves, and therefore their know-how and human capital' (p. 289). In contrast, when discussing the fundament role of institutions *vs* human capital in causing long-run economic development, Acemoglu et al. (2014, p. 879) argue that: 'Europeans appear to have brought more human capital per person to their extractive colonies than their settler colonies... If the United States is more educated today than Peru or Mexico, this is not because original colonizers there had higher human capital. Rather, it is because the United States established institutions that supported mass schooling, whereas Peru and Mexico did not.' Based on the existing literature, and the degree to which a developing country may be able to, or not, affect the third explanatory variable of interest (migration), our research hypothesis necessarily implies that interrelations amongst migration, education and institutions are essential. Hence, we look to data to give credibility to all three.

In their critique of the view that institutions outdo education in determining economic growth, one of the main concerns raised by Glaeser et al. (2004) is that unfit-for-purpose indicators were being employed to proxy institutional quality. We take this point seriously, and our choice of the measure of institutions is guided by the model specification, the potential interactivities between the main explanatory variables, and the existing literature (Acemoglu et al., 2001, 2002; Glaeser et al., 2004; Rodrik et al., 2004; Beck, 2012; Jones, 2013). On these bases, we espouse the importance of legal institutions, as defined by Beck (2012), for economic development.[21] Further, the measure of institutional quality that an econometrician utilises may capture various levels, from the general to the very specific.[22] In this paper, legal institutions are indicated by the rule of law, which Barro (1997) shows to be positively related to economic growth. Similarly, Rodrick et al. (2004) employ this measure to proxy institutions, concluding that institutions are a more robust determinant of economic development than geography and integration (which were the other two explanatory variables they studied).

Following the approach of McCord and Sachs (2015), and in line with Rodrick et al.'s (2004) interpretation of their results, we presume that migration, education, and institutions are complementary, rather than competitive, for the purpose of our study. Hence, we argue that the degree of influence each of migration, education, and institutions has on cross-country differences in economic development is also contingent on the scale and scope of each of the other factors. Take, for example, the 'brain drain' literature, which also encompasses the 'brain gain' hypothesis.[23] This area of research contributes to the education-migration-development nexus. The literature lacks consensus on the economic benefits and/or detriments of migrating skills to both the sending and the receiving countries, and it has been shown that the 'brain drain' phenomenon is no longer an issue associated only with developing countries (Chiswick, 2005; Stolz and Baten, 2012). Migrants may focus on human capital acquisition so as to improve their eligibility for skill-selective overseas immigration policies.

Nevertheless, it will not be difficult to think up scenarios where the institutional framework can be added to this discourse. As an example, weak institutions and/or low levels of average education or productivity are likely to not only cause citizens to seek exit but discourage entry by foreign citizens. Thus,

[21] In the words of Beck (2012, p. 4), legal institutions are 'rules that govern commercial relationships between different agents of the society, that is, firms, households, and government. In the broadest sense, legal institutions thus support market-based transactions by defining property rights and allowing for their transfer and protection. They allow for writing and enforcing contracts between agents that do not know each other, in a cost-effective manner… [and]… also provide public goods and govern externalities[.]'

[22] See Beck (2012) and the references therein on the different levels of legal institutions. On applications, various dimensions of legal institutions (including its outcomes) have been used in the existing literature to tackle issues (including on economic development and income inequality) at the cross-country, within-country, and inter-industry levels (e.g., Acemoglu et al., 2005; Beck et al., 2007; Oyèkọ́lá, 2021). Beck and Levine (2005) review the literature that examines how important legal institutions are for financial development.

[23] See, for example, Bhagwati and Hamada (1974), Miyagiwa (1991), Burda and Wyplosz (1992), Stark et al. (1997), Mountford (1997), Vidal (1998), Beine et al. (2001, 2008), Stark and Wang (2002), Chakraborty (2006), Docquier et al. (2008), Easterly and Nyarko (2009), Batista et al. (2012), and Docquier and Rapoport (2012).

as with capital (Papaioannou, 2009) and trade (Leeson, 2008), we propose that migrants will flow to countries with good institutions. Within a country, meanwhile, there will be a greater effort applied to productive endeavours (Baumol, 1990) and to engage with the formal sector of the economy (La Porta and Shleifer, 2008), when citizens of the country are confident that the institutional arrangements secure their property rights and enforces their contracts. Given the unconnected or competing treatments of migration, education, and institutions as determinants of economic outcome in the existing literature, our approach is warranted and fills an important gap.

3. Data

The main variables for our subsequent econometric analyses are proxies for economic development, border openness to migration, human capital, and legal institutions. In this section, we present data sources, variable definitions, and the descriptive statistics for these measures (and others) utilised in the empirical work presented in sections 4-5 below. All data are from Ortega and Peri (2014) and all time-varying values correspond to the year 2000, except we state otherwise.[24] Note that each table of results contain the number of countries/observations (denoted by $\mathbb{N}$) used.

3.1. Economic development

The indicator of economic development that we use is log real GDP per capita, which is adjusted for purchasing power parity (PPP) following the practice in the Penn World Tables (PTW) version 7.2. This variable is commonly employed in the existing literature because it captures more correctly (and broadly) our notion of comparable economic development (e.g., Acemoglu et al., 2001, 2014; Rodrik et al., 2004; Jones, 3013; Ortega and Peri, 2014). Besides, this choice allows us to place our results alongside a large body of related research.

3.2. Explanatory variables

As stated above, we are primarily interested in the predictive power of proxies for border openness, human capital, and legal institutions, which are captured, respectively, by: (i) migration—the fraction of the population born in a country other than that in which they live; (ii) education—the average number of years of schooling attained by the adult population (i.e., persons aged 25 and above) (Barro and Lee, 2013); and (iii) institutions—taken to be the rule of law, a variable that captures perceptions of the degree to which citizens have confidence in and abide by the rules governing a country, and in particular the quality of

[24] Interested readers are encouraged to see Ortega and Peri (2014, Table 1, p. 236) for additional data sources. As our reviewer noted, it would have been useful to employ data at different points to check for time-consistency of estimates or use a panel data set to validate our main findings. We are, however, unable to implement this due to lack of data.

contract enforcement, securing of property rights, the police, the courts, and the likelihood of crime and violence (Kaufmann et al., 2013).

3.3. Control variables

We follow the existing literature in also conditioning on a vector of controls, which consists of regional dummies, geographical features, cultural values, and colonial history (Acemoglu et al., 2001, 2014; Ortega and Peri, 2014). The variables in this vector have importantly been found to possess deep historical origins that are very unlikely to be affected by our three explanatory variables. Regional dummies are summarised in East Asia, Latin America, and Sub-Saharan Africa. Each of these variables takes a value of 1 if a country is located in it and 0 otherwise (Rodriguez and Rodrik, 2001; Rodrik et al., 2004).

We use a number of variables to indicate geographical features.[25] These include the log of a country's land area, the latitude of country centroid measuring the distance from the Equator of its capital city, the share of tropical land, minerals measured as the first principal component of the dummy variables for the presence of gold, iron, silver, zinc, and oil reserves, a dummy variable for whether a country is landlocked, mean distance to the coast, mean yearly temperature, mean yearly humidity, and indexes for the quality of soil and the incidences of malaria and yellow fever.

Cultural values are captured by three fractionalization indexes computed for the existence and distribution of different ethnic tribes, languages spoken, and religious beliefs from Alesina and La Ferrara (2005). For colonial history, we consider two measures. The first are dummy variables that equal 1 if a country was ever a colony of England or France and 0 otherwise. The second is the fraction of population of European origin at the end of the nineteenth century from Acemoglu et al. (2001).

3.4. Instrumental variables

Next, we describe the plausibly exogenous sources of variation in migration, education and institutions that are needed as we attempt to circumvent the potential identification problem apparent in treating the explanatory variables exogenously; see section 4 below. We used the same instrument for migration as Ortega and Peri (2014), while the instruments for education and institutions are based on the works of Hall and Jones (1999) and Woodberry (2004, 2012).

In particular, Ortega and Peri (2014) adapted the Frankel and Romer (1999) approach to build a gravity-based instrument for migration. The instrument is obtained in two steps. First, Ortega and Peri fit the data on bilateral migration shares for persons 25 years and above in the year 2000 from Docquier et al. (2010) to data on bilateral geographical and cultural characteristics of countries taken from the BACI dataset of CEPII. Second, the instrument (predicted migration) is obtained by aggregating the geography- and culture-

[25] The note attached to each table of results describes the relevant geographical endowment being used.

based value of bilateral migration shares for each country *i* across other countries *j*, using the expression: $\widehat{\mathcal{M}}_i = \sum_{j \neq i} e^{\widehat{\gamma}_{\mathcal{M}} \mathcal{Z}_{ij}}$, where $\mathcal{M}$ is the migration share predicted by bilateral costs and $\mathcal{Z}$ is a vector of independent variables, γ denoting the corresponding vector of coefficients.[26] The notion behind this instrument is that the independent variables ($\mathcal{Z}$) are exogenous to the income of country *i*, such that if actual migration and predicted migration are significantly related, the latter may be employed as an instrument for the former.

For education, we follow Acemoglu et al. (2014) in using the number of protestant missionaries per 10000 population in 1923 as an instrument. The source of this data is Woodberry (2004, 2012), with Acemoglu et al. augmenting Woodberry's data. To do this, they utilised information from the World Atlas of Christian Missions (Dennis et al., 1911) for Australia, Canada, Malta, New Zealand, and the United States. Further, these authors gave four reasons why using this measure to instrument for the level of educational attainment in a country may be challenging. They, meanwhile, concluded that once regional dummies, colonial history and institution are controlled for, protestant missions are largely a derivative of idiosyncratic factors, qualifying it for a role as an instrument for education.[27] Our sample size ranges from one and a half to about two and a half more than Acemoglu et al.'s 62 countries. For this reason, we take their Dennis et al.'s data for the presence of protestant missionaries and extracted data for all other countries directly from Woodberry.

Last, the instruments that we use for institutions are the fraction of the population speaking English and one of the other major languages from Western Europe: French, German, Portuguese, or Spanish in 1975. This variable was popularised as an instrument by Hall and Jones (1999) and has been adopted in several papers (e.g., Alcalá and Ciccone, 2004; Rodrik et al., 2004; Ortega and Peri, 2014). As European language alone seems to be a weak instrument in our model, we add the legal origin of countries as an additional instrument.[28] The latter is measured by dummy variables that equal 1 if a country's company law or commercial code derives from English common law, French commercial code, German commercial code, Scandinavian commercial code, or Socialist laws, and 0 otherwise.

3.5. Descriptive statistics

Table 1 contains the data summary for all the variables used in the econometric analyses. The last column, showing the number of observations/countries, establishes the extent of our sample coverage. To

[26] See Ortega and Peri (2014, pp. 233-237) for details. In all our regressions, we have used their predicted migration share that is based on the non-linear model specification.

[27] See Acemoglu et al. (2014, p. 887) for details. They have also used primary school enrolment rates in 1900 relative to the population aged between 6 and 14 as an additional instrument. We find, however, that this variable lacks predictive power when the three explanatory variables are simultaneously treated as endogenous regressors.

[28] This approach was also used by Freund and Bolaky (2008).

make better sense of this information and to anticipate our findings (in section 5 below), two exploratory investigations are carried out.

Table 1. Descriptive statistics.

The majority of data used are taken from Ortega and Peri (2014). Abbreviations: SD is standard deviation; ℕ is number of countries/observations. Readers are referred to section 3 for variable definitions and sources.

Variable	Mean	SD	Min	Max	ℕ
Real GDP per capita	8.51	1.35	4.76	11.21	184
Migration	0.04	0.08	0.00	0.52	188
Education	5.72	3.06	0.57	12.49	138
Institutions	-0.01	0.97	-2.22	1.96	177
Area	11.34	2.68	3.22	16.65	186
Latitude	0.29	0.19	0.00	0.72	162
Tropics	0.49	0.48	0.00	1.00	153
British colonial origin	0.32	0.47	0.00	1.00	155
French colonial origin	0.15	0.36	0.00	1.00	155
European settlers	28.38	40.97	0.00	100.00	153
Minerals	0.00	1.00	-0.39	6.76	148
Landlock	0.20	0.40	0.00	1.00	156
Coast	452.01	552.12	1.04	3418.50	153
Temperature	19.07	8.10	-4.00	32.00	153
Humidity	67.48	16.41	18.00	97.00	153
Soil quality	0.22	0.41	0.00	1.00	153
Malaria	0.30	0.40	0.00	1.00	150
Yellow fever	0.48	0.50	0.00	1.00	156
Ethnic fractionalization	0.43	0.25	0.00	0.93	175
Language fractionalization	0.39	0.28	0.00	0.92	172
Religious fractionalization	0.44	0.23	0.00	0.86	183
East Asia	0.10	0.30	0.00	1.00	188
Latin America	0.15	0.36	0.00	1.00	188
Sub-Saharan Africa	0.23	0.42	0.00	1.00	188
Predicted migration	0.04	0.03	0.00	0.16	188
Protestant missions	0.92	1.64	0.00	9.91	142
European language	31.01	43.01	0.00	100.00	149
English legal origin	0.33	0.47	0.00	1.00	175
French legal origin	0.44	0.50	0.00	1.00	175
German legal origin	0.03	0.18	0.00	1.00	175
Scandinavian legal origin	0.03	0.17	0.00	1.00	175
Socialist legal origin	0.17	0.37	0.00	1.00	175

First, table 2 depicts how real GDP per capita differs according to whether a country's migration level is above or below the median value; these are organised as high and low migration countries, respectively. Likewise, real GDP per capita of countries are arranged using the same criteria for their levels of education

and institutions. Based on these classifications, we report the means, standard deviations, and the number of observations in each group. We also document a test of mean equality, reporting the difference between the means of high and low values, standard errors, and *p*-values of difference significance.[29] As shown, all three paired differences for real GDP per capita are found to be statistically significant, with most at the 1% level. These outcomes give preliminary suggestion that greater migration, more education, and stronger institutions are highly associated with improvements in economic performance. Hence, an indication that differences in the levels of migration, education, and institutions across countries may account for cross-country differences in economic development, as hypothesised.

Second, we provide unconditional associations between the explanatory variables and real GDP per capita in figure 1.[30] To do this, we continue to use our split of countries into those with values below and above the median with regards to each of migration (top panel), education (middle panel), and institutions (bottom panel). Additionally, we rank the sample of countries according to their income per capita levels into four groups (quartiles). Then, for each above/below classification of the explanatory variables, we show the fraction of countries in each income quartile. According to this figure, which displays below-median observations in light bars and above-median observations in dark bars, the pattern that emerges is clear: migration, education, and institutions are all positively correlated with real GDP per capita, signifying their beneficial effect on economic performance. This also provides support for the preliminary findings reported in table 2. Moreover, both findings are in line with our hypotheses. We now turn to investigate these more formally from the next section.

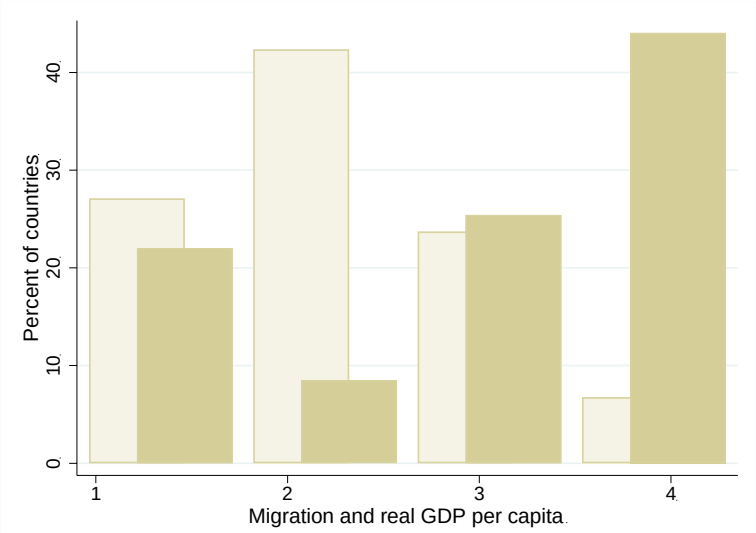
Table 2. Real GDP per capita by levels of migration, education, and institutions.

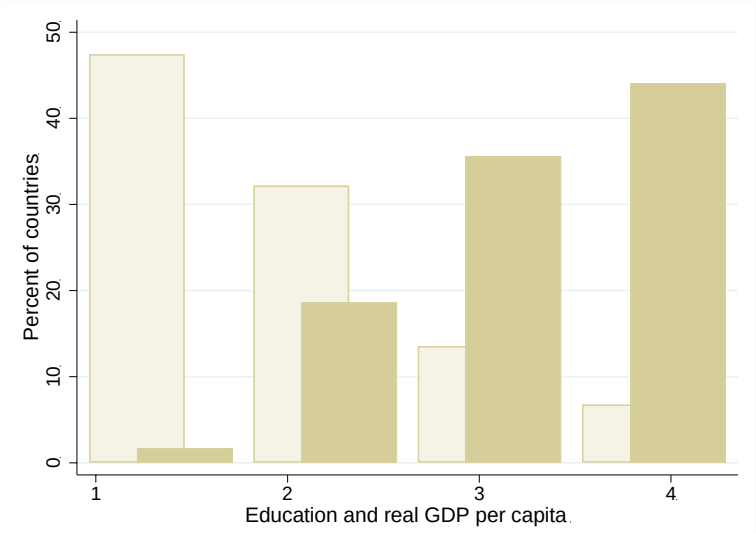
Each of migration, education, and institutions data is split into two—high and low. Countries are put in the high (low) group if their values are above (below) the median value. The table reports the mean values and the difference between the means of high and low values in row 1, standard deviations (in round brackets) and standard errors [in square brackets] in row 2, and the number of observations in each group and the *p*-values of difference significance *in italics* in row 3. Abbreviations: SD is standard deviation; SE is standard error; ℕ is number of countries/observations. Readers are referred to section 3 for variable definitions and sources.

	Migration			Education			Institutions		
	High	Low	Test of means	High	Low	Test of means	High	Low	Test of means
Mean	8.90	8.08	-0.83	9.40	7.87	-1.53	9.36	7.67	-1.69
SD/SE	(1.40)	(1.17)	[0.19]	(0.97)	(1.22)	[0.19]	(1.05)	(1.00)	[0.15]
ℕ/*p*-value	96	88	*0.00*	69	69	*0.00*	87	89	*0.00*

[29] The reported *p*-values are for *t*-tests. We reached similar conclusions to the results presented in table 2 when we applied the Mann-Whitney non-parametric *U* test.

[30] Although we have charted figure 1 for a uniform 118 countries, similar patterns were confirmed when we used all the available data points for each of migration, education, and institutions vis-à-vis real GDP per capita.





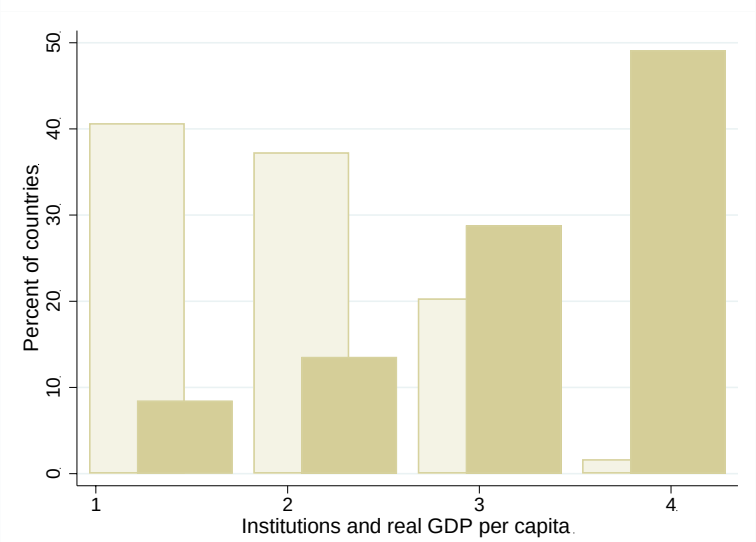


Figure 1. Migration, education, institutions, and real GDP per capita.

Real GDP per capita below and above the median of migration, education, and institutions. The light bars are for below the median observations, while the dark bars are for those above the median. Readers are referred to section 3 for variable definitions and sources.

4. Methodology

Our objective in this paper is to estimate and identify the following economic model:

$$Y_i = \alpha_0 + \alpha_1 Migration_i + \alpha_2 Education_i + \alpha_3 Institutions_i + \alpha_4 Controls_i + \epsilon_i \quad (1)$$

where, for each country indexed by i, Y_i is year 2000 real GDP per capita (PPP-adjusted and in logs) and all variables in equation (1) were introduced in section 3 above. The coefficients of most interest to us are α_1, α_2, and α_3, which captures the respective effects of migration, education, and institutions on economic performance. Given the theoretical considerations in section 2 (and the preliminary analyses in section 3), we expect to recover positive estimates for all three parameters (α_1, α_2, and α_3). Further, α_4 is a vector of coefficients collecting the effects of a vector of additional country-specific characteristics that may affect income—these are housed in $Controls_i$, and ϵ_i is an error term.

Our baseline strategy is to estimate equation (1) using OLS regressions. As is, however, well established in the existing literature, such OLS estimates of α_1, α_2, and α_3 cannot be regarded as causal or accurate. A first major reason for this is that the main explanatory variables are endogenous. Thus, given that there are factors in ϵ_i influencing Y_i and any or all of migration, education, and institutions, there may be: (i) reverse causality, and (ii) omitted variable bias. A second major concern entails that of measurement error, which will introduce attenuation bias to our estimates.

Given the possibility of these biases in the OLS estimates, our identification strategy is to estimate the following three equations in the first stage of 2SLS regressions:

$$Migration_i = \beta_0 + \beta_1 Predicted\ migration_i + \beta_2 Controls_i + \varepsilon_i \quad (2)$$

$$Education_i = \gamma_0 + \gamma_1 Protestant\ missions_i + \gamma_2 Controls_i + \nu_i \quad (3)$$

$$Institutions_i = \delta_0 + \delta_1 European\ language_i + \delta_2 Legal\ origin_i + \delta_3 Controls_i + \varphi_i \quad (4)$$

where the key exclusion restrictions are that predicted migration, protestant missions, and European language and legal origin determine the extents of migration, education and institutions but are not correlated with the factors in ϵ_i. Put differently, migration, education and institutions can be specified to depend on all the exogenous variables (Rodrik et al., 2004). We note that all variables in equations (2)-(4) were introduced in section 3.

Together, equations (1)-(4) form our core specification. In a style consistent with Rodrik et al.'s (2004) approach, we have selected measures for migration, education, and institutions that allow our work to be comparable with the previous literature. Moreover, the instruments utilised in this paper have also been shown to be valid, yielding strong second stage estimates although under distinct empirical specifications. In the next section, we begin by presenting the OLS estimates of equation (1). After reporting the results from our preferred economic model,[31] we check their robustness by: (i) including additional covariates, and

[31] This is the specification that has dealt with Rodriguez and Rodrik's (2001) critique.

(ii) excluding influential observations. Finally, we document findings from the 2SLS regressions to infer causality and investigate plausible interaction effects between migration, education, and institutions on real GDP per capita.

5. Results

5.1. OLS regressions

We begin by reporting the OLS estimates of the economic relationship shown in equation (1) in table 3, choosing to display only the coefficients for our three variables of interest and the corresponding robust standard errors in round brackets. Models 1, 2, and 3, which centre, respectively, on the contribution of each of migration, education, and institutions on real GDP per capita, do not include any control variables. As shown, all three explanatory variables are individually statistically significant at the 1 per cent level, with all having positive values as expected. There are some disparities, however, in terms of sizes of effects and explanatory powers. While the coefficient estimate on migration is 7.18 (with those on education and institutions being 0.29 and 1.03, respectively), institutions come out trumps as the factor that alone can account for the most substantial part of the variation in income (58%). From the table, the R-squared confirms this: the equivalent values for migration and education are, respectively, 17% and 44%.

Next, we consider the importance of each of migration, education, and institutions quantitatively. We do this by comparing two countries, Burundi and the United States, in order to obtain a more concrete sense of the magnitude of their relative contributions. Burundi and the United States are categorised, respectively, as having low and high levels of migration (0.008 *vs* 0.086), education (1.26 *vs* 12), and institutions (-1.33 *vs* 1.57). Further, Burundi's income per capita, of \$395, is in the bottom five in our sample, while that of the United States, \$39175, is in the top five.

Utilising this information, our comparative exercise is undertaken in three steps. First, using the estimated coefficients ($\alpha_1 = 7.18$, $\alpha_2 = 0.29$, and $\alpha_3 = 1.03$) in models 1, 2, and 3, respectively, we compute that, on average, there should be 0.56, 3.12, and 2.99 log-point differences between the logs of real GDP per capita of Burundi and the United States.[32]

Second, we "Americanise" Burundi and "Burundianise" the United States to ascertain the potential income effects of sequentially inputting for each country, *ceteris paribus*, the value of migration, education, and institutions obtained in the other country, using the values found in step one. We find that "Americanising" Burundi increases Burundi's real GDP per capita from \$395 to \$691 (for the effect of migration), to \$8917 (for the effect of education), and to \$7832 (for the effect of institutions). Meanwhile, as one might have expected, "Burundianising" the United States decreases its real GDP per capita from

[32] Letting $J = \text{Migration, Education, Institutions}$, we use $\Delta \ln Y_i = \widehat{\alpha_n} \times \Delta \text{J}$, with $n = 1, 2, 3$. Hence, for $J = \text{Migration}$, $\Delta \ln Y_i = \widehat{\alpha_1} \times \Delta \text{Migration} = 7.18 \times (0.086 - 0.008) = 0.56$. Following the same steps, it is easy to confirm that $\Delta \ln Y_i = 3.12$ for $J = \text{Education}$ and that $\Delta \ln Y_i = 2.99$ for $J = \text{Institutions}$.

$39175 to $22401 (for the effect of migration), to $1737 (for the effect of education), and to $1978 (for the effect of institutions).[33]

Third, we compare the estimates from the previous two exercises to their equivalent actual values. In reality, real GDP per capita in the United States differs from that of Burundi by a factor of approximately 100, and although the estimates above are not nearly as substantial, the results of these counterfactuals establish huge income gains for Burundi and signal massive income losses for the United States (i.e., if these estimates were interpreted as causal). Unsurprisingly, therefore, each of these experiments underscore the long-run relevance of improving each of migration, education, and institutions to a country's income per capita. As shown, the most beneficial or detrimental impacts came from education and institutions, which raise and reduce real GDP per capita for Burundi and the United States (respectively) by a factor of approximately 23 and 20. In contrast, migration's impact is estimated to change real GDP per capita for both countries (positively for Burundi and negatively for the United States) by a factor of 1.75.

Table 3. OLS regression results.

Dependent variable is log real GDP per capita (PPP) in 2000. All regressions include a constant. Robust standard errors (in round brackets). Abbreviations: N is no controls; R is regional dummies (East Asia, Latin America, and Sub-Saharan Africa); G is geographical features (Area, Latitude and Tropics); C is colonial history (British colonial origin, French colonial origin, and European settlers). Readers are referred to section 3 for variable definitions and sources. *** p<0.01, ** p<0.05, * p<0.1.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Migration	7.18***			3.61***	4.18***	4.17***	4.67***
	(1.27)			(1.12)	(0.90)	(0.94)	(0.92)
Education		0.29***		0.14***	0.05*	0.06*	0.08**
		(0.03)		(0.03)	(0.03)	(0.03)	(0.04)
Institutions			1.03***	0.71***	0.72***	0.72***	0.66***
			(0.05)	(0.08)	(0.08)	(0.09)	(0.10)
Controls	N	N	N	N	R	R, G	R, G, C
Observations	184	138	176	138	138	128	118
R-squared	0.17	0.44	0.58	0.69	0.8	0.81	0.83

Next, in model 4, we include all three explanatory variables simultaneously. As before, all three explanatory variables enter positively and remain highly statistically significant. Interestingly, the ranking of the size of their estimated coefficients on income is preserved, with estimated coefficients of 3.61, 0.14, and 0.71 for migration, education, and institutions, respectively. We note that this happens to be the outcome in all the results reported in this paper. In the rest of the models (5-7) assessed in table 3, we

[33] The values for "Americanising" Burundi are obtained as follows: (i) $\Delta \ln Y_i = 7.18 \times (0.086 - 0.008) = 0.56$—as Burundi's actual natural log of GDP per capita is 5.98, the level of income per capita based on migration level in the United States would be $\approx \$691\ (= e^{6.54})$; (ii) $\Delta \ln Y_i = 0.29 \times (12 - 1.26) = 3.12$—using now the education level in the United States would yield for Burundi the level of income per capita of $\approx \$8917\ (= e^{9.10})$, and (iii) $\Delta \ln Y_i = 1.03 \times (1.57 - (-1.332)) = 2.99$—based on quality of institutions in the United States, Burundi's new level of income per capita would be $\approx \$7832\ (= e^{8.97})$. Following the same steps, and observing that "Burundianising" the United States would result in the following corresponding log-differences: -0.56, -3.12, and -2.99, it is easy to confirm that the implied real GDP per capita for the United States (respectively) are: $\approx \$22401\ (= e^{10.02})$, $\approx \$1737\ (= e^{7.46})$, and $\approx \$1978\ (= e^{7.59})$.

gradually introduce the vector of additional controls that the existing literature has identified to possess the potential to exert an influence on economic development beyond our three explanatory variables (see, e.g., Diamond, 1997; Hall and Jones, 1999; Rodriguez and Rodrik, 2001). First, we add regional dummies to model 4 to obtain model 5. We then augment this with country-specific geographical features to realise model 6. Lastly, we insert colonial history to the previous model to get model 7. In all models, the estimated coefficients of migration, education, and institutions remain positive and statistically significant.

In table 4, we report the results from a variety of robustness tests, which we base on model 7 from table 3. Our approach is two-fold; to control for an even larger set of additional conditioning variable set and to exclude influential observations. In models 1-8, which fall within the first category, we sequentially include (in addition to the regional dummies, geographical features, and colonial history) the following additional factors: minerals, landlocked dummy, distance to the coast, temperature, humidity, index of soil quality, the incidence of malaria, and incidence of yellow fever. In each case, we find that the estimated coefficients of migration, education, and institutions on real GDP per capita remain positive and statistically significant. In model 9, all the additional control variables in models 1-8 are included at the same time. Again, the estimated effects of migration, education, and institutions on real GDP per capita continue to be positive and statistically significant. Besides, model 10 introduces as additional determinants of income the fractionalisation indices for ethnicity, language, and religion, with the results remaining unaffected.

In the remainder of the models (11-18) examined in table 4, we deal with the issue that falls within the second category; namely that of excluding influential observations in our sample. In model 11, we alleviate concerns that the results presented so far have been driven mainly by the neo-European countries; hence, we drop observations for Australia, Canada, New Zealand, and the United States. The estimated coefficients are still very close to our baseline estimates. In models 12-14, we remove observations by implementing more formal procedures: (i) excluding country-observations with absolute standardized residuals greater than 1.96 (model 12); (ii) excluding country-observations with a Cook's distance higher than the rule-of-thumb sill of 4 divided by the number of observations $\mathbb{N}$ (model 13); and (iii) implementing Li's robust regression that assigns influential observations, smaller weights (model 14). Finally, we omit all country-observation for which abs(dfbeta) > (2/sqrt($\mathbb{N}$)) for migration in model 15, for education in model 16, for institutions in model 17, and for all three explanatory variables together in model 18. In all these exercises, we find that the results remain robust.

Table 4. Establishing robust relationships.

Dependent variable is log real GDP per capita (PPP) in 2000. All regressions include a constant. Robust standard errors (in round brackets). Abbreviations: N is no controls; R is regional dummies (East Asia, Latin America, and Sub-Saharan Africa); G is geographical features (Area, Latitude and Tropics); C is colonial history (British colonial origin, French colonial origin, and European settlers); EV is explanatory variables. Readers are referred to section 3 for variable definitions and sources. *** p<0.01, ** p<0.05, * p<0.1.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Migration	5.06***	4.61***	4.86***	4.85***	4.90***	4.92***	4.86***	4.83***	4.70***
	(1.04)	(0.91)	(0.92)	(1.01)	(1.03)	(1.02)	(0.89)	(0.91)	(1.03)
Education	0.09**	0.09**	0.09**	0.10**	0.08**	0.09**	0.07**	0.09**	0.08*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Institutions	0.67***	0.66***	0.65***	0.66***	0.68***	0.69***	0.64***	0.67***	0.63***
	(0.14)	(0.10)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)
Control	R, G, C + Minerals	R, G, C + Landlock	R, G, C + Coast	R, G, C + Temperature	R, G, C + Humidity	R, G, C + Soil quality	R, G, C + Malaria	R, G, C + Yellow fever	R, G, C + All geography
Observations	111	118	118	116	116	116	118	118	116
R-squared	0.84	0.84	0.83	0.84	0.84	0.84	0.84	0.83	0.86
Model	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Migration	5.29***	4.81***	4.71***	5.03***	4.79***	3.83***	4.85***	4.24***	3.46***
	(0.86)	(0.89)	(0.87)	(0.83)	(0.82)	(1.15)	(0.75)	(0.88)	(0.99)
Education	0.09**	0.09**	0.08**	0.06**	0.06**	0.10***	0.07**	0.09**	0.05*
	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Institutions	0.69***	0.68***	0.64***	0.63***	0.64***	0.65***	0.69***	0.69***	0.74***
	(0.10)	(0.10)	(0.09)	(0.08)	(0.08)	(0.10)	(0.09)	(0.08)	(0.07)
Control	R, G, C + Fractionalization indices	R, G, C + excluding Australia, Canada New Zealand and the United States	R, G, C + excluding ℕ when estimated standardized residual > |1.96|	R, G, C + excluding ℕ when Cook's distance > 4/ℕ	R, G, C + Li's robust regression	R, G, C + excluding ℕ when |dfbeta| > (2/sqrt(ℕ)) for migration	R, G, C + excluding ℕ when |dfbeta| > (2/sqrt(ℕ)) for education	R, G, C + excluding ℕ when |dfbeta| > (2/sqrt(ℕ)) for institutions	R, G, C + excluding ℕ when |dfbeta| > (2/sqrt(ℕ)) for all three EV
Observations	113	114	113	104	118	107	110	108	97
R-squared	0.85	0.82	0.87	0.90	0.86	0.86	0.87	0.88	0.91

5.2. 2SLS regressions

In spite of robustness tests, carried out in the previous subsection, omitted variables, endogeneity, and measurement error still pose a threat to the reported results. We, therefore, present 2SLS estimates in this subsection, where migration, education, and institutions are now treated endogenously. To this end, we begin by displaying the first-stage regression results for all three variables in table 5, which is based on equations (2)-(4) or models 1-4 of table 6. As shown, the excluded instruments appear to be doing their job well in our estimating framework, with predicted migration and protestant missions, respectively, having significant positive effects on migration and education at the 1 per cent level, even after conditioning on regional dummies, geographical features, and colonial history that are included in both the first and second stage regressions. This is also true of legal origins instrumenting for institutions. We identify that European language is not significant in these specifications, a finding that is contrary to Hall and Jones (1999) and Rodrik et al. (2004). We conjecture that this may be due to the difference in the number of endogenous regressors between our study and theirs. We also note that predicted migration has significant positive effects on education and institutions, which is similar to the finding of Rodrik et al. (2004), who find that settler mortality has significant effects on institutions and integration

The first-stage results underline the challenge of disentangling the effects of education and institutions, given the endogenous nature of these variables (Gennaioli et al., 2014). In an earlier work, Rodrik et al. (2004) underscored the weight of this task, writing that:

> The extent to which an economy is integrated with the rest of the world and the quality of its institutions are both endogenous, shaped potentially not just by each other and by geography, but also by income levels. Problems of endogeneity and reverse causality plague any empirical researcher trying to make sense of the relationships among these causal factors (p. 133).[34]

This extra complication notwithstanding, we forge ahead in our empirical investigation following the approach of Rodrik et al. (2004).[35] In the bottom half of table 5, we reported several first stage statistics, viz: Anderson-Rubin (A-R) Wald test, Angrist-Pischke (A-P) F test, Cragg-Donald Wald F statistic, Hansen J statistic p-value, Kleibergen-Paap (K-P) Wald rk F statistic, Stock-Yogo (S-Y) weak ID test critical value, and Shea R-squared. Our objective in reporting these various test statistics is to evaluate the quality and validity of the instruments used for analyses. As can be seen, the generated statistics are all largely in support of the strength of the instruments. For example, the reported K-P statistics, which allow

[34] To our best knowledge, this paper is only one of two that have used more than two endogenous regressors; see also Ortega and Peri (2014).

[35] In particular, we employ instruments that have been tried and acquitted through peer-review publications and document several first stage diagnostic tests on weak instruments below. See Dollar and Kraay (2003) for a discussion on the problem of weak instruments when multiple instruments are used.

testing the null of jointly weak instruments, ranges from 10.22 to 18.46, implying that we can reject the weak instrument null hypothesis.[36] Thus, for an exactly identified 2SLS specification as in models 1 and 2 of table 6 below, the reported F statistics imply that we can reject the hypothesis that the IV size bias is greater than 5 per cent at the 5 per cent level of significance.[37]

Table 5. First stage regression results.

Dependent variable is migration in models 1 and 4, education in models 2 and 5, and institutions in models 3 and 6. First stage least-squares regression results in models 1-3 are for second stage regressions in models 1-3 of table 6, while models 4-6 are the equivalent for model 4 in table 6. Endogenous regressors (instruments), respectively, are migration (predicted migration) in model 1, education (protestant missions) in model 2, and institutions (European language and legal origin—English, French, German, Scandinavian, and Socialist) in model 3, and migration, education, and institutions (predicted migration, protestant missions, European language and legal origin—English, French, German, Scandinavian, and Socialist) in models 4-6. All regressions include a constant. Robust standard errors (in round brackets). Abbreviations: N is no controls; R is regional dummies (East Asia, Latin America, and Sub-Saharan Africa); G is geographical features (Area, Latitude and Tropics); C is colonial history (British colonial origin, French colonial origin, and European settlers); D is dummy variables for different sources of Protestant missions. The A-R test is the Anderson-Rubin Wald test of weak-instrument robust inference for testing the significance of the endogenous regressors. The A-P test is the Angrist-Pischke F test for weak identification of individual regressors. The Cragg-Donald is a Wald F statistic for a test of weak identification. Hansen J statistic p-value is a test of overidentification of all instruments. The K-P test is the Kleibergen-Paap Wald rk F statistic for weak identification. The S-Y test is the Stock-Yogo weak identification test critical value—the critical values in the square brackets are for the 10% maximal IV size and 25% maximal IV size, respectively; critical values in the triangular brackets are for the 5% maximal IV relative bias and 30% maximal IV relative bias, respectively). The Shea R-squared is the partial R-squared from the instruments in the first stage regressions. Readers are referred to section 3 for variable definitions and sources. *** p<0.01, ** p<0.05, * p<0.1.

Model	(1)	(2)	(3)	(4)	(5)	(6)
	Migration	Education	Institutions	Migration	Education	Institutions
Predicted migration	1.536***			2.063***	17.46**	8.294**
	(0.432)			(0.594)	(7.882)	(3.217)
Protestant missions		1.006***		-0.0263*	0.715**	-0.0721
		(0.3)		(0.0148)	(0.291)	(0.088)
European language			0.00834	0.00141	-0.00118	0.00487
			(0.012)	(0.00107)	(0.0265)	(0.0167)
English legal origin			0.184	0.0133	-3.693***	-0.912**
			(0.241)	(0.0411)	(0.964)	(0.352)
French legal origin			-0.416**	-0.0113	-5.203***	-1.656***
			(0.189)	(0.0281)	(0.873)	(0.314)
German legal origin			0.394*			
			(0.228)			
Socialist legal origin			-1.575***	-0.0179	-1.577	-1.955***
			(0.198)	(0.0267)	(1.822)	(0.333)

[36] In particular, the tabulated critical values for weak instruments in Stock and Yogo (2005) that are derived under the assumption of homoskedasticity for Cragg-Donald Wald F statistic is used for the Kleibergen-Paap rk F statistics that are based on the assumption of heteroskedasticity; this is now commonly adopted in the applied economic literature.

[37] Besides, the values of the F statistics mean that we can also reject the hypothesis that the relative IV bias is greater than 5 per cent at the 5 per cent level of significance. Moreover, these F statistics of exclusion restriction exceed the rule of thumb threshold of 10 suggested by Staiger and Stock (1997)—this is particularly appropriate for models 1 and 2 as the rule of thumb was conceived in the context of models with one endogenous regressor, given that instruments can be weak in models with higher endogenous regressions because of collinearity. While the latter is probably true in our case, there is minimal evidence from these first stage statistics that our results were materially influenced.

Controls	R, G, C	R, G, C, D	R, G, C	R, G, C, D	R, G, C, D	R, G, C, D
Observations	136	89	133	89	89	89
R-squared	0.373	0.65	0.702	0.482	0.774	0.64
	First stage statistics					
A-R test	7.77	9.89	20.26	6.66	6.66	6.66
A-P test	12.62	11.22	18.46	2.65	13.9	7.14
Cragg-Donald	35.84	14.38	16.675	3.959	3.959	3.959
Hansen J			0.6652	0.0097	0.0097	0.0097
K-P test	12.62	11.22	18.46	10.215	10.215	10.215
S-Y critical value	[16.38, 5.53]	[16.38, 5.53]	[26.87, 8.84]			
			⟨18.37, 5.25⟩	⟨12.20, 4.40⟩	⟨12.20, 4.40⟩	⟨12.20, 4.40⟩
Shea R-squared	0.2228	0.1574	0.414	0.3083	0.3885	0.252

Table 6. 2SLS regression results.

Dependent variable is log real GDP per capita (PPP) in 2000. All regressions include a constant. Robust standard errors (in round brackets). Abbreviations: R is regional dummies (East Asia, Latin America, and Sub-Saharan Africa); G is geographical features (Area, Latitude and Tropics); C is colonial history (British colonial origin, French colonial origin, and European settlers); D is dummy variables for different sources of Protestant missions. Endogenous regressors (instruments) are migration (predicted migration) in model 1, education (protestant missions) in model 2, institutions (European language and legal origin—English, French, German, Scandinavian, and Socialist—in model 3, and migration, education, and institutions (predicted migration, protestant missions, European language and legal origin—English, French, German, Scandinavian, and Socialist) in model 4. The results of the first stage regressions are reported in table 5. Panel A contains the 2SLS regression results, with the results from the equivalent OLS specification reported in panel B. Readers are referred to section 3 for variable definitions and sources. *** p<0.01, ** p<0.05, * p<0.1.

Model	(1)	(2)	(3)	(4)
	Panel A: Second stage of 2SLS			
Migration	8.73***			4.910***
	(2.146)			(1.836)
Education		0.457***		0.160**
		(0.128)		(0.077)
Institutions			0.815***	0.733***
			(0.0816)	(0.274)
	Panel B: Equivalent OLS specification			
Migration	7.226***			5.336***
	(0.961)			(0.958)
Education		0.257***		0.149**
		(0.069)		(0.0621)
Institutions			0.764***	0.423**
			(0.0825)	(0.188)
Controls	R, G, C	R, G, C, D	R, G, C	R, G, C, D
Observations	136	89	133	89
R-squared	0.73	0.641	0.784	0.788

Further, a similar conclusion holds for models 3 and 4 of table 6, where the models are overidentified such that we can also report the Hansen J statistic. Besides, the A-P F test helps to deal with the weak instrument problem in the presence of multiple endogenous regressors. In practice, having a strong A-P statistic on one of the endogenous regressors is sufficient to perform inference (Ortega and Peri, 2014). The Shea R-squared, capturing the degree to which migration, education and institutions depend on a particular instrument (e.g., predicted migration) for identification, also confirms that all three endogenous variables are sensibly well identified. These diagnostic tests on the potential weakness of the instruments all produce a reassuring conclusion that there is no need for concern.

Panel A of table 6 presents the results of the second stage of the 2SLS regressions, with its panel B containing the equivalent OLS estimates. As stated above, these models include covariates that capture regional dummies, geographical features, and colonial history. Following Acemoglu et al. (2014), we have also added the dummy for the different sources of protestant missions in any model involving education. The results indicate that the explanatory variables of interest continue to have strong positive effects on economic performance. In particular, models 1, 2, and 3 of table 6 produce the second stage estimated coefficients of 8.73, 0.457, and 0.815, respectively, on migration, education, and institutions that are also statistically significant at the 1 per cent level.

For illustration purposes, we again compare Burundi and the United States to gauge the quantitative implications of the 2SLS estimated coefficients of migration, education, and institutions ($\alpha_1 = 8.73$, $\alpha_2 = 0.457$, and $\alpha_3 = 0.815$) in models 1, 2, and 3, respectively. Given these values, we compute that, on average, there should be 0.68, 4.91, and 2.36 log-point differences between the logs of GDP per capita of Burundi and the United States.[38] Then, "Americanising" Burundi, by successively entering the values of migration, education, and institutions which were obtained in the United States will, *ceteris paribus*, lead to an increase in Burundi's real GDP per capita from \$395 to \$780 (for the effect of migration), to \$53639 (for the effect of education), and to \$4199 (for the effect of institutions). Just like in the OLS estimates, "Burundianising" the United States leads to a decrease in the latter's real GDP per capita, falling from \$39175 to \$19856 (for the effect of migration), to \$289 (for the effect of education), and to \$3689 (for the effect of institutions).[39] In summary, the results and the experiments from both the OLS and 2SLS

[38] Again, letting $J = \text{Migration, Education, Institutions}$, we use $\Delta \ln Y_i = \widehat{\alpha_n} \times \Delta \text{J}$, with $n = 1, 2, 3$. Hence, for $J = \text{Migration}$, $\Delta \ln Y_i = \widehat{\alpha_1} \times \Delta \text{Migration} = 8.73 \times (0.086 - 0.008) = 0.68$. Following the same steps, it is easy to confirm that $\Delta \ln Y_i = 4.91$ for $J = \text{Education}$ and that $\Delta \ln Y_i = 2.36$ for $J = \text{Institutions}$.

[39] The values for "Americanising" Burundi are obtained as follows: (i) $\Delta \ln Y_i = 8.73 \times (0.086 - 0.008) = 0.68$—as Burundi's actual natural log of GDP per capita is 5.98, the level of income per capita based on United States migration level would be $\approx \$780$ $(= e^{6.66})$; (ii) $\Delta \ln Y_i = 0.457 \times (12 - 1.26) = 4.91$—using now United States education level would yield for Burundi the level of income per capita of $\approx \$53639$ $(= e^{10.89})$, and (iii) $\Delta \ln Y_i = 0.815 \times (1.57 - (-1.332)) = 2.36$—based on United States quality of institutions, Burundi's new level of income per capita would be $\approx \$4199$ $(= e^{8.34})$. Following the same steps, and observing that "Burundianising" the United States would result in the following corresponding log-differences: -0.68, -4.91, and -2.36, it is easy to confirm that the implied GDP per capita for the United States (respectively) are: $\approx \$19856$ $(= e^{9.90})$, $\approx \$289$ $(= e^{5.67})$, and $\approx \$3689$ $(= e^{8.21})$.

estimates indicate qualitatively identical outcomes: a large fraction of the observed differences in economic prosperity between the United States and Burundi can be traced to differences in their levels of migration, education, and institutions.

In model 4, when all the three explanatory variables entered synchronously, we observe that the positive and statistically significant impacts of these variables on the outcome variable are retained. Based on these estimated coefficients, we can perceive that the 2SLS estimates are consistent with the baseline OLS results. Moreover, the estimated coefficients from 2SLS regressions are quantitatively larger than those from OLS regressions, except for migration. Likened to the OLS estimate of the effect of migration, the 2SLS estimate (4.910 *vs* 5.336) is smaller. This could be indicating that the reverse causality bias is a bigger problem than the attenuation bias from measurement error in the case of migration (countries whose national income levels are high for reasons other than migration may attract more migrants). The opposite is, however, found for the respectively displayed 2SLS and OLS effects of education (0.160 *vs* 0.149) and institutions (0.733 *vs* 0.423). Lastly, the reported standard errors from the OLS regressions are generally smaller than in the 2SLS regressions, suggesting that the former may be more precisely estimated.

5.3. Interaction effects

Our goal in this subsection is to test whether any meaningful relationships exist between migration, education, and institutions in determining economic development. Here, we ask: What complementarities matter? To answer this question, we next extend the linear econometric models employed so far by including interaction terms of the main independent variables along the categorisations established in figure 1 for the explanatory variables. In particular, we examine: (i) how the income effect of migration depends on country differences in education and institutions; (ii) how the income effect of education depends on country differences in migration and institutions; and (iii) how the income effect of institutions depends on country differences in migration and education. Since these specifications now include interaction terms, we need to provide additional instruments, for which we use interactions of our primary instruments with the new variables. Table 7, which documents the 2SLS regression results from this exercise, gives more details on the instruments.

In table 7, models 1-2, 4-5, and 7-8 mainly involve interacting one endogenous regressor with dummy variables for high (above the median) and low (below the median) levels of another endogenous regressor. For example, model 1 of table 7 is an augmented version that permits interaction of migration with dummy variables for above-median education and below-median education. In contrast, model 2 involves the interactions of migration with dummy variables for above-median institutions and below-median institutions. On the other hand, models 3, 6, and 9 take the form of a horse race, where we interact one endogenous regressor with dummy variables for high and low levels of the other two endogenous regressors. As an example, model 3 of table 7 is an augmented one that allows the interaction of migration

with dummy variables for above-median education, below-median education, above median institutions, and below-median institutions. Due to collinearity, however, the following interaction terms drop out of the estimated models 3, 6, and 9 (respectively)—the interactions of migration and below-median institutions, education and below-median migration, and institutions and above-median education.

Finally, four observations are noteworthy. First, the beneficial effect of migration for economic outcomes does not depend on the levels of education in a country but is affected by the quality of institutions. The estimated coefficient for migration interacted with above-median education is higher (11.21 *vs* 7.52); they are both statistically significant at the 1 per cent level (model 1). A confirmation that countries with higher levels of education may be better placed to successfully attract higher-skilled immigrants, superior ideas and greater capital investments; all of which will help to generate economic wealth. As displayed in model 2, the beneficial effect of migration for economic performance is affected by the quality of institutions in a country. In essence, we find that the estimated coefficient on migration interacted with above-median institutions is positive and highly significant, while the corresponding estimate on migration interacted with below-median institutions is negative albeit insignificant. This result indicates that countries with weak institutions may find it problematic to draw top immigrants in the first place nor would they be well equipped to appropriate the potential gains brought by immigrants.

Second, education has positive impacts on real GDP per capita that are statistically significant on all countries, with the effects appearing not to depend on the extents of migration (model 4) or quality of institutions (model 5). Thus, having a more educated society is universally better for economic development, a result akin to Baser and Gokten (2019).

Third, the beneficial effects of institutions for economic progress are not conditioned by the volume of migration in a country (model 7). As shown, however, the role played by institutions vary with the levels of education in a country, such that the estimated coefficient on institutions interacted with above-median education is positive and highly significant, while that of institutions interacted with below-median education though still positive is not significant. This finding is consistent with the literature on modernisation hypothesis (Lipset, 1959; Glaeser et al., 2007).

Table 7. Interactions between migration, education, and institutions.

Dependent variable is log real GDP per capita (PPP) in 2000. All regressions include a constant. Robust standard errors (in round brackets). Abbreviations: M is migration; E is education; I is institutions; R is regional dummies (East Asia, Latin America, and Sub-Saharan Africa); G is geographical features (Area, Latitude and Tropics); C is colonial history (British colonial origin, French colonial origin, and European settlers); D is dummy variables for different sources of Protestant missions. Endogenous regressors (instruments) are migration interacted with both high and low education (predicted migration interacted with both high and low education) in model (1), migration interacted with both high and low institutions (predicted migration interacted with both high and low institutions) in model (2), migration interacted with both high and low education, and migration interacted with both high and low institutions (predicted migration interacted with both high and low education, and predicted migration interacted with both high and low institutions) in model (3), education interacted with both high and low migration (protestant mission interacted with both high and low migration) in model (4), education interacted with both high and low institutions (protestant mission interacted with both high and low institutions) in model (5), education interacted with both high and low migration, and education interacted with both high and low institutions (protestant mission interacted with both high and low migration, and protestant mission interacted with both high and low institutions) in model (6), institutions interacted with both high and low migration (European language interacted with both high and low migration, and each legal origin interacted with both high and low migration) in model 7, institutions interacted with both high and low education (European language interacted with both high and low education, and each legal origin interacted with both high and low education) in model (8), and institutions interacted with both high and low migration, and institutions interacted with both high and low education (European language interacted with both high and low migration, European language interacted with both high and low education, each legal origin interacted with both high and low migration, and each legal origin education) in model (9). Readers are referred to section 3 for variable definitions and sources. The A-R test is the Anderson-Rubin Wald test of weak-instrument robust inference for testing the significance of the endogenous regressors. †The A-P test is the Angrist-Pischke F test for weak identification of individual regressors (i.e., weak identification for migration, education and institutions, respectively). The Cragg-Donald is a Wald F statistic for a test of weak identification. Hansen J statistic p-value is a test of overidentification of all instruments. ††The S-Y test is the Stock-Yogo weak identification test critical value—the critical values in the square brackets are for the 10% maximal IV size and 25% maximal IV size, respectively; critical values in the triangular brackets are for the 5% maximal IV relative bias and 30% maximal IV relative bias, respectively). †††The Shea R-squared is the partial R-squared from the instruments in the first stage regressions. *** p<0.01, ** p<0.05, * p<0.1.

Model		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Interacted with:									
Migration	> median E	11.21***		1.339						
		(3.557)		(5.965)						
Migration	< median E	7.515***		-0.798						
		(2.095)		(4.962)						
Migration	> median I		11.41***	11.04***						
			(2.191)	(4.201)						
Migration	< median I		-1.638	d.c						
			(5.474)							
Education	> median M				0.446***		0.0899			
					(0.124)		(0.0681)			
Education	< median M				0.349***		d.c			
					(0.132)					
Education	> median I					0.467***	0.362***			
						(0.124)	(0.117)			
Education	< median I					0.419**	0.339**			
						(0.178)	(0.157)			
Institutions	> median M							0.828***		0.922***

								(0.0936)		(0.118)
Institutions	< median M							1.057***		1.561***
								(0.144)		(0.26)
Institutions	> median E								0.992***	d.c
									(0.11)	
Institutions	< median E								0.405	-0.828**
									(0.291)	(0.347)
Control		R, G, C	R, G, C	R, G, C	R, G, C, D	R, G, C, D	R, G, C, D	R, G, C	R, G, C	R, G, C
First stage statistics										
A-R test		4.34	12.56	6.16	6.35	6.88	4.56	19.22	12.21	12.52
A-P F test†		4.36, 6.70	19.78, 5.19	2.94, 4.61, 10.58	18.92, 13.57	29.57, 18.37	15.47, 16.79, 11.27	66.69, 18.21	10.50, 8.76	28.06, 12.71, 7.90
Cragg-Donald		16.729	10.1	7.841	6.054	5.433	3.634	11.805	4.168	1.941
Hansen J								0.5109	0.685	0.2465
K-P test		5.107	3.926	2.981	3.185	4.812	2.946	15.863	7.533	3.498
S-Y critical value††		[7.03, 3.63]	[7.03, 3.63]	n.a	[7.03, 3.63]	[7.03, 3.63]	n.a	[29.32, 9.31]	[27.51, 8.85]	
								⟨18.76, 4.66⟩	⟨18.30, 4.69⟩	⟨18.47, 4.39⟩
Shea R-squared†††		0.25, 0.33	0.35, 0.15	0.23, 0.19, 0.28	0.17, 0.14	0.19, 0.13	0.31, 0.20, 0.14	0.55, 0.53	0.63, 0.28	0.66, 0.39, 0.26
Observations		118	135	118	89	89	89	133	117	117

Fourth, we turn to the models with one endogenous regressor interacted with the dummy variables for above the median and below the median levels of the other two endogenous regressors (i.e., models 3, 6, and 9). It is revealed in model 3 that only migration interacted with above-median institutions with an estimated coefficient of 11.04 is statistically significant at the 1 per cent level, with migration interacted with above-median and below-median education yielding, respectively, positive and negative point estimates that are not significant. For model 6, although all the estimated coefficients are positive, only the ones for education interacted with the dummy variables for institutions are statistically significant (at least at the 5 per cent level). The results in model 9 show that all the estimated coefficients of institutions interacted with dummy variables for above-median and below-median of both migration and education are statistically significant. In particular, the beneficial impact of institutions on real GDP per capita is upheld regardless of the levels of migration; however, it is shown that institutions interacted with below-median education results in the lowering of real GDP per capita. A possible explanation for this is that citizen engagement in political and productive activities are inhibited where the education level of a country is low, thereby reducing the overall outcome.

5.4. Results compared to existing studies

As mentioned earlier, the majority of existing studies in the economic development literature focuses on one endogenous variable; we do not find these appropriate to use as benchmarks for our study because we have three explanatory variables that are endogenous. In this section, we draw comparisons between our results and those reported in three other empirical papers—Rodrik et al. (2004), Acemoglu et al. (2014), and Ortega and Peri (2014)—chosen because they have at least two independent variables that are treated endogenously. For the purpose of this comparison, we focus on the results from 2SLS regressions. We first briefly review the above three papers before identifying similarities and differences.

Rodrik et al. (2004) estimate regressions of the log of income per capita in 1995 on institutions (rule of law), integration (trade openness), and geography (distance from the equator), using a cross-section of countries ranging from 79 to 137. In order to resolve the issue of endogeneity, it was important for them to find sensible instruments for institutions and integration. They employ Acemoglu et al.'s (2001) settler mortality as an instrument for institutions in the 79-country sample and follow Hall and Jones (1999) in using the fractions of the population speaking English and other Western European languages as instruments for institutions in the 137-country sample. For integration, they utilise Frank and Romer's (1999) gravity-based predictor of trade as an instrument. Their finding is that institutions dominate integration and geography in determining income levels around the world. In particular, they find in their preferred specification that the estimated coefficient of institutions is positive and statistically significant. By contrast, integration and geography both have negative and insignificant effects on income levels.

Acemoglu et al. (2014) provide estimates for the roles of human capital and institutions in long-run economic development, using cross-country (62 countries) and cross-region (684 regions) data samples. Focusing on the cross-country analysis, they proxy human capital by average years of schooling of population above age 15, institutions by the rule of law index, and economic development by the log of GDP per capita (PPP basis). All these variables are measured for the year 2005. To deal with the empirical challenge that both human capital and institutions are endogenous to long-run economic performance, they use the instrumental variables approach to address this problem. In particular, they employ Acemoglu et al.'s (2001, 2002) log of settler mortality and log of population density in 1500 as instruments for institutions and Woodberry's (2004, 2012) protestant missionaries in the early twentieth century for human capital. They find that the influence exerted by institutions, rather than by human capital, is more fundamental to long-run income determination.

Ortega and Peri (2014) primarily seek to disentangle the effects of trade openness and migration, two vehicles of globalisation, in causing cross-country differences in long-run income per capita in a cross-section of around 120 countries. In their paper, Ortega and Peri (2014) use trade share over GDP to proxy trade openness, foreign-born share in population to proxy migration, and real GDP per capita (PPP basis) to proxy economic development, with all three variables measured in the year 2000. As we have already seen in the prior discussions, both trade openness and migration are endogenous in such exercises. Using the gravity-based predictors of trade openness and migration, Ortega and Peri (2014) document a robust, positive effect of migration, over trade openness, on long-run income per capita. In an extended specification, the authors also account for the role of institutions, which they represent by a simple average of indexes of average protection against expropriation risk and constraints on the executive. This measure of institutions is based on Acemoglu et al. (2001) and is an average over the 1975-85 period. In addition to instrumenting for trade openness and migration, Ortega and Peri (2014) exploit distance to the equator and the share of the population, in 1975, of European descent as instruments for institutions (Hall and Jones, 1999; Alcalá and Ciccone, 2004). They find that migration and institutions have positive and significant effects on real GDP per capita, whereas trade does not.

Our paper is related to Rodrik et al. (2004), Acemoglu et al. (2014), and Ortega and Peri (2014), and also extends their work, in two ways. First, our paper is related to all three papers as they all seek to explicate determinants of differences in economic performance among countries. Both Rodrik et al. (2004) and Acemoglu et al. (2014) are concerned with establishing the *fundamental* factors causing disparities in economic prosperities around the world, confirming the overall view of the importance of institutions. The objective of Ortega and Peri (2014) is different: it is to systematically show that interactions between countries (i.e., globalisation) can be good for economic development. Hence, they focus on trade openness and migration. We interpret this to mean that Ortega and Peri (2014) are preoccupied with exploring the

proximate factors determining differences in economic progress across countries. On the bases of the above, and in line with Glaeser et al. (2004) and Rodrik et al.'s (2004) readings of institutions, we observe that our paper is more similar to Ortega and Peri (2014) than to Rodrik et al. (2004) or Acemoglu et al. (2014) because our focus here is also on the proximate causes. Our paper is, however, distinct from all three as we have expounded a hypothesis of joint and complementary, rather than that of separate and substitute, importance of the explanatory variables.

Second, our paper is also related to all three as they all recognise the endogeneity of the main explanatory variables of interest. In particular, Rodrik et al. (2004), Acemoglu et al. (2014), and Ortega and Peri (2014) all examine the role of institutions, as we have done. Besides, Rodrik et al. (2004) and Ortega and Peri (2014) also assess the impacts of integration/globalisation, with the former centring on trade and the latter on both trade and migration. We focus on one dimension of globalisation in this paper: migration. These two papers, however, do not systematically account for education; more particularly Rodrik et al. (2004). Further, Acemoglu et al. (2014) investigate the effect of human capital but do not empirically test for the relevance of globalisation (either by trade openness or migration). Hence, our empirical framework is broader, including migration (a measure of integration/globalisation as in the studies of Rodrik et al. (2004) and Ortega and Peri (2014)), education (as in the case of Acemoglu et al. (2014)), and institutions, which is covered in all three papers.

6. Conclusion

This paper represents an empirical investigation into the roles of globalisation (measured by border openness to migration), human capital (embodied by education level of the adult population) and institutions (proxied by the rule of law), and their interactions for economic development (captured by real GDP per capita). Our hypothesis is that higher actual (and the chance for eventual) migration, a more educated population, and better institutional quality within a country, generates the potential for greater economic progress. A natural extension of this proposition is that complementarities exist between migration, education, and institutions, aiding a country's pursuit of economic advancement. As stated earlier, the roles of these three key determinants, and the interactions between them for leading economic development, have hitherto not been meticulously inspected.

Furthermore, as migration, education, and institutions are endogenous in the process of economic development, this paper is the first methodical bid to address this concern by using 2SLS regressions. More specifically, we utilise predicted migration as an instrumental variable for migration, the number of protestant missionaries for education, and the fraction of the population speaking a European language, and legal origins, for institutions, based on the existing literature (Rodrik et al., 2004; Acemoglu et al., 2014; Ortega and Peri, 2014). We establish that the estimated positive, statistically and economically

significant effects of migration, education, and institutions from the OLS regressions are robust to using 2SLS regressions. On the interaction effects, the results show that: (i) migration's effect on real GDP per capita can be materially affected by cultivating good institutions but this effect is not dependent on the education level; (ii) education's effect on real GDP per capita is important irrespective of the levels of migration and institutions; and (iii) the effect of institutions on real GDP per capita is significantly improved by raising the level of education but is not influenced by migration level.

Our findings thus indicate that income level will rise when governments design and implement good complementary economic policy reforms that favour freer movement of people, increase the pool of skills, ideas and aggregate human capital, and foster and encourage strong institutional qualities. We conclude, not only that policy matters for economic development, but the interactions between border openness to migration, human capital, and legal institutions have a notable influence on economic development. Based on the results of this paper, an important implication for policy makers, particularly in developing countries, is that raising the educational attainment level and improving the quality of institutions, should be put at the top of their agenda. Failing to prioritise these two determinants could cause a major blockade in pursuing globalisation (i.e., integration with the rest of the world) and, ultimately, achieving economic development.

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