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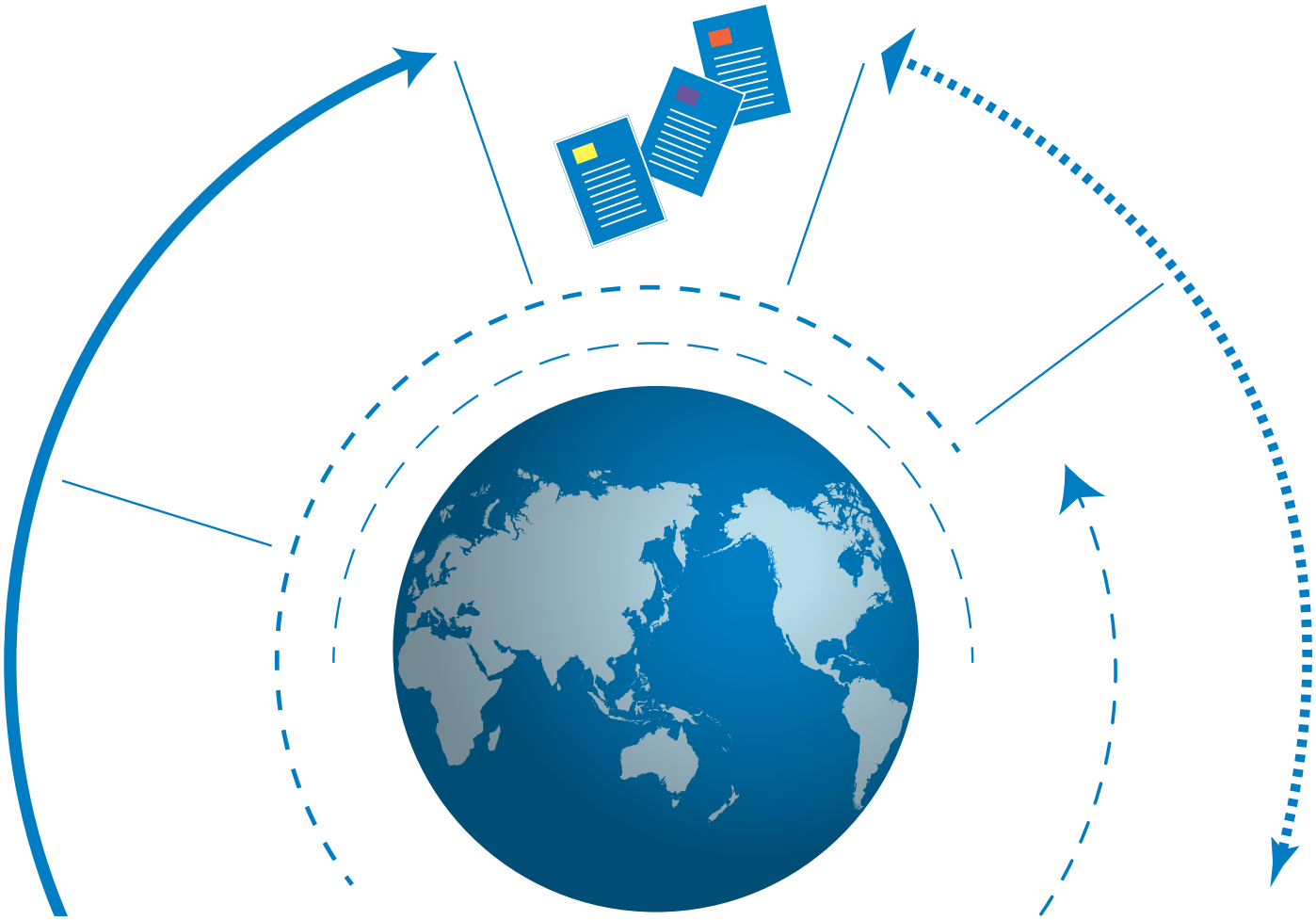
Working Paper No. 340

Research area: Latin American Economic Outlook

No sympathy for the devil! Policy priorities to overcome the middle-income trap in Latin America

Angel Melguizo, Sebastián Nieto-Parra, José Ramón Perea and Jaime Ariel Perez



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Authorised for publication by Mario Pezzini, Director, OECD Development Centre

September 2017

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Acknowledgements

The authors[1] would like to thank Rene Orozco for extremely efficient statistical support and insightful comments and suggestions all along this research. The paper was presented at seminars at the OECD (Paris, January 2016), IDB Research Department (Washington DC, April 2016), World KLEMS Conference (Madrid, May 2016) and World Economic Forum Latin America (Buenos Aires, April 2017), where we received useful comments by participants and discussants. We would particularly like to acknowledge the inputs and insightful comments from Luis Carranza, Jesus Felipe, Eduardo Fernandez-Arias, Lionel Fernandez, Alejandro Izquierdo, Felipe Larrain, Daniel Gomez Gaviria and Alejandro Werner. Refereeing within the OECD by Elena Crivellaro and Iza Lejarraga significantly improved the paper. Agustina Vierheller provided excellent assistance with the presentation and formatting. Initial results were included in OECD/CAF/ECLAC (2015), *Latin American Economic Outlook 2016*. This paper is part of an OECD Development Centre–World Economic Forum project on policy prioritisation.

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Preface

The *middle-income trap*, whereby GDP per capita growth slows down once a country approaches an intermediate level of development, is particularly persistent in Latin America. Although average per capita income in the region was relatively high in the mid-20th century, most Latin American countries have been unable to reduce significantly the income gap with advanced economies and reach high-income status. The few regional exceptions are Chile, Uruguay and some Caribbean countries. These trends contrast with European and Asian countries, much more effective in joining the high-income group during the last half of the 20th century.

This paper joins a crucial debate on development and *policy prioritisation,* benefiting from the experiences from OECD and emerging economies confronting this middle-income trap. What is holding back some countries which have been middle-income since the 1950s: weak productivity, high inequality, bad governance? Complementary to the rich literature based on case studies, this paper uses advanced statistical techniques and builds an original database covering several decades of economic growth, in order to identify institutional, social and economic features that differentiate those countries which overcame the middle-income trap vs those which did not. Governance, quality of education and skills and taxation stand out as the main policy priorities in this modelling. Furthermore, the paper presents for selected Latin American and Caribbean countries their main policy gaps compared with individualised benchmark countries, according to the economic and social characteristics of the countries.

The paper also corroborates the increasingly accepted "beyond-GDP" approach, by which even policy priorities to reach a high-income status should not be limited to economic variables, but some of them are part of a broader set of social and political dimensions as reflected in the OECD well-being indicators. Furthermore, it shows that domestic resource mobilisation is fundamental in the development process. Stable and significant sources of financing are needed throughout the transition to support the implementation of policies that can boost productivity with equity for a sustainable structural transformation. Structural tax reforms are necessary in Latin America and the Caribbean to reduce the excessive dependence on volatile and/or external sources of financing.

More broadly, the paper's analysis and findings are very relevant for the evolving discussion on development and co-operation with middle-income countries, the so-called *Development in Transition*. What can countries do to foster a move to higher income and development levels? What happens to them when they embark on such a transition? What about the vulnerabilities that most countries exhibit even when they graduate from middle- to high-income? Development is multidimensional: it is important to look beyond per capita GDP and to understand that there are multiple trajectories that countries can follow to move up the development ladder. Evaluating development challenges in each country, using as a benchmark the relevant experiences from other partners that are alike (in economic, social or political terms) is crucial. In particular, the *Latin American Economic Outlook 2016* already highlighted the fact that both the Latin American and Caribbean region and China are confronting the challenge of overcoming the middle-income trap, even sharing some common policy priorities (e.g. governance, inequality). The room for knowledge sharing and mutual learning is significant – including through South-South and Triangular international co-operation.

In addition to contributing to the Development Centre's work on Latin America and its flagship Outlook report, the paper offers useful insights for OECD country analysis, such as the OECD Multi-dimensional Country Reviews. This tool can also be helpful for moving towards new platforms for inclusive co-operation with middle-income countries, as called for by ECLAC, the OECD Development Centre and the European Commission with the aforementioned *Development in Transition* initiative.

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Résumé

Le phénomène qui fait que de nombreux pays en voie de développement peinent à trouver de nouvelles sources de croissance après avoir atteint un niveau de revenu intermédiaire est qualifié par la littérature empirique sur le développement de « piège du revenu intermédiaire » (*Middle-Income Trap* – MIT). Ce cas de figure constitue un défi particulièrement difficile à relever pour l'Amérique latine et les Caraïbes car seuls le Chili, Trinité-et-Tobago et l'Uruguay sont devenus des pays à haut revenu au cours des six dernières décennies, alors que plusieurs autres pays d'Amérique latine et des Caraïbes, qui présentaient des revenus intermédiaires dès 1950, sont restés dans cette fourchette de revenus. Sur la base des expériences de 76 économies émergents et des pays OCDE, ce document analyse de manière empirique les principaux domaines d'action qui expliquent le MIT en comparant les pays qui sont parvenus à en sortir et ceux qui s'y sont maintenus depuis les années 1950. En se basant sur plus de 200 000 estimations et en utilisant une analyse discriminante linéaire, nous identifions les éléments institutionnels, sociaux et économiques permettant de caractériser les politiques publiques prioritaires pour surmonter le piège du revenu intermédiaire. Par ailleurs, en utilisant la Méthode Témoin Synthétique, nous présentons, pour une sélection de pays d'Amérique latine, les principales lacunes des politiques publiques de ces pays en fonction de leurs caractéristiques propres.

Mots clés : piège à revenu intermédiaire, Amérique latine, politique, priorisation

Classification JEL : E6, O1, O2, O4

Abstract

The empirical literature on development has labelled as "middle-income trap" (MIT) the fact that many developing economies struggle to adjust to new sources of growth after reaching middle-income levels. For Latin America and the Caribbean, this is an especially challenging scenario, as only Chile, Trinidad and Tobago, and Uruguay have become high-income economies in the last six decades while several other LAC countries, already middle-income as early as 1950, stayed in that income range. This paper analyses empirically the main policy areas explaining the MIT, based on the experiences of 76 emerging economies and OECD countries, comparing those which evaded it and those which stayed there since the 1950s. Based on more than 200 000 estimations using a linear discriminant analysis, we identify institutional, social and economic features that help characterise policy priorities to overcome the middle-income trap. Furthermore, using the Synthetic Control Method, we present for selected Latin American countries their main policy gaps according to their unique characteristics.

Keywords: middle-income trap, Latin America, policy, prioritisation

JEL classification: E6, O1, O2, O4

1. Motivation

A challenging aspect of growth in emerging markets has been the lack of progress in productivity. The phenomenal growth that much of the emerging world, also in Latin America, posted during the 2000s was largely based on factor contribution, with productivity having a relatively marginal role. With the exception of some Asian countries such as China, India and Indonesia (OECD, 2014), most emerging economies made little progress in reducing their productivity gap with advanced economies (using the United States as a reference). This divergence is not only surprising in light of the sustained wave of growth that the emerging world registered during the last decade, but also because it is in disagreement with conventional theories of technological catch-up (Solow, 1956; Grossman and Helpman, 1991; Romer, 1990).

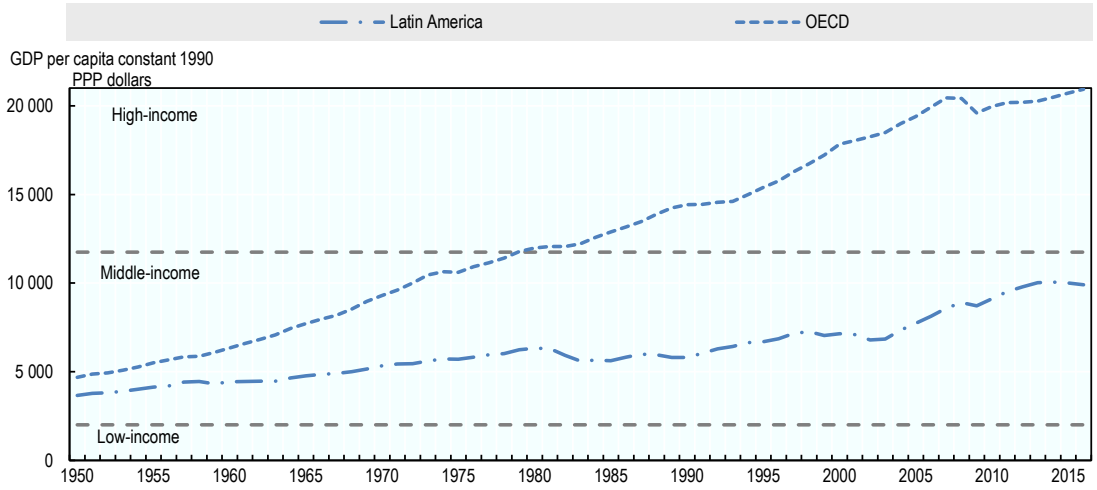
The economic literature (Eichengreen, Park and Shin, 2011; Aiyar et al., 2013; Felipe, Kumar and Galope, 2017; Zhuang, Vandenberg and Huang, 2012; OECD, 2014) links the prevalence of growth slowdowns, or even the existence of a "middle-income trap" (which can be understood as a particular case of the former) to the difficulty of adjusting the economy to the sources of growth that become more important after reaching middle-income levels. Growth in low-income countries arises essentially through labour re-allocation from low- to high-productivity activities and industries. On the other hand, arriving at middle-income levels usually requires new engines of economic growth, which are based on capital- and skill-intensive manufacturing and service industries (Kharas and Kohli, 2011). Economies that are successful in transitioning to these activities have a set of requirements (i.e. large pool of skilled labour, favourable rates of investment, a developed system of national innovation and a macroeconomic and institutional environment conducive to entrepreneurial activity) that are not easy to achieve, much less to co-ordinate.

We use the income thresholds defined in Felipe, Kumar and Galope (2017)[2] of 2 000 USD and 11 750 USD, measured in 1990 constant levels and adjusted for PPP, for lower and upper bounds of the middle-income group, respectively. Using fixed thresholds at constant PPP prices allows to identify the year in which each country joined a given income category based on a fixed benchmark. This is a key feature of this analysis, enabling the comparison of the current characteristics of Latin American countries with those of countries that overcame the middle-income trap at the time they did so. The record of Latin American countries with regard to the middle-income trap is clearly more alarming, and contrasts with the OECD (Figure 1). Starting from the lower middle-income range in the 1950s, the average OECD economy evaded the trap in the early 1980s, while the average Latin American country only got into the middle-high range in the mid-2000s. In fact, as shown in Figure 2, many of the countries which graduated in the last 30 years started from significantly lower income level in the 1950s.

2. These thresholds allow us to go as far as 1950 while the World Bank thresholds go back to the decade of the 90s and change annually.

Figure 1. Latin America and the OECD in the middle-income range

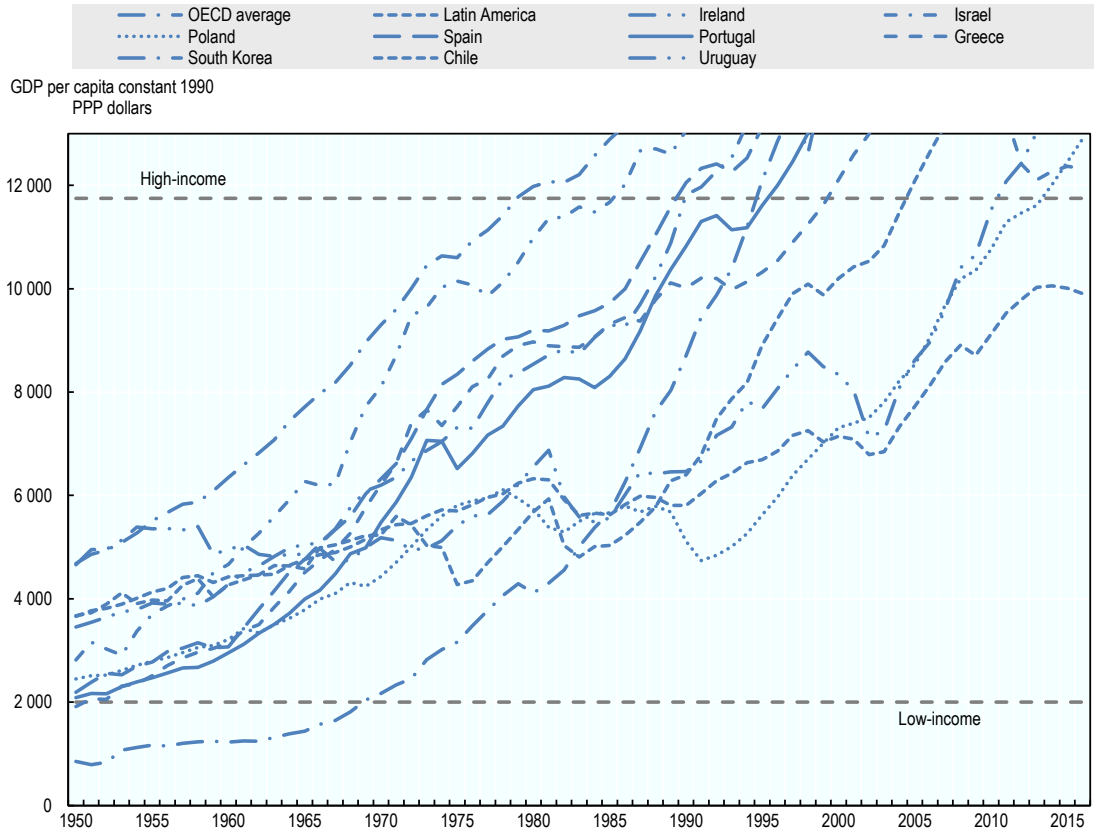
(GDP per capita constant 1990 US$ PPP dollars)



Source: Own elaboration.

Figure 2. Latin America and selected OECD middle-income trap evaders

(GDP per capita constant 1990 US$ PPP dollars)

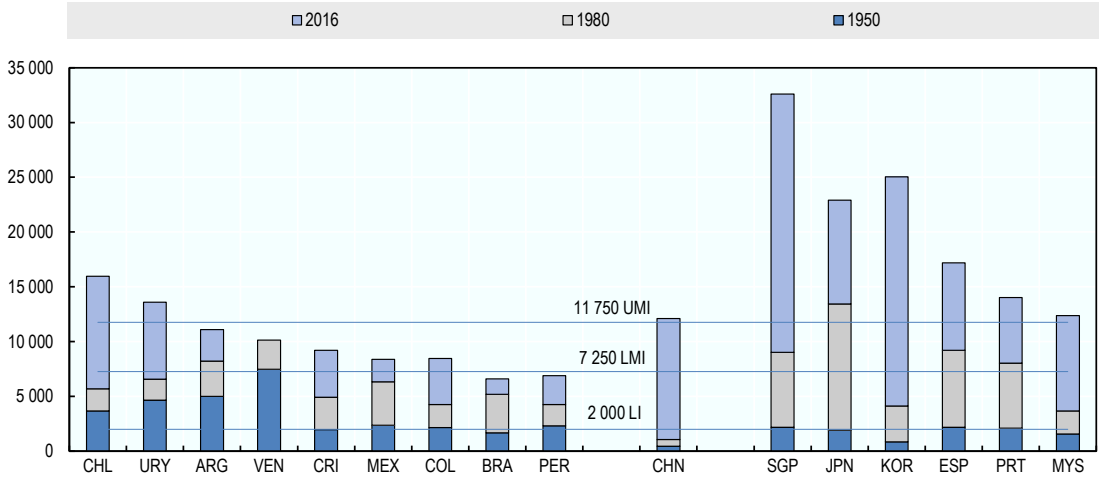


Source: Own elaboration.

Of Latin American and Caribbean countries,[3] only Trinidad and Tobago, Chile and Uruguay surpassed the limit of the middle-income trap (Figure 3). Thus, these countries differ most significantly from the countries in the higher starting income levels and the existence of long-lasting income stagnation. These patterns are particularly noticeable in Argentina and especially Venezuela, a country that was already upper middle-income in 1950. In all, joining the ranks of the high-income group has proven to be an insurmountable challenge for Latin America.

Figure 3. The middle-income trap in Latin America, OECD and China

(GDP per capita 1990 US$ PPP)



Source: Own elaboration.

This paper joins the rich literature on the *middle-income trap*, as coined by Gill and Kharas (2007) and Kharas and Kohli (2011), mostly for East Asian economies, and lately for China. The MIT literature theoretical foundation can be traced back to the literature of non-convergence, as in Quah (1996) and Kremer et al. (2011). However, it should be mentioned that the specific theoretical literature on MIT is thin, and not even an accepted definition exists. Han and Wei (2017), Felipe, Kumar and Galope (2017), and Ye and Robertson (2016) have recently provided evidence rejecting any unconditional notion of a middle-income trap. Interestingly enough, in the latter paper, the authors point to some Latin American countries to be trapped (e.g. Cuba, El Salvador, Colombia and Peru).

The approach also relates to the more widely accepted strand of empirical papers analysing "growth slowdowns" and "slow transitions" of previously rapid growing low-income economies (Eichengreen, Park and Shin, 2011; Agenor, Canuto and Jelenic, 2012; Zhuang, Vandenberg and Huang 2012; Aiyar et al., 2013; OECD, 2014). As was shown in Figure 1, Latin American economies have already stayed in the middle-income range for 65 years, while OECD countries and a handful of Asian economies (notably, Singapore) cruised over it in the early 1980s, starting from not much higher income levels. Given Felipe, Kumar and Galope (2017) find that historically graduating from low to high-income took 70 years, most Latin American countries therefore qualify either as trapped or affected by growth slowdown (i.e. unconditional or conditional middle-income trap).

3. Due to data limitations, the empirical analysis only covers Trinidad and Tobago among the Caribbean economies.

Our paper joins this literature and provides empirical support for policy prioritisation, based on an extensive set of variables from various strands of the literature on economic growth, with a focus on productive and trade structure, and institutions. Moreover, some policy variables (e.g. education or finance) are quality-adjusted, as recommended by the specific literature. Our set of variables covers the main proposals from the MIT/growth slowdown literature, obtaining similar results (e.g. Agenor, Canuto and Jelenic, 2012 highlight the fact that infrastructure, property rights and efficient labour markets are key to become high-income; Aiyar et al., 2013 point to institutions, demography, infrastructures, macroeconomic environment and policies, economic structure, trade structure; or Han and Wei, 2017 focus on demography, human capital, (lower) inequality, resource abundance, macroeconomic policy, financial development, institutions and political stability). A particularly relevant aspect refers to inequality, and the need to reach an inclusive growth trajectory. Among the aforementioned papers, only Han and Wei (2017) consider inequality as a source of non-convergence, despite the growing evidence of a productivity-equity nexus (OECD, 2016). Our empirical approach follows a similar strategy, including the Gini coefficient of income.

The paper is also related to policy prioritisation initiatives from the academia and other international organisations. For instance, we cover several of the areas proposed in the "growth diagnostics" by Hausmann, Rodrik and Velasco (2005), such as low social returns due to poor human capital or infrastructure, government failures materialised as micro or macro risks, low domestic savings and under-development of finance; and we add dimensions related to productive development policies (export diversification) and social policies (migration). Similarly, we complement some policy prioritisation efforts by international organisations adding new variables, broader country coverage and providing additional estimates. The World Economic Forum (2016) *Global Competitiveness Report* analyses a comparable group of institutions, policies and production factors, based on executive opinions from its associates, linking them to different stages of development (now in revision). The World Bank (2016) *Doing Business* concentrates on business regulation and their enforcement. And the OECD (2017) *Going for Growth* identifies policy priorities based on a gap analysis versus the OECD average, and various empirical papers that sustain the impact on productivity and/or participation, also with a more limited set of variables and countries. The closest analysis to ours – also with a focus on Latin America – from Izquierdo et al (2016) focuses on productivity determinants and their impact on the likelihood of a country to jump to a larger per capita income group. They define four income groups in a cluster analysis (which can roughly correspond to low, lower middle, upper middle and high-income) and cover a similar set of countries and policy areas. Despite the differences in methodology, we obtain similar results. Focusing on the two last jumps, Izquierdo et al. (2016) highlight financial development and governance, infrastructure, integration and trade, labour and health-care services as key.

Overall, our paper compares well with most of the academic and policy-focused literature, both in data, methodology and results. And we believe that it provides advances on variables (wider set of policy areas, including quality-adjustment), a novel approach on methodology (applying discriminant analysis and testing many policy combinations), and a fairer policy comparison, given we evaluate an ample set of countries and their policies and institutions in relatively similar levels of development.

The paper is organised as follows. Section 2 describes the data sources and defines the variables used in the empirical exercise. The empirical methodology is included in Section 3, and Section 4 presents the main results, with a focus on six Latin American economies. Conclusions and references close the paper.

2. Data

2.1. Definitions

The variables used to analyse the policy priorities to tackle the *middle-income trap* can be grouped into ten categories: demographics, macroeconomic indicators, tax structure, productive structure, institutional framework, education, financial development, openness and trade, infrastructure, and income inequality. As mentioned, these categories include aspects that are widely considered in the literature on middle-income trap and growth slowdowns. In addition, they are consistent with the classification used by aforementioned OECD *Going for Growth* as factors that can affect the productivity (OECD, 2017).

Data are summarised in Table 1 (definitions, sources and period covered). This dataset contains 23 variables (including GDP per capita) from multiple sources and covers the period 1950-2015. Based on the historical experience of OECD and other economies and on data availability, this paper defines policy priorities to overcome the *middle-income trap* in Latin American economies. Data employed capture both quantity and quality of key outcomes that should overcome the *middle-income trap*. In particular, regarding the quality of variables, education performance and the liquidity of the stock market are included. For other variables, such as quality of infrastructure, no long-term data collection means that only quantity variables (i.e. volume of goods transported by railway and mobile cellular subscriptions) are included.[4]

To define the thresholds between upper middle to high-income status, we use the income thresholds defined in Felipe, Kumar and Galope (2017). This allows for identifying countries across the various income categories as early as in 1950. The graduation is defined as the year a country moved from upper middle to high-income status.

Regarding macroeconomic indicators, our analysis includes current account balance, public revenues and gross capital formation, all of them as a percentage of GDP. For the tax structure, we use the tax revenues and direct taxes collection from OECD/ECLAC/CIAT/IDB (2017) and IMF *World Economic Outlook databases*. Among demographic variables, we include the ratio of the people under 15 and over 64 over total working-age population and international migrant stock as a percentage of population, both from World Bank *World Development Indicators* (WDI) database.

Data on education include the completion of secondary and tertiary education (from Barro and Lee, 2010) and the students' performance from Altinok, Diebolt and de Meulemeester (2014). Data on institutional development include an indicator that evaluates the regime from full democracy to full autocracy (from Polity IV Project, *Political Regime Characteristics and Transitions, 1800-2015*) and rule of law from World Bank *Worldwide Governance Indicators*.

4. Most of the data on quality of infrastructure start mid-2000s, which makes it difficult to include in this paper. For instance, data from the *Global Competitiveness Index Historical Dataset* (World Economic Forum) and the *Logistics Performance Index* (World Bank) both start in 2007. Similarly, data on the time required to get electricity starts only in 2009. Other types of infrastructure, in particular in the area of transportation (rail, airports, ports) would also be interesting, but data limitations do not allow their inclusion.

Regarding the production structure, data include the economic complexity index from the *Atlas of Economic Complexity*, the export diversification index from IMF *Export Diversification and Quality Database* (2014) and manufactures exports as a percentage of total exports from the WDI database. Openness and financial development variables include domestic credit provided by financial sector, stocks traded, foreign direct investment and total merchandise trade, all of them as a percentage of GDP and from the WDI database. Regarding income distribution, infrastructure and information and communication technology (ICT), data include the GINI index, goods transported by railway and mobile cellular subscriptions, all from the WDI database.

Following Felipe, Kumar and Galope (2017), we define upper middle-income and high-income countries based on their level of GDP per capita (1990 PPP USD). A country with GDP per capita between 7 250 and 11 750 is classified as upper middle-income category. The countries over that threshold are classified as high-income.

To obtain a complete dataset of countries that would allow for the comparison of recent middle-income trap evaders and current middle-income countries, we use Maddison's dataset on GDP per capita from Bolt and van Zanden (2014). Income is expressed in constant 1990 PPP dollars and covers the period 1968-2010, and thus allows the use of the previously mentioned fixed-income thresholds over time. Although this series ends in 2010, by using the same methodology as in Felipe, Kumar and Galope (2017) it was possible to extend the analysis to 2015 using the growth rates of GDP per capita at constant prices (IMF *World Economic Outlook* database April 2016).

Finally, we construct a standardised database from the data presented in Table 1 where we define period 0 for the high-income countries as the year where they crossed the threshold from upper middle to high-income. Regarding the control group of high-income countries, it started with Denmark that became a high-income country in 1968 and concludes with Poland that became a high-income country in 2014. For upper middle-income countries period 0 refers to 2015 or the closest year depending on the availability of the data.

Table 1. Database

Variable	Description	Source	Period Coverage
Age dependency (% of working-age population) - adjusted	Ratio of the people under 15 and over 64 over total working-age population.	WDI	1966-2015
International migrant stock (% of population)	International migrant stock is the number of people born in a country other than that in which they live. It also includes refugees.	WDI	1990-2015
Current account (% of GDP)	Current account balance as a percentage of GDP.	WDI	1966-2015
Public revenue (% of GDP)	General government gross revenue as a percentage of GDP.	WDI	1972-2014
Gross capital formation (% of GDP)	Gross capital formation over GDP.	WDI	1966-2015
Tax revenue (% of GDP)	General government gross tax revenue as a percentage of GDP.	OECD/IMF	1966-2014
Direct tax (% of GDP)	The sum of taxes on income and social security contributions expressed as a percentage of GDP.	OECD/IMF	1965-2014
Capabilities	Economic complexity index: Amount of productive knowledge implied in the country's export structure.	Atlas of Economic complexity	1995-2014
Manufactures exports (% of merchandise exports) - adjusted	Comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).	WDI	1966-2015
Rule of Law (-2.5 to 2.5)	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution.	World Bank Worldwide Governance indicators	1996-2014
Combined Polity Score (-10 to 10) - adjusted	Single regime score that ranges from +10 (full democracy) to -10 (full autocracy). The operational indicator of democracy is derived from the competitiveness of political participation, the openness and competitiveness of executive recruitment and constraints on the chief executive.	Polity IV Project, Political Regime Characteristics and Transitions, 1800-2015	1966-2014
Percentage of complete secondary schooling attained in population - adjusted	Percentage of population over 15 having completed secondary education. The variable is adjusted by subtracting the mean of the respective year.	Barro and Lee (2010)	1950-2010
Percentage of complete tertiary schooling attained in population - adjusted	Tertiary education includes what is commonly understood as academic education but also includes advanced vocational or professional education. Percentage of population over 15 having completed tertiary education. The variable is adjusted by subtracting the mean of the respective year.	Barro and Lee (2010)	1950-2010
Quality of education	An indicator of quality of education is the mean of a country's scores for all adjusted assessments for the students of secondary education.	Altinok, Diebolt, De Meulemeester. A new International Database on Education Quality: 1965-2010.	1965-2010
Domestic credit provided by financial sector (% of GDP) - adjusted	Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available.	WDI	1966-2015
Stocks traded, total value (% of GDP) - adjusted	The value of shares traded is the total number of shares traded, domestic and foreign, multiplied by their respective matching prices. Figures are single counted (only one side of the transaction is considered). Companies admitted to listing and admitted to trading are included in the data. Data are end of year values.	WDI	1975-2015

Merchandise trade (% of GDP) - adjusted	Merchandise trade as a share of GDP is the sum of merchandise exports and imports divided by the value of GDP, all in current US dollars.	WDI	1966-2015
Exports diversification	The overall Theil index is the sum of the intensive and extensive components. Intensive (within), and extensive (between) Theil indices are calculated as follows. First create dummy variables to define each product as "Traditional", "New", or "Non-traded". Traditional products are goods that were exported at the beginning of the sample, and non-traded goods have zero exports for the entire sample. Thus, for each country and product, the dummy values for traditional and non-traded remain constant across all years of our sample. Higher values indicate lower diversification.	IMF	1962-2010
FDI (% of GDP) - adjusted	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.	WDI	1970-2015
GINI index (0 to 100)	Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI	1981-2013
Mobile cellular subscriptions-adjusted	Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of post-paid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months).	WDI	1980-2014
Railways, goods transported	Goods transported by railway are the volume of goods transported by railway, measured in metric tons times kilometres travelled and divided by the surface area (square kilometres)	WDI	1980-2015
GDP	Maddison's (2010) dataset on GDP per capita (1990 PPP USD) available until 2010 extended up to 2015 using IMF World Economic Outlook April 2016 projections of real GDP per capita.	Maddison (2010)	1950-2010

The dataset covers 76 economies where 37 correspond to high-income and 39 to upper middle-income countries. In addition, we only kept as high-income countries those also considered as such by the World Bank classification.[5] High-income countries (in parenthesis the year each country moved to high-income level) included in the analysis are Denmark (1968), Canada (1969), Sweden (1969), Australia (1970), Netherlands (1970), France (1971), New Zealand (1972), Belgium (1973), Germany (1973), United Kingdom (1973), Saudi Arabia (1974), Norway (1975), Austria (1976), Japan (1977), Italy (1978), Slovenia (1978), Finland (1979), Trinidad and Tobago (1980), Hong Kong (China)(1983), Israel (1986), Singapore (1988), Ireland (1990), Spain (1990), Puerto Rico (1994), South Korea (1995), Portugal (1996), United Arab Emirates (1996), Estonia (2000), Greece (2000), Chile (2005), Kuwait (2005), Latvia (2005), Czech Republic (2006), Lithuania (2007), Qatar (2010), Uruguay (2011) and Poland (2014).

The upper middle-income countries included are Albania, Algeria, Argentina, Azerbaijan, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Croatia, the Dominican Republic, Ecuador, Georgia, Hungary, Iran, Jamaica, Jordan, Lebanon, Former Yugoslav Republic of Macedonia (FYROM), Mexico, Montenegro,

5. Under this criterion we exclude Armenia, Equatorial Guinea, Gabon, Kazakhstan, Malaysia and Mauritius.

Oman, Panama, Paraguay, Peru, Romania, Russia, Serbia, Seychelles, South Africa, Syrian Arab Republic, Thailand, Turkey, Turkmenistan, Uzbekistan and Venezuela.[6,7] Ten of these countries are upper middle-income since 1950 (Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, FYROM, Montenegro, Russia, Turkmenistan, Uzbekistan and Venezuela); Argentina is upper middle-income since 1970; seven countries became upper middle-income between 1995 and 2005 (Bulgaria, Hungary, Mexico, Oman, Syrian Arab Republic, Thailand and Turkey), and seven became upper middle-income after 2005 (Brazil, China, Colombia, Costa Rica, Panama, Serbia and Seychelles). The remaining 14 countries would not be upper middle-income according to the thresholds but were included according to the World Bank classification (Albania, Algeria, Botswana, the Dominican Republic, Ecuador, Iran, Jamaica, Jordan, Lebanon, Namibia, Paraguay, Peru, Romania and South Africa).

2.2. Variables

The analysis needs to take into account the mean of each group variable. For instance, in 1985 the highest value of mobile cellular subscriptions per 100 people in the sample was 1.5 (Norway), while in 2014 the lowest value was 22.5 (Cuba). The world mean of mobile cellular subscriptions per 100 people went from 0.04 to 113.8 in that period. Therefore, some variables need to be adjusted each year by the mean to in order to compare the countries across time. We eliminate bias problems by subtracting the world average[8] from the series that have lineal trends. In addition, we also eliminate extreme values of the standardised database that could affect the mean of the groups. Therefore, we evaluate if each series has a lineal trend across time. A simple technique is to run for each series i the following regressions by Ordinary Least Square (OLS):

$$X_{i,t} = a_i + \beta_i * time_t + \varepsilon_t \quad (1)$$

where $X_{i,t}$ refers to the average of variable i for all high-income and upper middle-income countries at time t, $time_t$ is a series of years and ε_t is the error term. If the coefficient β_i is statistically significant, we conclude that the variable i has a linear trend. As a robustness check, unit root tests were applied to these series. Ten variables were adjusted by subtracting the global mean to each country. Table 1 also highlights the variables adjusted to avoid lineal trend problems. In particular, Table 2 shows the results of the significance test mentioned above.[9] Owing to insufficient observations regarding completion of secondary and tertiary education, we have also adjusted these two variables given the progress achieved since 1950.[10]

6. In Latin America, Brazil and Peru are re-classified as upper middle, following World Bank income classification https://datahelpdesk.worldbank.org/knowledgebase/articles/906519 (last accessed 5 June 2017).

7. As mentioned, most of the Caribbean countries cannot be included due to missing data.

8. Global mean refers to the average of all the countries with data available for a given year, including low-income, middle-income and high-income countries.

9. Some variables were not adjusted even with significant β due to the lack of long series. Only variables with more than 35 years were considered for the decision rule.

10. Even though the data is available from 1950, it is given in 5-year intervals.

Table 2. Data adjustment (mean bias)

Variable	t-statistic	Significant at 5%	Number of years	Variable adjusted
Age dependency (% of working-age population) - adjusted	-44.02	Yes	50	Yes
International migrant stock (% of population)	NA	NA	6	No
Current account (% of GDP)	1.75	No	50	No
Public revenue (% of GDP)	4.65	Yes	43	No
Gross capital formation (% of GDP)	-1.11	No	50	No
Tax revenue (% of GDP)	0.67	No	49	No
Direct tax (% of GDP)	4.09	Yes	49	No
Capabilities	-3.96	Yes	20	No
Manufactures exports (% of merchandise exports) - adjusted	11.35	Yes	50	Yes
Rule of Law (-2.5 to 2.5)	NA	NA	15	No
Combined Polity Score (-10 to 10) - adjusted	14.66	Yes	50	Yes
Percentage of complete secondary schooling attained in population - adjusted	NA	NA	9	Yes
Percentage of complete tertiary schooling attained in population - adjusted	NA	NA	9	Yes
Quality of education	NA	NA	12	No
Domestic credit provided by financial sector (% of GDP) - adjusted	21.78	Yes	50	Yes
Stocks traded, total value (% of GDP) - adjusted	12.35	Yes	41	Yes
Merchandise trade (% of GDP) - adjusted	20.32	Yes	50	Yes
Exports diversification	-6.66	Yes	45	No
FDI (% of GDP) - adjusted	9.88	Yes	46	Yes
GINI index (0 to 100)	-1.13	No	31	No
Mobile cellular subscriptions adjusted	12.96	Yes	35	Yes
Railways, goods transported	-6.93	Yes	50	No

Second, after constructing the standardised database, we identify and eliminate extreme values that can potentially affect the posterior results. We use the leverage statistic h, which assesses how far away an observation is from its mean. Belsley, Kuh and Welsch (1980) define the leverage $h_{i,j}$ of the j_{th} observation of the variable i as:

$$h_{i,j} = \frac{1}{n_i} + \frac{\left(z_{i,j} - \bar{z}_i\right)^2}{(n_i - 1)S_i^2} \quad (2)$$

where n_i refers to the number of observations, S_i^2 to the variance, $z_{i,j}$ to the observation j and $\bar{z}$ to the mean, of the standardised variable z_i. The farther away the observation j is from its mean, the higher leverage h_j it has. In addition, the larger the sample size and the variance of z, the less is the influence of any single point.

Finally, we determine when a leverage value has potential to strongly influence the analysis. The rule of thumb we use is that $h_{i,j}$ is considered large if it is two times larger than the mean leverage value, $\bar{h}_i = \frac{p}{n_i}$ where p refers to the number of beta parameters, in our case is equal to 2. In particular, we exclude observations that satisfy: $h_{i,j} > \frac{4}{n_i}$. Annex 1 shows the observations (countries) that are excluded for each variable.

3. Empirical methodology

Our strategy is to identify which variables among the previous set are good discriminators between upper middle-income and high-income countries. In particular, we use the linear discrimination analysis proposed by Fischer (1936) where the maximal separation of groups is determined from an "Eigen-analysis" where the discriminant function is the eigenvector associated with the largest eigenvalue (Stata, 2013).

The choice of discriminant analysis is justified by the existence of income categories, identified *ex ante*. Discriminant analysis is a statistical technique used to allocate observations in a sample to a set of pre-determined categories, through a model of group discrimination based on observed variables. Hence, discriminant analysis is preferable to other classification methods (e.g. cluster analysis), in cases where there is prior knowledge of the categories (Fernandez, 2002). An added advantage of discriminant analysis is that it allows identifying the key discriminators among the predictor variables. In this way, discriminant analysis allows to pursue the main two tasks of this study: classifying a country in one of the income groups; and in parallel, evaluating the relative importance of the predictor variables in separating groups.

Subsequently, we identify for each upper middle-income country the improvement needed in each of these variables to become high-income. We then compare it with two scenarios; the upper middle-income country with the average of the high-income countries in the window of the period the HI moved from middle-income; and a "synthetic" country defined as a linear combination of all the HI countries, evaluated ten years before becoming high-income. This last approach identifies particular areas that should be a priority for each country to overcome the middle-income trap, according to its own intrinsic characteristics and development path (Lin, 2012).

3.1. Linear Discriminant Analysis

The objective of a discriminant analysis is to classify individuals/countries/objects by a set of independent variables, into one of two or more mutually exclusive and exhaustive categories (Morrison, 1969). For our purpose, we use the Linear Discriminant Analysis (LDA) because it allows for a clear interpretation of the effects of each variable in the classification of the groups. In particular, we will determine which variables discriminate better between the income groups. The discriminant function can be written as:

$$D_j = b_o + b_1 z_{1,j} + b_2 z_{2,j} + b_k z_{k,j} + \cdots + b_n z_{n,j} \quad (3)$$

where $z_{k,j}$ is the jth country's value of the kth independent value, b_k is the discriminant coefficient for the kth variable and D_j is the jth country's discriminant score. However, the size of the coefficient b_k has the influence of the scale we use for z_k. We normalise each variable by its standard deviation in order to make the coefficients comparable. Where b_k^* is the standardised coefficient (standardised loadings) of the standardised variable $z_k^* = \frac{z_j}{\sigma_k}$, if $|b_k^*| > |b_l^*|$, the variable z_k^* is a better discriminator between the income groups than z_l^*. In addition, in determining which variables are the best discriminator the size of the groups is not relevant (Morrison,1969).

This linear discriminant analysis relies on two assumptions: The observations from the groups of countries – based on per capita income – should be multivariate normal and

have equal covariance matrices. In addition, we avoid multicollinearity problems because if two variables are highly correlated, they are measuring almost the same thing and their coefficients will be unstable and hard to interpret (Morrison, 1969).

Given that it is not possible to incorporate all the variables at the same time, the strategy we use consists in having all the different combinations of estimations of groups of four variables and then ranking the variables according to the average standardise coefficient.

Among them, we only take into account the estimations that satisfy the two basic assumptions of LDA previously mentioned. First, and in order to avoid the multicollinearity problem, we take those that have a variance inflation factor (VIF) less than 10,[11] and provide a significant discriminant function.[12] Specifically, out of the 234 256[13] estimations we ran, where 7 315[14] of them were distinct, we kept 1 295 estimations that satisfy the previous conditions/assumptions.

Although we corrected the standardised database for extremes values, we did not do so for extremes values inside each country. For instance, a value in period 0 for a country j may be the result of an extraordinary event in that year compared to previous years. Therefore, to avoid this possible problem in the LDA, we take an average in the window of -4 to 0 and use that observation for the estimations. As a robustness check, we analyse the structure coefficients, which measure the correlation between each discriminating variable and the discriminant function.

3.2. Synthetic Control Method

In order to take into account the specificities of development paths (Lin, 2012), we also applied the Synthetic Control Method (SCM) introduced by Abadie and Gardeazabal (2003).[15] It consists of an algorithm that creates a synthetic control unit based on the similarity of this control unit to the treated unit before the treatment, both with respect to relevant covariates and past realisations of the outcome variable. In other words, the synthetic control method reproduces the counterfactual (i.e. it estimates the missing counterfactual) such that on average the synthetic control is the most similar to the treated country in terms of covariates and past outcomes.

Formally, the SCM works as follows. We have 1 treatment unit and a pool M of control units. For each unit j we have a vector of observed covariates and pre-intervention outcomes, Z_j. Let Z_1 be the vector $k \times 1$ of pre-intervention characteristics of the threated unit and Z_0 is $k \times M$ matrix which contains the same variables for the control units. Let W be a $M \times 1$ vector of positive weights that sum to one. The algorithm chooses W^* that minimise $\sqrt{(Z_1 - Z_0 W)' V (Z_1 - Z_0 W)}$ where V is a $k \times k$ matrix. An optimal choice of V assigns weights to linear combinations of the variables in Z_0 and Z_1 to minimise the

11. A value of 10 is a common rule of thumb in the literature (e.g. Marquardt, 1970; Kutner, Neter and Wasserman, 1989; Kennedy, 1992).

12. We use the Wilk's Lambda to test the significance of the discriminant functions.

13. We run estimations of 4 variables with all the 22 variables: $total\ estimations\ run\ in\ Stata = 22^4$.

14. $Combination = \frac{n!}{k!(n-k)!} = \frac{22!}{4!(22-4)!} = 7{,}315$. A combination is any set or subset of items, regardless of their internal order.

15. The authors used it to measure the cost of conflicts in the Basque Region of Spain.

mean square error of the synthetic control estimator. For instance, V is chosen such that it assigns larger weights to pre-treatment variables that have larger predictive power on the outcome.

In this paper, we use the SCM for a different purpose. Rather than creating a missing counterfactual, we relay in this method to find for each upper middle-income country the weighted average of high-income countries that better replicates its characteristics between 20 and 11 years before they passed from upper middle-income to high-income. Specifically, we replicate the characteristics of the current upper middle-income country with those of the high-income countries ten years before passing the threshold from middle-income to high-income. Indirectly, we assume that these high-income countries that jumped at time 0 received an intervention or started to adopt and implement some policies from ten years before becoming high-income. This also allows to take into account that countries' graduation can be accumulative.

In particular, we take as covariates (predictors) an average of the selected variables in the discriminant analysis approach from -20 to -11 years for high-income countries and from -4 to 0 years for the upper middle-income countries. On the other hand, we do not take pre-treatment outcome values into account in our analysis. With these predictors we construct Z_0 and Z_1 for high-income and upper middle-income, respectively. In addition, we use for the matrix V the standardised coefficients obtained in the discriminant analysis. Finally, we find for each upper middle-income the optimal vector W^*: the weighted average of the high-income countries that best replicates the characteristics of each upper middle-income country.

4. Results

4.1. Main results

Table 3 summarises the results of the discrimination analysis from the 1 295 estimations that satisfy the previous conditions and assumptions. It includes the average per estimation of both the standardised and the structure coefficients. Column 1 presents the average of the standardised coefficients (average loadings) per variable for all regressions run and Column 2 shows their rank per relevance in differentiating between trapped countries and evaders. In other words, a variable with a higher coefficient indicates that on average it contributes more to the discrimination between the high-income and the upper middle-income group. In particular, this analysis finds that the rule of law, the quality of education, the tax revenues, the age dependency, degree of democracy, total investment, productive capabilities (economic complexity index), the value of stocks traded, domestic credit provided by financial sector and the percentage of complete tertiary education show up as key policy areas to overcome the middle-income trap, evaluated at a country's "graduation time" from the middle-income trap.[16] Column 3 presents a robustness check of the previous results, showing the average of the structure coefficients for all regressions run. These structure coefficients measure the correlations between each discriminating variable and the discriminant function, confirming the expected signs.[17]

4.2. Case studies for selected Latin American countries

This section presents the application of this model to selected Latin American countries (Argentina, Colombia, Panama, Brazil and Peru) and presents the main policy gaps according to different specifications. In particular, it shows that the policy priorities differ across countries to pass from middle-income to high-income. Second, it highlights the fact that there is no unique development path, since the current socio-economic and institutional features of each upper middle-income country and past characteristics of some high-income countries are more useful and relevant than others. In that context, the "no one size fits all" argument is included in this paper by determining the "synthetic control country" for each upper middle-income country. Finally, key divergences emerge when the policy gaps are compared to the simple average of high-income countries and the "synthetic control country". This last point is fundamental at a moment where budget constraints oblige to focus only on a selected group of policies contributing to overcome the middle-income trap.

16. These variables have average loading equal and above to the median of all of them.

17. The sign of the top 10 variables are the same as the average loadings confirming the results presented in Column 1. Furthermore, by excluding total investment and coverage in tertiary education, the rest of the variables presented in Column 1 remain at the top 10 level (Column 4). Column 5 shows the mean value of the variables for group 1, representing the mean value for high-income countries between -4 and 0 years (with 0 the year in which each high-income country moved from middle-income to high-income). Column 6 shows the mean value of the variables for group 2, representing the mean value for upper middle-income countries between -4 and 0 years (with 0 being 2015).

Table 3. Main results of the discriminant analysis (average loadings)

	Standardised coefficient		Robust check: correlations			
Variable	Average loadings	Rank loading	Average structure	Rank structure	Mean group 1	Mean group 2
Rule of Law (-2.5 to 2.5)	1.00	1	0.80	2	0.70	-0.23
Quality of education	0.93	2	0.83	1	553.12	486.44
Tax revenue (% of GDP)	0.86	3	0.76	3	29.61	22.06
Age dependency (% of working-age population) – adjusted	-0.65	4	-0.64	5	-19.26	-6.81
Combined Polity Score (-10 to 10) - adjusted	0.60	5	0.62	6	5.39	-1.69
Gross capital formation (% of GDP)	0.53	6	0.44	11	26.29	23.25
Capabilities	0.43	7	0.67	4	0.55	0.16
Stocks traded, total value (% of GDP) - adjusted	0.41	8	0.59	8	-4.80	-19.79
Domestic credit provided by financial sector (% of GDP) - adjusted	0.37	9	0.49	9	1.71	-22.16
Percentage of complete tertiary schooling attained in population - adjusted	0.32	10	0.30	13	1.89	1.97
Exports diversification	-0.32	11	-0.62	7	2.01	2.84
Public revenue (% of GDP)	-0.27	12	-0.06	20	27.47	32.13
Percentage of complete secondary schooling attained in population - adjusted	0.17	13	0.15	17	6.24	2.35
Manufactures exports (% of merchandise exports) – adjusted	-0.12	14	0.46	10	12.99	-9.30
Merchandise trade (% of GDP) - adjusted	0.11	15	0.30	14	0.00	-18.42
Direct tax (% of GDP)	-0.11	16	0.18	15	10.48	9.41
Mobile cellular subscriptions adjusted - adjusted	0.06	17	0.13	18	7.17	12.89
GINI index (0 to 100)	-0.06	18	-0.35	12	35.61	39.48
Current account (% of GDP)	0.05	19	0.09	19	-2.14	-2.31
International migrant stock (% of population)	0.04	20	0.04	21	12.64	7.31
FDI (% of GDP) - adjusted	0.03	21	-0.03	22	-0.96	-1.35
Railways, goods transported	0.02	22	-0.15	16	4.51	1.74

4.2.1. Argentina

Table 4 compares Argentina to the simple average of high-income countries regarding the variables that separate best between upper middle-income and high-income countries evaluated at their "graduation time" from middle-income status. For these selected variables, Columns 1 and 2 show the average values for Argentina in the past five years (between -4 to 0 years with 0 being 2015) and the average of high-income countries five years before they become high-income countries (between -4 to 0 years with 0 being the threshold year). Column 3 presents the difference among these two columns and Column 4 standardises (with respect to the mean and standard deviation of each variable) that difference for each of the selected variables. Column 4 shows that the policy gaps with more than one standard deviation compared to the average of high-income countries are in the rule of law, the quality of education, the economic complexity index

(capabilities), the liquidity of the stock market (stocks traded over to the GDP) and the domestic credit provided by the financial sector.[18]

Table 4. Argentina versus average of high-income countries

green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation

			The gap with HI in period [-4,0]***	
Variables	Argentina*	Average HI [-4,0]**	AVG HI-UMI	AVG HI (standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.73	0.70	1.44	1.98
Quality of education	481.96	553.12	71.16	1.10
Tax revenue (% of GDP)	29.92	29.61	-0.31	-0.05
Age dependency (% of working-age population)	56.65	34.67	-21.97	-2.24
Combined Polity Score (-10 to 10)	8.68	10.00	1.32	0.18
Gross capital formation (% of GDP)	18.71	26.29	7.58	0.66
Capabilities	-0.14	0.55	0.69	1.08
Stocks traded, total value (% of GDP)	4.74	28.37	23.63	1.67
Domestic credit provided by financial sector (% of GDP)	30.59	77.82	47.23	1.51
Percentage of complete tertiary schooling attained in population	11.50	9.94	-1.56	-0.77
GDP (1990 PPP USD) or total standardised differences	**11 092.78**	**12 120.44**	**1 027.66**	**5.13**

Note: * Values cover years -4 to 0 (with 0=2015). ** Values represent the average for high-income countries (HI) from years -4 to 0 (with 0 the year the high-income country moved from upper middle- income – UMI- to HI). *** Negative means a higher value for the country studied.

Table 5 compares Argentina to the "synthetic country" regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap. The synthetic country is the result of the weighted average of the following countries (weights in parenthesis): Sweden (42%), Lithuania (30%), Ireland (11%), Israel (10%) and Canada (8%). These countries have been selected by the socio-economic and institutional characteristics of all HI countries between 20 and 11 years before starting as high-income countries. Columns 1 and 2 show respectively the average values for Argentina in the past five years (between -4 to 0 years with 0 being 2015), and the average of the synthetic comparison country between -4 to 0 years (with 0 being the threshold year in which it graduated). Column 4 presents the difference between Columns 2 and 1 and Column 5 standardises (with respect to the mean and standard deviation of each variable) that difference for each of the selected variables. Similarly, Column 6 presents the difference between Columns 3 and 1 and Column 7 standardises (with respect to the mean and standard deviation of each variable) that difference for each of the selected variables. Column 7 shows that the policy gaps with more than one standard deviation are in the rule of law, the quality of education, the economic complexity index (capabilities) and the domestic credit provided by the financial sector.

18. In the country analysis described in this section, we omit "age dependency" as a policy action to move from upper middle-income to high-income.

Table 5. Argentina versus synthetic country

							green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation		
				The gap with SC in period [-20,11]**		The gap with SC in period [-4,0]		The gap with HI in period [-4,0]	
Variables	Argentina*	SC [-20,11]*	SC [-4,0]***	SC before-UMI	SC before (standardised)-UMI	SC-UMI	SC (standardised)-UMI	AVG HI-UMI	AVG HI (standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.73	0.11	0.6	0.84	1.16	1.33	1.83	1.44	1.98
Quality of education	481.96	480.1	548.41	-1.86	0.03	66.45	1.03	71.16	1.1
Tax revenue (% of GDP)	29.92	28.16	29.87	-1.76	0.26	-0.05	-0.01	-0.31	-0.05
Age dependency (% of working-age population)	56.65	46.72	36.79	-9.92	1.01	-19.85	-2.02	-21.97	-2.24
Combined Polity Score (-10 to 10)	8.68	8.56	10	-0.12	0.02	1.32	0.18	1.32	0.18
Gross capital formation (% of GDP)	18.71	11.93	24.33	-6.78	0.59	5.62	0.49	7.58	0.66
Capabilities	-0.14	0.12	0.62	0.25	0.39	0.76	1.19	0.69	1.08
Stocks traded, total value (% of GDP)	4.74	27.65	16.38	22.91	1.62	11.64	0.82	23.63	1.67
Domestic credit provided by financial sector (% of GDP)	30.59	64.85	89.08	34.26	1.1	58.5	1.87	47.23	1.51
Percentage of complete tertiary schooling attained in population	11.5	10.44	12.83	-1.06	0.52	1.33	0.65	-1.56	-0.77
GDP (1990 PPP USD) or total standardised differences	**11 092.78**	**7 783.30**	**12 079.47**	**-3 309.48**	**6.69**	**986.68**	**6.04**	**1 027.66**	**5.13**

Note: * Values range from -4 to 0 (with 0 = 2015). ** is the Synthetic Country (SC) for this UMI. Values are the average from years -20 to -11 (with 0 the year the country moved from UMI to HI). ***: is the Synthetic Country (SC) for this UMI. Values are the average from years -4 to 0 (with 0 the year the SC moved from UMI to HI). ****: Negative means a higher value for the country studied.

The comparison of Tables 4 (Column 4) and 5 (Column 7) shows that while the value of stocks traded is a key policy gap in Argentina when compared to the average HI countries between 4 and 0 years before they start as HI income countries, in the case of the "synthetic country", it is not the case. Among the 10 selected variables from the discriminant analysis (i.e. the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap), policy priorities should focus on improvements in the rule of law, the quality of education, the economic complexity index (productive capabilities) and the domestic credit provided by the financial sector according to the synthetic country model.

4.2.2. Colombia

Table 6 compares Colombia to the simple average of high-income countries regarding the variables that separate better UMI and HI countries evaluated at their "graduation time" from the middle-income status. In particular, Column 4 shows that the policy gaps with more than one standard deviation compared to the average of selected HI countries before passing to the HI status (between 4 and 0 years with 0 the threshold year) are in the rule of law, the quality of education, the level of tax revenues and the liquidity of the stock market measured by the value of stocks traded.

Table 6. Colombia versus average of high-income countries

			green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation	
			The gap with HI in period [-4,0]***	
Variables	Colombia*	Average HI [-4,0]**	AVG HI-UMI	AVG HI (standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.37	0.70	1.07	1.47
Quality of education	431.09	553.12	122.02	1.88
Tax revenue (% of GDP)	19.71	29.61	9.89	1.45
Age dependency (% of working-age population)	46.26	34.67	-11.58	-1.18
Combined Polity Score (-10 to 10)	7.08	10.00	2.92	0.40
Gross capital formation (% of GDP)	25.21	26.29	1.08	0.09
Capabilities	0.05	0.55	0.50	0.79
Stocks traded, total value (% of GDP)	6.07	28.37	22.30	1.58
Domestic credit provided by financial sector (% of GDP)	64.00	77.82	13.82	0.44
Percentage of complete tertiary schooling attained in population	18.55	9.94	-8.61	-4.24
GDP (1990 PPP USD) or total standardised differences	**8 344.77**	**12 120.44**	**3 775.67**	**2.69**

Note: * Values cover years -4 to 0 (with 0=2015). **Values represent the average for high-income countries (HI) from years -4 to 0 (with 0 the year the high-income country moved from upper middle-income – UMI- to HI). *** Negative means a higher value for the country studied.

Table 7 compares Colombia to the "synthetic country" regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap. The synthetic country is created based on the weighted average of the following countries (weights in parenthesis): Australia (44%), Latvia (26%), Denmark (14%), Canada (11%) and Ireland (5%). They have been determined by the socio-economic and institutional characteristics of HI countries between 20 and 11 years before starting as high-income countries. Column 7 shows that the policy gaps with more than one standard deviation are in the rule of law and the quality of education.

Table 7. Colombia versus synthetic country

							green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation
				The gap with SC in period [-20,11]****		The gap with SC in period [-4,0]****	
Variables	Colombia*	SC [-20,11]**	SC [-4,0]***	SC before-UMI	SC before (Standardised)-UMI	SC-UMI	SC (Standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.37	0.03	0.50	0.40	0.55	0.87	1.20
Quality of education	431.09	437.45	540.64	6.36	0.10	109.55	1.69
Tax revenue (% of GDP)	19.71	20.37	25.34	0.65	0.10	5.62	0.83
Age dependency (% of working-age population)	46.26	39.75	35.68	-6.51	0.66	-10.58	-1.08
Combined Polity Score (-10 to 10)	7.08	6.77	10.00	-0.31	0.04	2.92	0.40
Gross capital formation (% of GDP)	25.21	21.77	29.70	-3.43	0.30	4.50	0.39
Capabilities	0.05	0.10	0.57	0.05	0.07	0.52	0.82
Stocks traded, total value (% of GDP)	6.07	27.26	11.37	21.19	1.50	5.30	0.37
Domestic credit provided by financial sector (% of GDP)	64.00	72.61	80.91	8.61	0.28	16.91	0.54
Percentage of complete tertiary schooling attained in population	18.55	11.99	13.55	-6.56	3.23	-5.00	-2.46
GDP (1990 PPP USD) or total standardised differences	**8 344.77**	**7 843.33**	**11 949.16**	**-501.44**	**6.82**	**3 604.39**	**2.70**

Note: * Values range from -4 to 0 (with 0 = 2015). ** is the Synthetic Country (SC) for this UMI. Values are the average from years -20 to -11 (with 0 the year the country moved from UMI to HI). ***: is the Synthetic Country (SC) for this UMI. Values are the average from years -4 to 0 (with 0 the year the SC moved from UMI to HI). ****: Negative means a higher value for the country studied.

The comparison of Tables 6 (Column 4) and 7 (Column 7) shows that while the level of tax revenues and the value of stocks traded are key policy gaps in Colombia when compared to the average HI countries, these are not as different when the "synthetic country" is analysed. Among the 10 selected variables from the discriminant analysis (i.e. the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap), policy priorities should focus on improvements in the rule of law and the quality of education according to the synthetic country model.

4.2.3. Panama

Table 8 compares Panama to the simple average of high-income countries regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income status. In particular, Column 4 shows that the policy gaps with more than one standard deviation compared to the average of selected HI countries before passing to the HI status (between 4 and 0 years with 0 the threshold year) are in the rule of law, the quality of education, the level of tax revenues and the liquidity of the stock market measured by the value of stocks traded.

Table 8. Panama versus average of high-income countries

			green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation	
			The gap with HI in period [-4,0]***	
Variables	Panama*	Average HI [-4,0]**	AVG HI-UMI	AVG HI(standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.14	0.70	0.85	1.16
Quality of education	432.13	553.12	120.98	1.87
Tax revenue (% of GDP)	18.88	29.61	10.72	1.58
Age dependency (% of working-age population)	54.08	34.67	-19.41	-1.98
Combined Polity Score (-10 to 10)	9.08	10.00	0.92	0.13
Gross capital formation (% of GDP)	45.20	26.29	-18.91	-1.65
Capabilities	0.38	0.55	0.18	0.28
Stocks traded, total value (% of GDP)	5.23	28.37	23.13	1.64
Domestic credit provided by financial sector (% of GDP)	75.96	77.82	1.85	0.06
Percentage of complete tertiary schooling attained in population	14.37	9.94	-4.43	-2.18
GDP (1990 PPP USD) or total standardised differences	**9 253.04**	**12 120.44**	**2 867.40**	**0.90**

Note: * Values cover years -4 to 0 (with 0=2015). ** Values represent the average for high-income countries (HI) from years -4 to 0 (with 0 the year the high-income country moved from upper middle-income – UMI- to HI). ***Negative means a higher value for the country studied.

Table 9 compares Panama to the "synthetic country" regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap. The synthetic country is a result of the weighted average of the following countries (weights in parenthesis): Australia (48%), Lithuania (21%), Trinidad and Tobago (19%) and Israel (12%). They have been determined by the socio-economic and institutional characteristics of HI countries between 20 and 11 years before starting as high-income countries. Column 7 shows that the policy gaps with more than one standard deviation are in the rule of law, the quality of education and the value of stocks traded.

Table 9. Panama versus synthetic country

				green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation			
				The gap with SC in period [-20,11]****		The gap with SC in period [-4,0]****	
Variables	Panama*	SC [-20,11]**	SC [-4,0]***	SC before-UMI	SC before (standardised)-UMI	SC-UMI	SC (standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.14	0.07	0.60	0.21	0.30	0.74	1.02
Quality of education	432.13	429.38	538.23	-2.75	0.04	106.10	1.64
Tax revenue (% of GDP)	18.88	18.86	23.67	-0.03	0.00	4.79	0.70
Age dependency (% of working-age population)	54.08	39.68	40.37	-14.40	1.47	-13.71	-1.40
Combined Polity Score (-10 to 10)	9.08	8.58	10.00	-0.50	0.07	0.92	0.13
Gross capital formation (% of GDP)	45.20	27.29	29.21	-17.91	1.56	-16.00	-1.40
Capabilities	0.38	0.08	0.62	-0.30	0.47	0.25	0.39
Stocks traded, total value (% of GDP)	5.23	29.67	19.45	24.43	1.73	14.22	1.01
Domestic credit provided by financial sector (% of GDP)	75.96	73.39	82.70	-2.57	0.08	6.74	0.22
Percentage of complete tertiary schooling attained in population	14.37	11.69	13.99	-2.68	1.32	-0.38	-0.19
GDP (1990 PPP USD) or total standardised differences	**9 253.04**	**8 233.20**	**12 142.96**	**-1 019.85**	**7.04**	**2 889.92**	**2.11**

Note: * Values range from -4 to 0 (with 0 = 2015). ** is the Synthetic Country (SC) for this UMI. Values are the average from years -20 to -11 (with 0 the year the country moved from UMI to HI). ***: is the Synthetic Country (SC) for this UMI. Values are the average from years -4 to 0 (with 0 the year the SC moved from UMI to HI). ****: Negative means a higher value for the country studied.

The comparison between Tables 8 (Column 4) and 9 (Column 7) shows that while the level of tax revenues is a key policy gap when compared to the average HI countries, this is not the case when the "synthetic country" is analysed. Among the 10 selected variables from the discriminant analysis (i.e. the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap), policy priorities should focus on improvements in the rule of law, the quality of education and the value of stocks traded according to the synthetic country model.

4.2.4. Brazil

Table 10 compares Brazil to the simple average of high-income countries regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from middle-income status. In particular, Column 4 shows that the policy gaps with more than one standard deviation compared to the average of selected HI countries before passing to the HI status (between 4 and 0 years with 0 the threshold year) are in the rule of law and the percentage of complete tertiary schooling attained.

Table 11 compares Brazil to the "synthetic country" regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap. The synthetic country is a result of the weighted average of the following countries (weights in parenthesis): Sweden (44%), Italy (20%), Czech Republic (19%), Austria (9%), Mauritius (8%) and the Netherlands (0.1%). They have been determined by the socio-economic and institutional characteristics of HI countries between 20 and 11 years before starting as high-income countries. Column 7 shows that the policy gaps with more than one standard deviation are in the rule of law, the capabilities (economic complexity index) and the percentage of complete tertiary schooling attained.

Table 10. Brazil versus average of high-income countries

			green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation	
			The gap with HI in period [-4,0]***	
Variables	Brazil*	Average HI [-4,0]**	AVG HI-UMI	AVG HI(standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.08	0.70	0.78	1.08
Quality of education	498.69	553.12	54.43	0.84
Tax revenue (% of GDP)	33.41	29.61	-3.81	-0.56
Age dependency (% of working-age population)	45.58	34.67	-10.90	-1.11
Combined Polity Score (-10 to 10)	8.08	10.00	1.92	0.26
Gross capital formation (% of GDP)	20.71	26.29	5.58	0.49
Capabilities	0.11	0.55	0.44	0.69
Stocks traded, total value (% of GDP)	29.13	28.37	-0.77	-0.05
Domestic credit provided by financial sector (% of GDP)	100.51	77.82	-22.69	-0.73
Percentage of complete tertiary schooling attained in population	5.63	9.94	4.31	2.12
GDP (1990 PPP USD) or total standardised differences	**6 907.03**	**12 120.44**	**5 213.41**	**3.03**

Note: * Values cover years -4 to 0 (with 0=2015). ** Values represent the average for high-income countries (HI) from years -4 to 0 (with 0 the year the high-income country moved from upper middle-income – UMI- to HI). *** Negative means a higher value for the country studied.

Table 11. Brazil versus synthetic country

				green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation			
				The gap with SC in period [-20,11]****		The gap with SC in period [-4,0]****	
Variables	Brazil*	SC [-20,11]**	SC [-4,0]***	SC before-UMI	SC before (Standardised)-UMI	SC-UMI	SC (Standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.08	0.22	0.87	0.30	0.41	0.95	1.31
Quality of education	498.69	492.44	534.82	-6.25	0.10	36.13	0.56
Tax revenue (% of GDP)	33.41	30.29	30.86	-3.12	0.46	-2.55	-0.37
Age dependency (% of working-age population)	45.58	42.09	30.30	-3.48	0.35	-15.28	-1.55
Combined Polity Score (-10 to 10)	8.08	9.23	10.00	1.15	0.16	1.92	0.26
Gross capital formation (% of GDP)	20.71	14.54	26.64	-6.17	0.54	5.93	0.52
Capabilities	0.11	0.23	1.02	0.12	0.19	0.91	1.43
Stocks traded, total value (% of GDP)	29.13	29.68	24.07	0.55	0.04	-5.06	-0.36
Domestic credit provided by financial sector (% of GDP)	100.51	87.39	96.72	-13.12	0.42	-3.79	-0.12
Percentage of complete tertiary schooling attained in population	5.63	8.60	8.06	2.97	1.46	2.43	1.20
GDP (1990 PPP USD) or total standardised differences	**6,907.03**	**8,398.14**	**12,073.91**	**1,491.11**	**4.12**	**5,166.88**	**2.86**

Note: * Values range from -4 to 0 (with 0 = 2015). ** is the Synthetic Country (SC) for this UMI. Values are the average from years -20 to -11 (with 0 the year the country moved from UMI to HI). ***: is the Synthetic Country (SC) for this UMI. Values are the average from years -4 to 0 (with 0 the year the SC moved from UMI to HI). ****: Negative means a higher value for the country studied.

The comparison between Tables 10 (Column 4) and 11 (Column 7) shows that while the capabilities (economic complexity index) is a key policy gap when compared to the "synthetic country", this is not the case when the average for HI countries is analysed. Among the 10 selected variables from the discriminant analysis (i.e. the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap), policy priorities should focus on the rule of law, the capabilities (economic complexity index) and the percentage of complete tertiary schooling attained according to the synthetic country model.

4.2.5. Peru

Table 12 compares Peru to the simple average of high-income countries regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from middle-income status. In particular, Column 4 shows that the policy gaps with more than one standard deviation compared to the average of selected HI countries before passing to the HI status (between 4 and 0 years with 0 the threshold year) are in the rule of law, the quality of education, the level of tax revenues, the capabilities (economic complexity index), the value of stocks traded and the domestic credit provided by the financial system.

Table 12. Peru versus average of high-income countries

			green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation	
			The gap with HI in period [-4,0]***	
Variables	Peru*	Average HI [-4,0]**	AVG HI-UMI	AVG HI (standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.60	0.70	1.30	1.79
Quality of education	437.52	553.12	115.60	1.78
Tax revenue (% of GDP)	18.61	29.61	11.00	1.62
Age dependency (% of working-age population)	53.86	34.67	-19.18	-1.95
Combined Polity Score (-10 to 10)	9.08	10.00	0.92	0.13
Gross capital formation (% of GDP)	26.44	26.29	-0.15	-0.01
Capabilities	-0.83	0.55	1.38	2.17
Stocks traded, total value (% of GDP)	1.94	28.37	26.43	1.87
Domestic credit provided by financial sector (% of GDP)	20.75	77.82	57.06	1.82
Percentage of complete tertiary schooling attained in population	12.27	9.94	-2.33	-1.15
GDP (1990 PPP USD) or total standardized differences	**6 748.34**	**12 120.44**	**5 372.10**	**8.07**

Note: * Values cover years -4 to 0 (with 0=2015). ** Values represent the average for high-income countries (HI) from years -4 to 0 (with 0 the year the high-income country moved from upper middle-income – UMI- to HI). *** Negative means a higher value for the country studied.

Table 13_compares Peru to the "synthetic country" regarding the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap. The synthetic country is a result of the weighted average of the following countries (weights in parenthesis): Lithuania (48%), Canada (25%), Trinidad and Tobago (18%), Australia (7%) and Israel (2%). They have been determined by the socio-economic and institutional characteristics of HI countries between 20 and 11 years before they start as high-income countries. Column 7 shows that the policy gaps with more than one standard deviation are in the rule of law, the quality of education, the capabilities (economic complexity index) and the domestic credit provided by the financial system.

The comparison of Tables 6 (Column 4) and 7 (Column 7) shows that while the level of tax revenues and the value of stocks traded are key policy gaps in Peru when compared to the average for HI countries, these are not as different when the "synthetic country" is analysed. Among the ten selected variables from the discriminant analysis (i.e. the variables that separate best between UMI and HI countries evaluated at their "graduation time" from the middle-income trap), policy priorities should focus on improvements in the rule of law, the quality of education, the capabilities (economic complexity index) and the domestic credit provided by the financial system according to the synthetic country model.

Table 13. Peru versus synthetic country

							green: bigger than 1 standard deviation over threshold; red: gap bigger than 1 standard deviation
				The gap with SC in period [-20,11]****		The gap with SC in period [-4,0]****	
Variables	Peru*	SC [-20,11]**	SC [-4,0]***	SC before-UMI	SC before (Standardised)-UMI	SC-UMI	SC (Standardised)-UMI
Rule of Law (-2.5 to 2.5)	-0.60	0.17	0.60	0.77	1.06	1.19	1.64
Quality of education	437.52	433.61	548.00	-3.91	0.06	110.48	1.70
Tax revenue (% of GDP)	18.61	18.44	22.99	-0.17	0.02	4.38	0.64
Age dependency (% of working-age population)	53.86	44.76	42.83	-9.10	0.93	-11.03	-1.12
Combined Polity Score (-10 to 10)	9.08	9.14	10.00	0.07	0.01	0.92	0.13
Gross capital formation (% of GDP)	26.44	16.87	26.13	-9.57	0.84	-0.31	-0.03
Capabilities	-0.83	0.19	0.62	1.02	1.60	1.45	2.28
Stocks traded, total value (% of GDP)	1.94	23.43	11.69	21.49	1.52	9.75	0.69
Domestic credit provided by financial sector (% of GDP)	20.75	54.98	63.83	34.23	1.09	43.08	1.38
Percentage of complete tertiary schooling attained in population	12.27	10.52	13.44	-1.75	0.86	1.17	0.57
GDP (1990 PPP USD) or total standardised differences	**6 748.34**	**7 255.79**	**12 178.32**	**507.45**	**7.99**	**5 429.98**	**7.89**

Note: * Values range from -4 to 0 (with 0 = 2015). ** is the Synthetic Country (SC) for this UMI. Values are the average from years -20 to -11 (with 0 the year the country moved from UMI to HI). ***: is the Synthetic Country (SC) for this UMI. Values are the average from years -4 to 0 (with 0 the year the SC moved from UMI to HI). ****: Negative means a higher value for the country studied.

5. Conclusions and next steps

The empirical literature on development coined in the mid-2000s the term "middle-income trap", as developing economies – notably in East Asia – struggle to adjust to new sources of growth after reaching middle-income levels. This *trap* represents a specially challenging scenario for Latin America, given that only Trinidad and Tobago, Chile and Uruguay have become high-income economies in the last six decades.

This paper analyses empirically the main policy areas explaining the "middle-income trap", based on the experiences of 76 emerging economies and OECD countries that were mostly middle-income in the 1950s, comparing those which evaded it and those which stayed "trapped". In doing so, it also aligns with the more micro- and macro-founded research on growth slowdowns.

Based on 1 295 estimations, and using a linear discriminant analysis and a synthetic control method, we identify institutional, social and economic features that help characterise countries which did and did not graduate. Some of the key policy variables are adjusted by their quality, such as education or financial deepening, which is an additional contribution to previous works.

Our results show that countries interested in graduating, defined as reaching the high-income range (USD 11 750, measured in 1990 constant levels and adjusted for PPP) should focus on the following policy areas: governance (rule of law and political stability), education (quality of secondary education and tertiary education attainment), investment, capabilities, finance (liquidity in the stock market and domestic credit provided by the financial system), and taxation.

This policy prioritisation can be applied at the country level, as shown for Argentina, Brazil, Colombia, Panama and Peru. The paper also includes a sensitivity analysis, constructing benchmark economies for each country, based on similarities on the main structural variables, that allows a more country-specific policy prioritisation.

For the next steps, the paper could expand the theoretical framework, classifying variables as triggers (e.g. resources, reforms), propagators (e.g. credit, middle class) or inhibitors (e.g. institutions, traps). In addition, the empirical strategy is purely statistical and economy-centred, with less (or no) variables covering social dimensions or the political economy of reforms. Finally, the policy advice could be more granular, based on country studies (evaders or trapped countries), and on policies (e.g. skills, taxes).

Annex. Descriptive statistics

Variable	Mean HI	Mean UMI	Country	Group	Value
Age dependency (% of working-age population) - adjusted	-19.26	-6.81	Israel	HI	-0.38
			Oman	UMI	-20.80
			Qatar	HI	-34.78
			Saudi Arabia	HI	10.80
			Syria	UMI	13.87
			Uruguay	HI	2.81
Capabilities	0.55	0.16	Azerbaijan	UMI	-1.55
			Hungary	UMI	1.49
Combined Polity Score (-10 to 10) - adjusted	5.39	-1.69	Kuwait	HI	-12.65
			Qatar	HI	-15.64
			Saudi Arabia	HI	-12.23
			Uzbekistan	UMI	-14.57
Percentage of complete secondary schooling attained in population – adjusted	6.24	2.35	Czech Republic	HI	44.57
			Hungary	UMI	25.71
			Poland	HI	31.18
Percentage of complete tertiary schooling attained in population – adjusted	1.89	1.97	Australia	HI	7.91
			Estonia	HI	7.80
			Israel	HI	8.76
			Russia	UMI	16.70
			Uruguay	HI	-4.29
Current account (% of GDP)	-2.14	-2.31	Azerbaijan	UMI	15.51
			Kuwait	HI	23.61
			Qatar	HI	25.00
			Saudi Arabia	HI	25.68
			Seychelles	UMI	-18.50
Direct tax (% of GDP)	10.48	9.41	Hungary	UMI	16.68
			Kuwait	HI	0.31
			Lithuania	HI	30.35
			Oman	UMI	1.15
			United Arab Emirates	HI	0.04
Domestic credit provided by financial sector (% of GDP) - adjusted	1.71	-22.16	China	UMI	85.65
			Israel	HI	119.51
			Japan	HI	122.71
			Thailand	UMI	83.53
Exports diversification	2.01	2.84	Azerbaijan	UMI	5.85
			Kuwait	HI	5.37
			Qatar	HI	4.75
			Saudi Arabia	HI	6.10
			Trinidad and Tobago	HI	4.52
			Venezuela	UMI	5.68

Variable	Mean HI	Mean UMI	Country	Group	Value
FDI (% of GDP) – adjusted	-0.96	-1.35	Kuwait	HI	-5.22
			Montenegro	UMI	8.04
			Seychelles	UMI	12.20
			Singapore	HI	8.71
GINI index	35.61	39.48	Chile	HI	54.74
			Colombia	UMI	53.74
Gross capital formation (% of GDP)	26.29	23.25	China	UMI	47.09
			Panama	UMI	45.20
			Puerto Rico	HI	16.08
			Qatar	HI	40.65
			Singapore	HI	38.93
International migrant stock (% of population)	12.64	7.31	Qatar	HI	82.49
			United Arab Emirates	HI	77.62
			Oman	UMI	41.09
Manufactures exports adjusted	12.99	-9.30	Kuwait	HI	-51.17
			Qatar	HI	-47.84
Quality of education	553.12	486.44	Chile	HI	433.74
			Hungary	UMI	575.90
			Kuwait	HI	387.75
			Qatar	HI	360.81
Merchandise trade adjusted	0.00	-18.42	Hungary	UMI	71.26
			Singapore	HI	220.42
Mobile cellular subscriptions adjusted	7.17	12.89	Czech Republic	HI	59.48
			Lithuania	HI	63.52
			Syria	UMI	-50.35
Public revenue (% of GDP)	27.47	32.13	China	UMI	11.33
			Estonia	HI	2.07
			Israel	HI	57.39
			United Arab Emirates	HI	6.67
Railways, goods transported adjusted	4.51	1.74	Seychelles	UMI	50.26
			United Arab Emirates	HI	194.63
Rule of Law (-2.5 to 2.5)	0.70	-0.23	Chile	HI	1.28
			Portugal	HI	1.23
			Venezuela	UMI	-1.76
Stocks traded, total value adjusted (% of GDP)	-4.80	-19.79	China	UMI	108.23
			Greece	HI	27.25
			Korea, Rep.	HI	26.94
Tax revenue (% of GDP)	29.61	22.06	Hungary	UMI	38.00
			Israel	HI	41.93
			Singapore	HI	15.37

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