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The Rise of the Middle Class in Emerging Countries: Its Sources, Evolution and Impacts on Economic Growth

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Résumé

L'objectif de cette étude est d'analyser l'importance des classes moyennes dans la croissance économique des pays en développement. L'étude examine différentes mesures de la classe moyenne et leurs relations avec la croissance économique dans un groupe de 30 pays émergents, en particulier la Chine, durant la période 1985-2010. Le modèle de croissance de Forbes (2000) est utilisé afin d'examiner la relation entre la classe moyenne et la croissance économique à l'aide de différentes méthodes d'estimation, telles que les moindres carrés ordinaires (MCO), les modèles d'effets fixes et aléatoires et la méthode des moments généralisés (GMM) en système. Différents indicateurs socio-économiques de la Banque Mondiale, du Center for Systemic Peace (CSP) et de la base de données de Barro-Lee (2010) sont utilisés comme variables de contrôle sur la croissance. À l'aide d'un modèle logit, l'étude tente également de déterminer si la classe moyenne a une incidence sur l'apparition du piège du revenu intermédiaire dans les pays en développement. Ce phénomène de croissance décrit par Gill et Kharas (2007) est à l'effet que certains pays à revenus intermédiaires tels que le Brésil et la Malaisie n'ont pas réussi à croître suffisamment afin de devenir des pays développés à haut-revenus. L'étude démontre que la classe moyenne a une influence positive et significative sur la croissance économique, et que l'utilisation de différentes définitions à un effet significatif sur les résultats obtenus. Au cours des 25 dernières années, on trouve que le classe moyenne a eu une importance accrue pour les pays émergents étant donné une croissance moyenne de sa taille de 8.5% par année, et une augmentation de son revenu moyen de 16% au cours de la même période. On constate également qu'une classe moyenne forte aide les pays en développement à faire la transition vers une catégorie de revenus supérieure. Dans l'ensemble, la classe moyenne a un plus grand impact sur la croissance à long-terme, et plusieurs facteurs supportent une croissance plus durable tels que le capital humain, des conditions macroéconomiques stables et une orientation politique plus démocratique. Ces résultats suggèrent que la Chine, un pays à revenu intermédiaire à forte croissance, devrait continuer de soutenir l'augmentation de la taille de sa classe moyenne afin d'assurer une croissance économique durable et d'éviter le piège du revenu intermédiaire.

Mots-clés: Classe moyenne, Pays émergents, Chine, Croissance économique, GMM en système, Piège du revenu intermédiaire

Abstract

This study examines the concept of the middle-class, by comparing various income-based definitions and their respective implications for the economic growth in a group of 30 emerging countries including China from 1985 to 2010. Using a popular growth model, a modified Solow growth model from Forbes (2000), the relationship between the middle-class and economic growth is examined. Several estimation methods are employed, including: the Ordinary Least Squares (OLS), fixed and random-effects and system Generalized Methods of Moments (GMM). Various socio-economic variables, from the World Bank's World Development Indicators, the Center for Systemic Peace and the Barro-Lee (2000) datasets are included in the model to determine the channels by which the middle-class influences growth. Using a logit model, this study also assesses whether the middle-class helps countries avoiding the middle-income trap, a phenomenon first described by Gill and Kharas (2007) by which some middle-income countries, such as Brazil and Malaysia, have not succeeded in making the transition from a middle-income to a high-income status. This study examines the relationship between the income distribution and the risk of a middle-income trap. A main finding is that the middle-class has a positive and significant influence on economic growth in the developing countries, but the strength of this relationship varies with the definition of the middle-class. On average, over the past 25 years, the middle-class grew by 8.5% and its mean income also increased by 16% during the period, suggesting a heightened importance of the group in the selected countries. Another important result is that the middle-class generally helps countries in making a successful transition from a lower-income to an upper-income category. Overall, the middle-class has a greater impact on growth over longer time periods, and several channels influence the strength of this relationship with human capital, stable macroeconomic conditions and a more democratic political orientation supporting greater and more sustainable growth. These findings suggest that China, a fast-growing middle-income country, should continue to support increases in the size of its middle-class to ensure sustainable growth and to avoid the middle-income trap growth outcome.

Keywords: Middle-Class, Developing Countries, China, Economic Growth, System-GMM, Middle-Income Trap

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Acronyms

$2SLS/3SLS$	Two (Three) Stages Least-Squares
FE	Fixed-Effects
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
GNI	Gross National Income
LAC	Latin American Countries
MC	Middle-Class
MIT	Middle-Income Trap
MLE	Maximum Likelihood Estimation
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
RE	Random-Effects
US	United-States
WDI	World Development Indicator
$WIID$	World Income Inequality Database

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"What makes the desert beautiful is that sometimes it hides a well"

- Antoine de Saint-Exupéry

1 Introduction

It is well acknowledged amongst economists that middle classes play an important role in economic development. Since the 19th century, several researchers, including the economic historian David Landes, have associated the emergence of a middle-class to the prosperity of industrialized nations (Banerjee and Duflo, 2008). The development of this social class is related to an important consumption role propelling domestic demand and ensuring sustainable economic growth (Chun, Hasan and Ulubasoglu, 2011). The presence of a large middle class in societies is also associated with greater levels of individual freedoms, civil liberties and social cohesion which also increases growth (Alesina and Rodrik, 1994; Tridico, 2013). Recently, the emergence of the middle classes in developing countries, such as China, has been the focus of several studies (Ravaillon, 2009; Kharas, 2010).

Since the introduction of market reforms in the early 1980s, China has experienced significant socioeconomic transformations and has achieved impressive growth rates. As a result of fast and stable growth, wage levels have risen leading to the emergence of a Chinese middle-class (Yuan, Wan and Khor, 2012). Even if it is large in absolute terms at about 157 million people (as of 2010), the Chinese middle-class is relatively small when compared to the historical standards of other countries with similar income levels and at similar stages of development (Kharas, 2010). Moreover, despite the significant poverty reductions of the past decades, the Chinese middle-class is considered fragile given the considerable inequality levels in the country (Milanovic and Yitzhaki, 2002; Pressman, 2007). This raises several questions on the future growth prospects of the Chinese middle-class. Importantly: Could a worsening of income inequality eventually shrink the Chinese middle-class, and thereby negatively influence economic growth?

A main objective of this study is to examine the evolution of the middle-class and its contribution to growth since China's transition to a market-economy in the 1980's. For statistical and comparison purposes, the empirical analysis is conducted on a panel of 30 Latin American and East Asian countries selected for their common socio-economic characteristics and/or similar level of economic development with China.[1] Table I lists the countries included in the panel. The interest of performing a cross-country analysis, instead of an analysis of China on a stand-alone basis, is to gain insights from the historical experiences of the selected countries with respect to their inequality levels, their middle-classes and their overall economic development.

[1] The countries are selected based on a set of common socioeconomic characteristics, such as their economic growth, their population sizes, their human capital levels, and the quality of their governance. The level of economic development is defined as the country's income level, measured by the GNI per capita, following the World Bank's income classification. As the objective of the study is to generate insightful comparisons with China, only developing countries are included. More details on the selection of countries are included in Sections III and IV.

Table 1: Regions and Countries included in the Panel

Regions	Countries
Asia	Bangladesh, China, Indonesia, Kazakhstan, Kyrgyz Rep., Lao PDR, Malaysia, Pakistan, Philippines, Thailand, Sri Lanka, Vietnam
Latin America	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Rep., Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela

Income-based definitions of the middle-class are used to measure its size and contribution to economic growth over time in each country. The middle-class measures included in the analysis are specific to developing countries, and reflect their lower economic development. As such, the income thresholds to designate the middle-class are considerably lower than measures used in developed countries. For instance, while in emerging countries the middle-class can be defined as the share of the population that lives on $2-$10 USD (in 2005 PPP) per day, in Canada the income thresholds to define this group are considerably higher, at $40-$120 USD (in 2005 PPP) per day (Cross and Sheikh, 2015).[2] In both developed and developing countries, several definitions exist for the middle-class, starting with a distinction between absolute and relative measures, where the former have fixed income thresholds over time, and the later have income ranges that fluctuate with the country's overall income distribution. Even within the range of either absolute or relative measures, there is a significant variety of indicators. As there is yet no consensus on which measures are the most appropriate to measure the middle-class, and more specifically in the context of developing countries, one objective of this study is to examine the various definitions both theoretically and empirically.

The econometric model used in this study is built from the recent literature of the influence of inequality and middle-classes on economic growth. The precise mechanisms by which the middle-class enters this relationship are still unclear. I intend to shed light on this question by examining the hypothesis that the middle-class is the main source of human capital in these developing economies, using education, healthcare and gender-related proxies. I also seek to determine if the presence of a strong middle-class encourages progress in democratic institutions, and if it improves country-specific macroeconomic conditions.

[2]Dollars used in this study are in 2005 USD, expressed in purchasing power parity. The first definition is from Banerjee and Duflo (2008), and the second one is from Beach (1996) but described by Cross (2015), a former Chief Economic Analyst at Statistics Canada. Several other approaches are used to define the middle-class both in developing countries and in Canada, and these two measures are used for comparison purposes. While the Banerjee and Duflo (2008) measure is absolute, Beach's measure is relative (50%-150% of median income) as it is more common to refer to the Canadian middle-class using relative measures. More details on the general differences between both types of measures can be found in Section II.

The Middle-Income Trap Prospects

A second main question examined in this study is the role middle classes play in the middle income trap. In the past three decades, the rapid growth rates and the internationalization process have allowed China to make the transition from being a low-income to a middle-income country (Eichengreen, Park and Shin, 2011, 2013). However, China's growth model is reaching its limits and there are concerns regarding its sustainability (Kharas, 2010). There is a risk that the fast-growing economy could fall into the middle-income trap (MIT), a phenomenon where it would stagnate at the middle-income level and fail to graduate to the ranks of higher-income countries (Gill and Kharas, 2007). Recent empirical studies have found evidence that productivity slowdowns and rising inequalities are factors that determine whether an economy will be subject to the trap (Kharas and Kholi, 2011; Egawa, 2012, 2013). Building on these recent works, this study seeks to determine whether a potential shrinking of the middle-class could lead China into the middle-income trap. More precisely, the second question examined in this study is: Could a slowdown in China's growth rates, due to poor income redistribution mechanisms, be such that the country would fall in the middle-income trap in the next decades?

Over the past few years, China's growth model departed from the East Asian model (the "Asian Tigers") of growth with equity, as its inequality levels have risen considerably following the continuous increases in economic growth (Islam, 2015). As such, given the significant divergence with the experience of its neighbor countries, several questions arise regarding China's future growth prospects. While there is a consensus that a slowdown will eventually happen in the Chinese economy, there are uncertainties as per the expected magnitude of this slowdown, and whether it could lead to a MIT (Eichengreen, Park and Shin, 2011, 2012; Aiyar, Duval, Puy, Wu and Zhang, 2013). Whether China could fall in a MIT in the future decades is a question of interest for several reasons. As the second largest economy after the United States and as the most populous country, China exerts a significant global influence (Islam, 2015). Due to its large consumer base and significant demand for commodities, it provides a considerable source of revenues for several exporting countries, including Canada (Eichengreen, Park and Shin, 2011). Moreover, it is also the largest merchandise trader, with a comparative advantage in cheap textiles and clothing manufacturing (World Trade Organization, 2014). A permanent growth slowdown in China could change the trade dynamics, and result in significant economic consequences for its international trade partners. On the other hand, if China successfully avoids the MIT, it is important to understand whether this transition will be the result of a successful economic transition - from an economy oriented in manufacturing to an economy turned toward higher-value added industries - or of the establishment of the appropriate structural reforms,

or both.

In this context, the interest of including several countries in the analysis is to learn from their economic successes and failures, and to draw comparisons with China's experience. As we will see, about half of the countries in our panel are considered trapped in the MIT (see Table 9)[3], and an analysis of the economic failures of these countries could highlight some of the factors that trigger an MIT. Moreover, this analysis could provide guidance on the measures to put in place to avoid such an outcome in China. Brazil is an interesting example of a country that fell in the trap due to its incapacity to put in place appropriate reforms; its experience can be contrasted with China, due to its size and economic importance (Kharas and Kholi, 2011). Malaysia and Philippines, both in the MIT, are also relevant examples due to their geographic proximity to China.

Despite the rising interest from academic practitioners, who have conducted large-scale surveys and qualitative studies on the middle-class, only a few in-depth analysis have been realized to determine the most relevant middle-class measure in the context of developing countries (Birdsall, 2010). Furthermore, very few authors have conducted a quantitative analysis on the importance of the middle-class for economic growth in the context of these economies. Moreover, to my knowledge, only a limited number of studies have made a combined analysis of the role of the middle-class in economic growth and its relationship to the middle-income trap. The contribution of this study to the literature is twofold:

> 1) A quantitative analysis of the importance of the selected developing countries' middle-class for their economic development, growth and institutional quality.
> 2) An assessment of the relationship between the middle-class and the incidence of a middle-income trap.

Empirically, six absolute and relative income-based middle-class definitions are evaluated, to determine which measures are the most appropriate in the context of the selected developing countries. Using three measures, I examine the evolution of the size, mean income and income share of the middle-classes for the period from 1985 to 2010. Then, following Forbes (2000) I estimate a growth model to assess the influence of the middle-class on economic growth and development over time. Regressions include several proxies of human capital, measured from several health and education indicators from the World Bank's World Development Indicator (WDI) series. I also include political variables from the Center for Systemic Peace (CSP). Various estimation methods are used, starting from the basic methods of OLS and fixed-effects (FE) to the system Generalized Methods of Moments (GMM). To answer the second question underlying this study, I run a binary

[3] A more detailed definition of the MIT, as well as a description of the approach used to define the countries trapped in the MIT is included in Sections II and III.

logit model to find the probability of a country falling into the middle-income trap, and to examine the various socio-economic determinants of this outcome.

The study is organized as follows. Section II presents a review of the literature on the concepts of the middle-classes and the middle-income trap, with a discussion of their definitions and their relevance in the context of developing countries. Section III describes the main variables and introduces a preliminary analysis of the middle-class and the growth rate of real GDP per capita. Section IV develops the methodology and presents the models and leading hypotheses. It also includes a description of the data and main variables. Section V presents the empirical results from both econometric models. Section VI and VII conduct a sensitivity analysis to assess the robustness of the empirical results. Section VI concludes and identifies directions for future research.

2 Literature Review

This section presents a review of the literature on the roles of the middle-class on economic growth. The review is divided in two sections. In the first section, I review the various definitions and measurement methods for the middle-class in the context of developing countries, and I also include a description of the criteria used to select an appropriate measure. I then review the main studies on which the framework and empirical methodology for this study are built. In the second section, I examine the definitions and empirical methods used in the literature related to the concept of the middle-income trap. This review highlights the relationship of emerging countries' middle-class to economic growth, as well as their future growth prospects, and the current state of research and the gaps in the literature on the subject.

2.1 Roles of the Middle-Class in Economic Development

2.1.1 Definitions and Measurement of the Middle-Class

The definition of the middle-class varies widely in the literature, as there is no official governmental or agency-based definition to designate the group (Eisenhauer, 2011; Felipe, Abdon and Kumar, 2012). The definition also changes from one culture to another, and often depends on the purpose at hand. There is even less consensus on the definitions of the middle-class in the context of emerging countries (Ravaillon, 2009).[4] After reviewing the various definitions of the middle-class, used in the general literature, I discuss the advantages and disadvantages of using either a relative or an absolute measure.

Following Max Weber in the early 20th century, the concept of a middle-class emerged as an economic necessity to distinguish classes for social and political purposes (Banerjee and Duflo, 2008). The notion has evolved over time, but it always remained multidimensional by encompassing both sociological and economic ideas. As there are no theoretical (and even less empirical) grounds by which one middle-class measure should be better than another, I explain each definition in detail.

Sociologists recognize that the middle-class has distinctive social and cultural characteristics, and identify the group using a set of behavioral characteristics such as the professions and educational attainment levels (Banerjee and Duflo, 2008). An underlying hypothesis of the socioeconomic approach is that individuals have a psychological attachment to their social classes, as well as a set of distinctive attitudes and behaviors (Erikson and Goldthorpe, 2002). While recognizing that the middle class is a broad concept

[4] Definitions also vary in the context of developed countries. However, the focus of this paper being on emerging countries, the word middle-class is used to specifically refer to these countries.

involving cultural aspects and social values, for the measurement purpose of this study I restrict its definition to an economic measure. Moreover, I make this choice given that income-based measures are often easier to measure and to manipulate than the subjective measures used in the socioeconomic approach (Birdsall, 2010). Also, it would be difficult to compare results across countries, while using subjective measures, as they are based on individuals' self-perceptions and cultural behaviors (Birdsall, Graham and Pettinato, 2000).

When defining the middle-class, economists generally use consumption-based or income-based measures, which can further be classified as either absolute or relative measures. Absolute measures are defined with fixed income ranges that establish a lower and an upper consumption or income bound in purchasing power parity (PPP) terms. On the other hand, relative measures identify the middle-class with respect to quintiles or percentiles of an underlying national income or consumption distribution function. The economic definitions of the middle class are closely related to the definitions of poverty, given that an identification of the middle-income group depends on how we draw the line between poverty and richness (Eisenhauer, 2011). In absolute terms, a lower bound that is commonly used to define the middle-class is the World Bank's absolute definition of the moderate poverty line, of daily income per capita of $2 USD in 2005 PPP (Ravaillon, 2009). In relative terms, the poverty threshold is commonly set at the first quintile of the income distribution (Easterly, 2001, 2002). Alternative measurement methods of the middle-class have also been proposed; Birdsall (2010) proposes a measure combining a relative lower bound ($10 USD) and an absolute upper bound (95th percentile of the income distribution). Figure 10 summarizes the various economic definitions used in the literature on middle-classes, and includes a review of their respective definitions, thresholds and methodologies.

Theoretically, the choice of an absolute or a relative measurement method depends on the purpose at hand (Chun and al., 2010; Kharas and Gertz, 2011). Relative measures allow for comparing the evolution of the size of the middle-class within countries over time. However, applying thresholds that vary by country may give a very broad definition of what constitutes the middle-class and it can make inter-country comparisons difficult (Eisenhauer, 2011). Another drawback of the relative measures is that even if an individual is considered middle-class it can still be in absolute poverty, and this could be a concern in several poor and developing countries (Ravaillon, 2009). In contrast, using an absolute approach is useful when making an inter-country assessment of the size of the middle-class (Kharas and Gertz, 2011). However, it is not obvious which measures should be selected, given that the thresholds often seem to be determined in an arbitrary manner (Eisenhauer, 2011; Cross & Sheikh, 2015). There are also obvious welfare implications related to taking an absolute approach as it involves drawing the line between the poor class and the rich class (Eisenhauer, 2011). While determining the poverty line may be straightforward, given

that it is commonly defined by the basic necessities of living, determining the line above which an individual is considered rich may not be obvious (Edo and Sosa-Escudero, 2012).

While in this study I conduct an inter-country assessment of the developing countries' middle-class, it is not clear that a relative measure is the most appropriate for lower-income countries. On the other hand, absolute measures are not without flaws, and it is not obvious which measure to select given that thresholds are often seemingly arbitrarily determined. Thus, given that both the relative and absolute measures have their respective advantages and disadvantages, I chose to consider both. Indeed, the two types of measures could relate to different reasons why the middle class is important for economic growth and as such could both lead to interesting results (Chun and al., 2011). It is important to note that this study does not attempt to develop a new middle-class measure, and the objective is simply to assess the merits of using either measure in the context of developing countries.

In the literature, there is also a debate on whether income or consumption-based measures are more appropriate to measure the size of the middle-class (Birdsall, 2010). It is debatable that consumption-based measures are more relevant in developing countries given that this consumption-data is often less reliable. However, the difference between income-based and consumption-based measures is minor for developing countries given that at low levels of income there is a very high correlation between income and consumption (Chun, 2010). As such, in this study, I use both types of measures in assessing the most relevant cut-offs to measure the middle-class.

2.2 Inequality and Economic Growth

The literature on the influence of the middle-class on economic growth builds on the general literature of the relationship between inequality and economic growth. Thus, an understanding of the most widely used models and estimation methods in the growth literature is necessary, prior to building a more specific model for the middle-class. As such, in this section, I first present the various theoretical and empirical considerations in the studies of inequality and growth. Then, I present the specific studies on the relationships that exist between the middle-class and economic growth.

Inequality and its Determinants

The debate on whether there is a causal relationship between inequality and growth is still not settled in the empirical literature, and it has long been a topic of interest amongst economists (Forbes, 2000). The major question underlying this debate is whether high inequality sustains economic growth or undermines it. Moreover, the causality between

both variables is not clear, and some authors propose that it is growth that causes inequality rather than the reverse. Empirically, several papers have examined the question and there is a wide divergence across their results, that can be attributed mainly to their different estimation methods and datasets. In this section, I summarize and compare the main models in the literature on inequality and growth.

Empirically, it is generally accepted that inequality has an influence on economic growth. However, the magnitude and the sign of this relationship differ across studies, according to the models and estimation methods used. Generally, the different papers use the growth model presented below, or a modification of this representation (Forbes, 2000). This is the model used in this paper, and it is presented in more details in Section IV.

Basic growth model

$$Growth_{i,t} = \beta_1 Income_{i,t-1} + \beta_2 Inequality_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t-1} \quad (1)$$

Where: $Growth_{i,t}$ is the growth of real GDP per capita (in real terms), $Income_{i,t-1}$ is the log of real GDP per capita (in real terms), $Inequality_{i,t-1}$ is a measure of income distribution, $X_{i,t-1}$ is a set of control variables and $\varepsilon_{i,t-1}$ is the error term.

This expression is a modified version of the Solow growth model, a neoclassical model that attributes long-run economic growth to labor force growth, capital accumulation and technological progress (Chun and al., 2011). Equation 1 includes an income distribution variable, often defined as the Gini coefficient. However, and as explained in the next section, this inequality variable is sometimes replaced by other measures, such as the middle-class, to take into account a different part of the income distribution (Voitchovsky, 2005). Another important variable is the initial income, measured by the log of the real GDP per capita. This variable is included to account for convergence as predicted by the Solow growth model, where poor countries grow faster to eventually catch up with richer countries (Barro, 2008). The set of control variables varies widely in the literature, but generally includes measures of human capital, such as education and health outcomes.

Table 2 summarizes the main papers examining the relationship between inequality and growth. There are several divergences across the various studies with respect to the estimation methods used and the predicted signs of the relationship between both variables. Thus, when examining the inequality-growth relationship, the model specification choices have a very significant impact on the results.

Using the basic OLS estimation method, Bénabou (1996) and Perotti(1996) both find a

negative relationship between inequality and growth in a cross-country context. Deininger and Squire (1996) assessed this relationship by constructing a much larger and wider cross-country panel than was previously available, and this allowed the subsequent researchers to use much more advanced estimation techniques (Banerjee and Duflo, 2003). Forbes (1998, 2000) significantly departs from the other studies as she finds that inequality has a positive influence on economic growth, by using the fixed-effects estimation method as a means to control for country-specific effects. Several authors have attributed this result to her choice of examining the relationship over short-term periods, of 5 and 10 years, instead of the usual 20-25 years (or even longer periods in some cases). Li and Zhu (1998) also obtained similar results to Forbes (1998, 2000) as they used the same estimation method. Barro (2000) finds a different relationship across the lower and higher income countries, with inequality having a negative influence for low-income countries but a positive impact for high-income countries. Moreover, he uses a a much larger set of control variables and a different estimation method, the three-stages least-squares (3SLS). In a subsequent paper, he uses a similar approach but with a much wider set of control variables and finds a similar result (Barro, 2008).[5] Banerjee and Duflo (2003) find that the relationship between inequality and growth depends on the degree of inequality itself, such that one needs to allow for a certain degree of non-linearity when examining inequality. Among other things, they attribute the great diversity of results across the different studies to a failure to properly account for this factor. In this paper, I use Forbes (2000) model, which is very similar to Perotti (1996), as it is parsimonious and popular in the empirical growth literature. The results from the other studies are used for comparisons and discussion purposes.

[5] In his first paper, Barro (2000) regresses growth on the log of GDP per capita, the squared log of GDP per capita, the gini coefficient, the government consumption as a share of GDP, the rule of law index, the democracy index (and its squared term), the inflation rate, the years of schooling, the log of fertility rate the investment as a share of GDP and the grown in the terms of trade. In his subsequent paper, Barro (2008) still uses the initial income term, the terms of trade, the log of the fertility rate, the rule of law and the investment ratio, but instead of the other variable he includes the inverse of the life expectancy, the upper level of educational attainment, the openness variable and an interaction term between the gini and the initial income.

Table 2: Selected Studies on Inequality and Growth - Estimation Methods and Results

Author(s)	Sign of the relationship	Estimation method(s)
Deininger and Squire (1996)	-	OLS
Bénabou (1996)	-	OLS
Perotti (1996)	-	OLS
Forbes (1998, 2000)	+	OLS, FE/RE, GMM
Li and Zhu (1998)	+	OLS, FE/RE, 2SLS
Barro (2000)	+/-	OLS, FE, 3SLS
Barro (2008)	+/-	OLS, FE, 3SLS
Banerjee and Duflo (2003)	+/-	OLS, FE/RE, GMM

Notes: FE and RE stand for fixed effects and random effects, GMM is the Arellano-Bond Generalized Method of Moments, and 2SLS/3SLS are the two-stages least-squares and three-stages least-squares. A +/- sign corresponds to a situation where the author finds inconclusive results, such that the relationship can be positive, negative or both depending on the estimation methods used and/or model specification.

Generally, authors start examining the relationship using the basic estimation method of OLS, and then turn to more sophisticated techniques such as the panel fixed and random effects, the two-stages and three-stages least squares methods, and more recently, the difference and system Generalized Methods of Moments (GMM) estimators. Evidently, the results vary widely across the different estimation methods. Using the OLS, authors generally find a negative relationship between inequality and growth (Deininger and Squire, 1996; Bénabou, 1996; Perotti, 1996). On the other hand, when using the fixed effects estimator, the relationship is sometimes positive as suggested by Forbes (1998, 2000) and Zhu(1998)'s findings. While an improvement over the OLS, both the fixed and random effects estimation results are generally biased in the presence of the lagged income variable, and authors have used more advanced estimation techniques such as the two-stages and three-stages least squares method, or the system and difference GMM estimations to account for this endogeneity. The results using these more sophisticated approaches also vary widely across the different authors. In this paper, I follow a similar approach by first estimating the baseline model using the basic estimation methods and then turning to more complex techniques. A more detailed explanation of these models is included in Section IV.

A note on endogeneity

While the relationship between inequality and growth has been widely examined in the literature, it is still not clear whether it is possible to interpret any of the evidence casually (Banerjee and Duflo, 2003). It is often recognized that inequality has a multidimensional relationship with growth, due to the presence of several confounders, defined as unobservable growth-dependent factors that influence both the levels and growth of inequalities (Banerjee and Duflo, 2003; Voitchovsky, 2005). As such, the direction of the causality between both variables is unclear, and while several authors stipulate that

the causality runs from the economic growth to the inequality levels, others argue that the causality runs in the opposite direction. As the main focus of this paper is to examine the relationship between the growth of the middle-classes and the subsequent economic growth of the selected developing countries, I focus on the second strand of the literature. Yet, I still acknowledge the first theory, as it is a highly relevant subject of discussion in the growth literature. It comes from the hypothesis that economic growth fosters inequality, rather than the reverse. This theory first emerged following Kuznets (1955) which stipulated that the relationship between economic growth and inequality varied at different levels of economic development, with inequality initially increasing and then gradually decreasing as the country reached a certain development level. While I recognize the importance of the Kuznets theory, I will not elaborate the discussion on the subject as in this paper it is the opposite relation that is of main interest

Estimating Equation 1 using the basic estimation methods of OLS and random and fixed-effects, the model suffers from a reverse causality endogeneity bias, where the dependent variable is correlated with the main regressor. To control for this endogeneity problem and to reach better conclusions on the relationship that may exist between inequalities and economic growth, authors have used more advanced estimation techniques, such as the GMM and the 2SLS and 3SLS. In this paper, the system-GMM is used as the preferred estimation method to address the problem of unobservable and omitted confounders. Moreover, following the popular practice, to further reduce the endogeneity concerns the regressors (including the inequality variable) enter the model as an average over the five years prior to the year during which growth is measured (Forbes, 2000; Dollar and Kray, 2002). This methodology should reduce the concerns related to the possibility of a reverse causality, and robustness checks will be conducted at this effect. A detailed explanation of the system-GMM estimator and the methodology is included in Section 4.

Importantly, the objective of this paper is not to establish the direction of the causality but to examine whether a relationship exists between growth and inequality, to then assess the strength of this relationship. Therefore, it is acknowledged that the model and estimation techniques used in this paper are only one of the possible ways to interpret the data (Banerjee and Duflo, 2003).

2.3 The Middle Class and Economic Growth

Inequality is a multi-dimensional measure of income distribution that can be measured in several ways (World Bank, 2015). Despite the popularity of the Gini coefficient, several authors have measured the relationship between economic growth and inequality by using alternative measures of income distribution, such as the the Theil index, the Atkinson

inequality measure or one of the several middle-class measures (Voitchovsky, 2005).[6]The Gini coefficient captures the overall distribution of income, but other measures more closely tied to the income distribution at the bottom and at the top of the distribution are sometimes preferred (Barro, 2008). The interest of using the middle-class measures, instead of an average measure of the overall income distribution, is that they could potentially yield different empirical results and provide additional theoretical grounds from which a more equal income distribution should support higher economic growth (Voitchovsky, 2005). In this paper, I build on two strands of the literature, the first on the influence of inequality on economic growth, and the second on the specific impact of the middle-class on growth in this relationship. Using Forbes (2000) and Perotti (1996)'s model as the baseline model, I add several variables to control for the channels by which the middle-class influences growth. These variables are selected from a careful review of the literature on the relationships between growth, inequality and the middle-class.

Several papers discuss the theoretical reasons for expecting a large middle-class to be beneficial for economic growth. These various theories can be broadly classified as related to the human, physical and political capital. For the purpose of this study, I present four channels of interest that are later tested by including selected variables in the baseline model: the Human Capital Channel, the Political Channel, the Gender-inequality Channel and the Macroeconomics Channel. The variables and results from this analysis are presented in Section V.

Human Capital Channel

The presence of a large middle-class is frequently associated with higher levels of human capital which eventually lead to higher economic growth (Castello and Climent, 2010; Banerjee and Duflo, 2008).[7] In general, the middle-class has the means and the aspirations to acquire education. This group values education and is well-aware of the future benefits that a good education brings (Banerjee and Duflo, 2008). By contrast with the poor, the middle-class has the means to invest in higher levels of education, and is able to save enough money for its future aspirations (Perotti, 1996). Education is also found to shape the fertility decisions, as well-educated families most likely consider the decision to have additional children on the basis of their financial abilities to provide them with the

[6]The Theil index is constructed as a weighted average of the inequality both within and among a country's various subgroups. On the other hand, while it is similar to the Gini index, the Atkinson measure is a normative measure that attributes different weights to the various segments of the income distribution (World Bank, 2015). Despite the interesting features of these various indicators, in this paper, I focus on the middle-class measures.

[7]Human capital is often measured through various education and health proxies, such as educational attainment, life expectancy and fertility rates.

appropriate education and healthcare (Banerjee and Duflo, 2008). Moreover, education generally leads to greater self-awareness regarding health, such that life expectancy is generally higher in large middle-class societies (Barro, Mankiw and Sala-i-Martin, 1995). Due to their higher educational attainments and their better health practices, the middle-classes have to ability to occupy positions that require advanced skills and experience. As a result, productivity levels are generally higher in societies with a sizable middle-class. Some authors also associate the presence of a large middle-class to greater entrepreneurial spirit and to more innovation abilities (Banerjee and Duflo, 2008).

Political Channel

A wide variety of studies have examined the relationship between inequality and democracy. In general, inequality is associated with greater political instability and the absence of social cohesion (Pressman, 2007). With large income disparities, the political decisions are often guided by elitist groups that follow their own-interests at the expense of the poor (Easterly, 2001). Moreover, in highly unequal societies, there is a greater risk of coups d'états and more frequent constitutional changes. On the other hand, the presence of a large middle-class is often associated with a greater democratic orientation (Lu, 2013). In this situation, a larger fraction of the population is in favor of policies promoting upward social mobility, such as policies turned toward education and public safety nets (Alesina and Rodrik, 1994). Consequently, countries with larger middle-classes benefit from more inclusive growth and more stability (Birdsall, 2010).

Gender-Inequality Channel

The study of the influence of gender inequality on economic growth is particularly interesting in the context of developing countries, as gender inequality is often higher than in developed economies (Dollar and Gatti, 1999). Gender inequality has several negative repercussions on growth and economic development. As explained by Klasen (1999), inequalities in educational and job market access, between males and females, can result in considerable market distortions by restricting the available pool of talents in a given economy. Ultimately, gender inequality results in lower human capitals and productivity levels (Aiyar and al., 2013). Moreover, child mortality and fertility rates are generally lower in societies where women are more educated, as they tend to make the decisions to have children based on whether they can provide them with the necessary resources and investment in education (Klasen, 1999). Indirectly, gender inequality has negative repercussions on investment and population growth, and ultimately on economic growth

itself (Dollar and Gatti, 1999; Klasen, 1999).

From the previous studies, the presence of a large middle-class is generally found to support increased incomes and overall living standards, which should also generally improve gender equality (Dollar and Gatti, 1999). Moreover, from its distinctive political values and social norms, the middle-class also generally values the presence of women in society, in the workforce and as a political agent. Overall, gender equality and economic growth are mutually reinforcing, with higher income generally leading to more gender equality, and greater gender equality supporting higher economic growth (Dollar and Gatti, 1999; Aiyar and al., 2013).

Macroeconomics Channel

The middle-class is often associated with distinctive behaviors that lead to more favorable macroeconomic outcomes. This working-class generally has stable employment and regular income, such that it can save a fraction of its salary. In fact, the savings rates are generally higher in societies with larger middle-classes, as they save more than the poor, who can barely meet the livings necessities (Banerjee and Duflo, 2008; Chun and al., 2011). In turn, high savings rates are beneficial for macroeconomic stability and sustainable growth (Aiyar and al., 2013). A large middle-class also supports a strong domestic demand by its consumption patterns (Eichengreen, Park and Shin, 2012; Islam, 2015). From its preference for higher quality and more sophisticated products, the middle-class induces the creation of new industries (Banerjee and Duflo, 2008). Importantly, a large middle-class is also associated with higher productivity levels, which supports greater competitiveness levels and ultimately, higher economic growth (Banerjee and Duflo, 2008; Chun and al, 2011).

Empirical Studies

Despite the large interest for the middle-class in the academic community, very few papers have used the measure empirically. Easterly (2001) wrote an influential paper on the influence of the middle-class for growth and for overall economic development. In his paper, he refers to the middle-class consensus as a situation where there are no strong class differences, no ethic diversity, and a high share of income for the middle-class. Defining the middle-class as the share of the population comprised in the second, third and fourth quintiles of the income distribution (Q2-Q4), he runs two-stages and three-stages least squares to estimate the influence of this middle-class measure on several development outcomes. Overall, his findings suggest that across countries, a middle-class consensus (and a larger middle-class) results in more education, better health outcomes, better

infrastructures and economic policies, less political instability and more democracy. In an empirical analysis, Banerjee and Duflo (2008) examine the socio-economic characteristics of the middle-class in 13 developing countries.[8] Using an absolute measure - the share of the population that earns between $2-$10 per day (USD in 2005 PPP) - they find that the middle-class is associated with higher employment levels, lower fertility rates and different consumption patterns. Their findings confirm the predictions that through various channels, the middle-class has a positive influence on economic growth and development.

Empirically, several authors use Easterly (2001)'s quintiles measure as a measure of the middle-class. Yet, Chun and al. (2011) use two additional measures: the range of the population living on $2-$10 USD per day in 2005 PPP, as Banerjee and Duflo (2008), and the share of the population that earns between 75%-125% of the median income. They find different relationships across the different middle-class measures and growth, as well as between these measures and the various socioeconomic indicators. Very few paper use such a diverse set of middle-class measures in a cross-country context. [9] In this paper, I also use both relative and absolute middle-class measures, to validate whether they result in significant empirical differences.

2.4 The Middle-Income Trap

In China, despite the significant poverty reductions of the past decades, the Chinese middle-class is considered fragile given the considerable inequality levels in the country (Kharas, 2010). From 1985 to 2010, inequality has increased both within and between the urban and rural areas, with the Chinese Gini coefficient increasing from 29.9 to 50.1 (see Table 25). Moreover, in the past three decades, although China's growth rates have remained high despite the high inequality levels, one can wonder how much longer economic growth can be sustained if income inequality further increases. Ultimately, it raises the question of whether China is at risk of falling in the middle-income trap in the coming years (Egawa, 2012, 2013; Eichengreen, Park and Shin, 2012, Aiyar and al., 2013).

In a report, the Asian Development Bank (2011) unveiled two possible scenarios for Asia by 2050: the Asian Century and the Middle-Income Trap. Under the former, in the future decades the Asian economies would generate more than half of the world GDP with the middle-income countries as powerhouses. Yet, the risk scenario is the Middle-Income Trap,

[8] The countries included in their study are: Cote d'Ivoire, Guatemala, India, Indonesia, Mexico, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, South Africa, Tanzania and Timor Leste.

[9] They find that the middle-class a positive influence on growth, but that this relationship is indirect, and mostly through the impact of human capital on growth. The results vary across all three measures, with the quintile measure being the only one having a slightly positive relationship with growth and the other two having none. However, when measuring the indirect influence of the middle-class, all three measures suggest a positive influence on schooling and savings.

a situation where the share of the Asian economies with respect to the world's GDP would fall to only 32% (Egawa, 2012).

The concept of a middle-income trap was first proposed in 2007 when Gill and Kharas coined the term in the World Bank report "An East Asian Renaissance: Ideas for Economic Growth". Formally, it is the risk of economic stagnation from an inability of the rapidly growing middle-income countries to make the transition to the ranks of high-income countries, due to several factors, such as: a failure to update an unbalanced economic structure, high inequality levels, an unfavorable demography, a poor institutional quality, unstable macroeconomic conditions and a failure to adapt innovation capabilities. Since its appearance in 2007, the concept has been extensively used to describe the experience of several countries considered "trapped" mostly in the Latin American and Asian regions, such as Brazil and Malaysia (Aiyar and al., 2013).

In this paper, I use a panel of both Latin American countries and East Asian countries to contrast their economic experiences, and to understand whether China and other selected developing countries are at risk of a MIT in future years. More precisely, given the theoretical relationship between inequality and economic growth, I examine empirically whether increasing the middle-class helps in avoiding the MIT.

Determinants of the Middle-Income Trap

Studies examining the determinants of the MIT build on the general growth literature, and use similar models and socio-economic determinants (Aiyar and al., 2013). There are a lot of theoretical discussions on the subject, but not a lot of empirical evidence has been gathered so far (Felipe, Abdon and Kumar, 2012).

The middle-income trap is generally described as a situation where countries are unable to make the transition from a middle-income to a high-income status due to a failure to undertake the necessary structural transformations to support their economic growth and development (Kharas and Kholi, 2011). However, while it is a widely examined concept, no formal definition exists to describe it (Felipe, Abdon and Kumar, 2012). Figure 11 summarizes the various definitions used in the literature on the middle-income trap and includes a review of their respective measurement methods.

Underlying these definitions is the need to define the income thresholds to classify countries in the lower, middle and upper income categories; the World Bank's GNI per capita classification is the most predominantly used method (Felipe, Abdon and Kumar, 2012; Aiyar, 2013). Every year, the income thresholds are updated to reflect changes in inflation; in 2010, countries were defined as low-income if they had GNI per capita of less than $1,005

(in USD, with the Atlas factor), middle-income with GNI per capita in between $1,006 and $12,275 and high-income with GNI per capita above $12,276. In this classification, the Atlas conversion factor is used to reduce the impacts of exchange rates fluctuations due to inflation, in the cross-country comparisons of national incomes (World Bank, 2015).[10]

Similarly to the literature on the middle-classes, both absolute and relative approaches can be used to refer to the middle-income trap. The relative measures focus on identifying the factors behind some countries' successes and others' failures in making the transition to a higher-income level (Woo, 2011, 2012). A widely used relative approach, by Felipe, Abdon and Kumar (2012), is the study of the inter-country distribution of income, where the middle-income trap is defined by the probability or the expected time to move from one income category to another. In this paper, I use this classification approach to identify the countries that are trapped in the middle-income category.[11]

In the literature, various factors have been examined as potential triggers of the MIT. Figure 1 summarizes the main determinants, based on several authors who have described the historical experiences of the countries caught in the trap, or at risk. While there is still no consensus on the specific causes of a MIT, it is generally agreed that development success lies in the ability of countries to change their development strategies once they reach the middle-income stage (Kharas and Kholi, 2011). More precisely, middle-income countries need to ensure their economic transition toward higher-value added industries by adopting the appropriate institutional and economic reforms (Zhuang, Vandenberg and Huang, 2012). The various MIT determinants are obviously interrelated, and an appropriate development strategy should take into account this interdependence (Felipe, Abdon and Kumar, 2012).

[10] As indicated on the World Bank's website, the Atlas conversion factor is the average of a country's exchange rate for a given year, and its exchange rates for the two preceding years, adjusted for the difference in inflation between this country and the international inflation rate (World Bank, 2015).

[11] The objective of this paper is not to find a new definition of the MIT, as such, the MIT countries are identified from the classification presented in Felipe, Abdon and Kumar(2012)'s paper.

Figure 1: Summary of the Main Determinants of the Middle-Income Trap

Major Causes of the MIT	Description	Countries (Examples)
Over-dependence on manufacturing exports and investment	An overreliance on external demand and investments makes the economy vulnerable to a global slowdown. It also creates an unbalanced economic structure.	Argentina, Brazil, Mexico
Income inequality	Lowers domestic demand. Lowers investments in education and healthcare, which ultimately lowers skill training and development. Generates social instability and slows progress in democratic institutions.	Brazil
Demographics: Drying up of the demographic dividend	Population aging reduces the labor force and makes labor more expensive. The country becomes less competitive than low-wage countries in the production of standardized products. The increased dependency ratio is also a fiscal burden.	Thailand
Institutions: Government size, Poor Governance and Corruption	The capacity of the private sector to expand may be constrained by government's involvement in the economy. Poor governance and corruption may hamper middle-income countries' economic growth, notably by a shortage of government budget for economic reforms. Poor property rights discourage the individuals to engage in innovation and research & development activities.	Mexico
Macroeconomic Fundamentals	Lack of government's ability to formulate and implement a comprehensive growth strategy. Restrictive international trade barriers, high inflation, high credit growth (and dependence to credit), poor financial sector development are examples of macroeconomic imbalances.	(All countries trapped in the middle-income trap)
Lack of innovation and insufficient accumulation of technological capabilities	Underinvestment in research and development. Such countries are unable to compete with countries with greater capabilities in more technology-intensive goods and services. Moreover, these countries often have higher wages than low-income countries making them less competitive in the manufacturing goods sector. Hence, they are "stuck in the middle". The economy's ability to generate innovation depends on other factors, importantly the human capital levels in the economy and the quality of institutions.	Malaysia; Turkey; South Africa; Latin American countries (Mexico, Brazil, Argentina, Chile, Peru and Venezuela); Southeast European countries

Sources: Ohno (2009), Kharas and Kholi (2011), Egawa (2012, 2013), Agenor and Canuto (2012) and Aiyar and al. (2013).

Over-dependence on manufacturing exports and external investment

An unbalanced economic structure is often cited as one of the most important factors behind a MIT (Ohno, 2009; Kharas and Kholi, 2011; Agenor and Canuto, 2012) . Historically, countries with resources-dependent growth models that are highly dependent on cheap labor and investment have been more prone to a MIT (Kharas and Kholi, 2011). Once these countries reach the middle-income level, they have an inability to compete with developed countries in the higher-value markets as their primary resources eventually get exhausted due to depletion of natural resources, a rise in wages, or a combination of both (Ohno, 2009). Moreover, since these economies have been highly dependent on primary industries, they have failed to upgrade their human capital as to become as competitive as developed countries in the second and third-tiers industries (Eichengreen, Park and Shin, 2011).

Historically, some Latin American countries, such as Argentina and Brazil, realized rapid growth by extracting and exporting natural resources (Kharas and Kholi, 2011). At a certain point, economic growth in these countries diminished as natural resources became scarce and their exports could no longer support an expansion of the economy. Moreover, this heavy-reliance on the exports of natural resources made these economies extremely fragile to the risks of global economic downturns and to swings in commodity prices (Kharas and Kholi, 2011). While extracting these resources helped in shaping the economy and in lifting a significant portion of the population out of poverty, these economies had not developed competences in more advanced industries, and eventually their growth stagnated (Ohno, 2009).

A famous argument supporting the middle-income trap risk in some East Asian countries, such as China, is related to these economies' dependence on the exports of cheap manufactured goods (Kharas and Kholi, 2011). The economic development of these countries has been heavily reliant on the presence of a cheap and abundant labor force as primary production input (Taylor and Xiaoyun, 2012). Similarly to the experience of the LAC, as this cheap labor eventually become scarce and as wages rise, Asian economies could lose their competitiveness in the manufacturing sector. If the appropriate structural reforms are not taken at the appropriate time, this could have detrimental impacts on long-term economic growth. These reforms involve investing in the human capital to develop a larger number of skilled-workers, improving the quality of infrastructures, and reforming the macroeconomic environment as to support the creation of new industries and to export to new markets (Ohno, 2009; Kharas and Kholi, 2011).

Income inequality

Many researchers have pointed to inequality as a considerable risk factor for a MIT (Egawa, 2011, 2012; Kharas and Kholi, 2011). A middle-income trap can be triggered when inequality levels become persistent and start having a detrimental influence on growth. The related explanations are closely related to those exposed in the discussion on inequality and economic growth in subsection 2.2. However, it is the persistence of inequality and its presence at a certain level of economic development - when the country reaches the middle-income level - that triggers the MIT by threatening long-term growth and socio-economic stability (Kharas and Kholi, 2011).

Following the economic development process of developed economies, countries should develop their internal economy and become less reliant on external demand and investment (Kharas and Gertz, 2009). A vibrant domestic market supports innovation, spurs investment and leads to the creation of new industries. However, in the situation of high income inequality, there is a limited home market for more sophisticated and higher-quality products (Banerjee and Duflo, 2003). Relatedly, in such a situation, socio-economic stability is threatened and does not support the development of the appropriate economic programs favoring long-term growth (Easterly, 2001).

Even more importantly, inequality influences human capital levels due to the divergences in the quality and quantity of education and health care (Castello-Climent, 2010). In turn, this affects the overall productivity levels and the country's competitiveness on the international scene. As such, income redistribution programs, as well as targeted education reforms, are necessary to overcome the MIT (Egawa, 2012, 2013).

Demographics

As it is the case in the growth literature, demographics play in important role in the context of the MIT, by the means of two channels: the size of the labor force, and the size of the fiscal burden (Egawa, 2012). By the law of supply and demand, as the population ages and as the active labor force decreases, the labor becomes more expensive. In open-economies, this eventually influences competitiveness levels considerably, and it can even lead to detrimental impacts on long-term economic growth. As aforementioned, this could become a very problematic situation for a country that is highly-reliant on the presence of a cheap labor force, such as China (Egawa, 2012). Consequent to a rise in the share of the population aged above 65, there is also an increase in the fiscal burden faced by governments to support social programs for the elderly. Stated differently, demographics become a problem when the population ages significantly before the country becomes rich

(Gill and Kharas, 2015).

Institutions

The quality of institutions is crucial for economic growth and development. In certain countries, the lack of the appropriate government reforms and institutional mechanisms may result in several consequences that can eventually have negative impact on economic growth (Gill and Kharas, 2007, 2015). The appropriate set of policies is required to support improvements in productivity, by investing in human capital, infrastructures and innovation, and ensures social cohesion and the respect of property rights (Ohno, 2009). Indeed, the motivations for innovation and entrepreneurship are highly dependent on having appropriate property rights and enforceable laws (Agenor and Canuto, 2012). Additionally, a favorable political environment will improve the financial conditions and will increase the economy's ability to attract external investments (Kharas and Kholi, 2011). The quality of institutions and governance is also highly related to the distribution of income, as explained in the subsection 2.2.

Macroeconomic fundamentals

A country's macroeconomic stability is crucial to ensure its successful transition from a middle-income to a high-income status. Countries need conducive business environment with stable prices and growth, achieved as the result of the appropriate monetary policies regarding exchange rates, inflation-targeting and fiscal policies (Ohno, 2009). This argument is closely related to the quality of institutions and governance, as the politics often intervene, either directly or indirectly, in shaping the macroeconomic conditions (Pressman, 2007). Most importantly, trade and financial markets liberalization programs, along with the relevant financial regulation mechanisms, must be in place to ensure sustainable growth (Haussman, Pritchett and Rodrik, 2012).

Innovation and Technological Capabilities

The lack of innovation and technological capabilities is a major reason for some countries' inability to move to higher value added industries (Ohno, 2009). The adoption of new technologies helps in boosting productivity, but also in producing higher quality products that help gaining a competitive advantage in new markets (Agenor and Canuto, 2012). When they reach the middle-income level, some countries can no longer import technologies or imitate them as they did previously, as they now need to acquire a comparative advantage by developing their own innovative processes (Kharas and Gertz, 2009). Closely related to this argument is the quality of institutions as it is crucial to have the appropriate set of enforceable laws and a favorable environment to support the investment in R&D and innovation (Zhuang, Vandenberg and Huang, 2012). In general, the public sector is also the largest investor in R&D, and it strongly influences the quality of education and the well-functioning of capital markets which also strongly support the development and efficiency of new technologies (Ohno, 2009).

2.5 The Middle-Class and the Middle-Income Trap

In summary, growth slowdowns are frequently referred to as total factor productivity (TFP) slowdowns that can be the result of several factors. Income inequality is often cited as one of the main causes as it influences growth through various channels such as social cohesion and the human capital levels (Kharas and Kholi, 2011). It is generally accepted that to avoid the trap there is a need to undertake the appropriate structural reforms and to change the development strategy as to shift the economy toward higher-value added activities. As such, for a successful transition to take place it requires significant advancements in human capital and technology, as well as a reduction in inequality (Gill and Kharas, 2007, 2015).

To my knowledge, very few studies have examined empirically the role that the middle-class plays in triggering the middle-income trap (Ozturk, 2015). However, as detailed in the previous section, some studies have included a theoretical discussion on the influence of inequality on this economic risk (Egawa, 2012, 2013; Gill and Kharas, 2007, 2015; Kharas and Kholi, 2011). In this study, I build on the literature on the influence of the middle-class on economic growth to extend the analysis to an examination of the MIT question. More precisely, I attempt to quantify the relationship between the degree of income inequality and economic growth as to assess the likelihood of selected countries, including China, falling into the trap.

Eichengreen, Park and Shin (2011) examined the probabilities of growth slowdown in a panel of countries, using probit regressions where they include measures of initial growth

and income, as well as several control variables such as the educational attainment levels and the share of exports. Overall, they find dispersion in the per capita income at which slowdowns occur, and that slowdowns are less likely in countries that have high level of secondary and tertiary high school, and a relatively large share of exports. In a similar fashion, Ozturk (2015) uses a binary logit model function to assess developing countries' likelihood of making the transition from a lower to an upper income status. The model includes several variables: a measure of he middle-class share, the number of patents, the FDI intensity and the productivity levels. Overall, she finds that the middle-class is important in avoiding the middle-income trap. In this paper, I build a similar model to assess the likelihood of countries moving to a higher income level, using an income transition variable constructed from the GNI per capita levels. By contrast to Ozturk (2015), I include several measures of the middle-class and different control variables. The model is explained in greater details in Section IV.[12].

[12]Eichengreen, Park and Shin (2011) use a probit model, whereas in this study I use a binary logit model. The difference between the logit and probit models is mainly the link function underlying the models, where for the logit it is a cumulative distribution function, and for the probit it is a standard normal distribution. Both models are very similar, and the choice of the logit over the probit comes from the fact that the interpretation of results is generally easier with the former specification.

3 Empirical Evidence

In this section, I conduct a preliminary analysis of the relationship between the middle-class and the economic growth in a panel of 30 developing countries (see Table 1). First, I examine whether there are empirical divergences across various middle-class measures, to help select the measures to introduce in the econometric models. More precisely, I compare 6 absolute and relative measures, for which the definitions are included in Table 3.[13] The theoretical differences between the various measures have been explained in the literature review. In this section, I also examine whether there are empirical differences across the six measures, by evaluating them in terms of three dimensions: the size, the mean income and the income share of the middle-class. I also assess if there exists a relationship between the size of the middle-class and economic growth, as a preliminary analysis to developing the baseline model. Finally, I contrast the situation of the middle-class and growth, in three countries with different levels of development: Brazil, China and Malaysia.

Table 3: Selected Absolute and Relative Middle-Class Measures

Types of Measures	Acronyms	Definitions
Absolute	**MC1 ($2-$10)**	Share of the population that earns between $2-$10 per day in 2005 PPP USD.
	MC2 ($2-$13)	Share of the population that earns between $2-$13 per day in 2005 PPP USD.
	MC3 ($2-$20)	Share of the population that earns between $2-$20 per day in 2005 PPP USD.
	MC4 ($4-$20)	Share of the population that earns between $4-$20 per day in 2005 PPP USD.
Relative	**MC5 (Q2-Q4)**	Share of the population in the second, third and fourth quintiles of the national income distribution.
	MC6 (75%-125%)	Share of the population that earns between 75% to 125% of the national median income.

See Figure 10 for a complete description of the various measures.

[13] For the remainder of this paper, the measures will be referred to by their acronyms as indicated in Table III.

3.1 Selection of the Middle-Class Measures

As aforementioned, there are no formal considerations on how to select a middle-class measure in the context of developing countries (Ravaillon, 2009). However, an understanding of the concept of the middle-class itself, leads to the elaboration of a criterion for a suitable measure: economic stability. The middle-class is generally described as a group that is the main vehicle of human capital in a society, given its strong values for education and its great aspirations for future success (Banerjee and Duflo, 2009). Moreover, it is also an influent political agent that values social cohesion and democracy (Pressman, 2007; Tridico, 2013). As such, an appropriate measure is one that ensures a certain level of economic stability for the group, where stability is measured as a low probability for people to fall back into poverty, and an ability to meet their basic survival needs (Birdsall, 2010). In fact, an individual that fights poverty does not have the ability and the means to acquire human capital as its main concerns are to find shelter and food to survive (Birdsall, Graham and Pettinato, 2000).

There are similarities between the definitions of the middle-class and the poor in the literature, but a major difference is that both a lower and an upper income threshold must be defined when referring to the middle-class (Cross and Sheikh, 2015). For the absolute measures, the lower income threshold must be high enough such that there is a low probability for a given middle-class individual to fall back into poverty (Ravaillon, 2009). It is certainly arguable that the $2 a day threshold in certain measures is too low, but it is important to bear in mind that the measures are developed in the specific context of developing countries. As such, as explained by Easterly (2001), while these measures are low by the developed countries' standards they are still relatively high by developing countries'. Yet, the Asian Development Bank (2011) acknowledges that this boundary is too low, and has chosen a slightly higher income threshold of $4 per day. In terms of the choice of an appropriate upper-income level, there seems to be some sort of arbitrariness across the different measures. On the other hand, the relative measures are defined based on the income or consumption distribution, such that the income thresholds used to define the middle-class are not as arbitrary. However, these measures are often criticized for not being applicable in the context of certain low-income developing countries (Ravaillon, 2009). For instance, a measure centered around the median of the income distribution, such as MC6 (75%-125%), can suggest significantly lower income thresholds than the absolute measures (Easterly, 2001; Edo and Sosa-Escudero, 2012).

Following Edo and Sosa-Escudero (2012), to evaluate the representativeness of the six measures, I look at the level and growth of the middle-class across 3 dimensions: the size, the mean income and the income share. The size is defined as the share of the population

comprised in the middle-class group, and is bounded between 0 and 100%. While it can provide interesting insights, this measure is not applicable for one of the relative measure, MC5 (Q2-Q4) as it has fixed income boundaries over time. Moreover, an assessment of the size of the group is not indicative in itself of any trend, as it could be that the size of the group increased without a corresponding rise in income, resulting in an overall impoverishment of the middle-class (Edo and Sosa-Escudero, 2012). As such, it is also important to examine the trends in the mean income, defined as the average income earned by middle-class citizens. Yet, despite their relevant features, the size and the mean income are not indicative of the relative position and the importance of the group in a given economy (Edo and Sosa-Escudero, 2012) As such, another related indicator is the income share, defined as the share of the national income earned by the middle-class relative to the overall population.

Using these three criteria, can help in determining whether there is a composition effect, where an increase in the size of the middle-class could either be related to people successfully moving from poverty to the middle-class, or to rich people falling into the middle-class (Edo and Sosa-Escudero, 2012). This is related to the economic stability criterion, where a desirable feature of a middle-class measure is to capture the relative stability of the middle-class in terms of its income and welfare (Birdsall, Graham and Pettinato, 2000). In the following analysis, I refer to all three indicators altogether to conduct an analysis of the situation of the middle-class in the selected countries, and to select the most relevant measures.

Tables 4, 5 and 6, respectively present the levels and changes of the sizes, annual mean incomes and income shares for all six middle-class measures for our sample of 30 emerging economies from 1985 to 2010.

Table 4: Middle-Class Sizes and Growth (ppt) - Selected Measures

Country	Middle-Class Sizes (%)														
	MC1 ($2-$10)			MC2 ($2-$13)			MC3 ($2-$20)			MC4 ($4-$20)			MC6 (75%-125%)		
	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ
Argentina	31.3	26.9	-4.4	43.9	37.6	-6.3	66.7	58.7	-8.1	61.2	54.1	-7.1	26.6	24.4	-2.2
Bangladesh	13.1	23.8	10.7	69.0	72.9	3.9	13.1	24.2	11.1	1.7	4.4	2.7	44.0	39.2	-4.8
Bolivia	69.2	57.3	-11.9	68.5	74.3	5.8	78.7	70.0	-8.7	47.3	47.0	-0.3	25.9	19.8	-6.1
Brazil	54.6	54.3	-0.4	22.8	80.7	57.9	66.3	75.7	9.3	40.8	59.0	18.2	19.2	20.8	1.7
Chile	61.8	49.6	-12.2	49.4	57.8	8.4	73.3	77.6	4.3	44.6	68.8	24.2	22.4	25.9	3.5
China	7.5	64.1	56.6	12.0	54.1	42.1	7.5	71.5	64.0	0.2	40.9	40.7	39.1	23.2	-16.0
Colombia	65.5	59.6	-5.9	79.1	92.8	13.7	78.4	75.3	-3.1	51.3	52.0	0.7	24.0	21.1	-3.0
Costa Rica	64.5	53.0	-11.6	114.4	75.2	-39.2	79.4	77.3	-2.1	47.8	64.0	16.2	30.0	23.6	-6.3
Dominican Rep.	61.4	65.9	4.5	10.1	38.6	28.5	68.0	82.5	14.5	37.4	57.6	20.2	23.5	22.7	-0.8
Ecuador	62.3	64.8	2.5	75.7	64.3	-11.4	73.5	81.7	8.2	48.3	59.1	10.8	22.7	24.6	1.9
El Salvador	61.7	66.1	4.4	90.1	73.6	-16.5	72.9	78.6	5.7	49.0	53.1	4.1	21.5	25.2	3.7
Guatemala	28.2	59.0	30.9	10.8	20.8	10.0	29.8	69.1	39.3	10.9	42.2	31.2	19.7	21.3	1.6
Honduras	37.3	51.9	14.6	57.4	66.4	9.0	40.4	64.7	24.3	17.7	42.4	24.7	19.3	17.6	-1.7
Indonesia	12.0	53.1	41.1	9.7	41.9	32.2	12.0	54.7	42.7	1.7	17.0	15.3	38.5	33.2	-5.3
Kazakhstan	49.6	85.9	36.3	55.4	66.6	11.2	92.6	97.4	4.8	90.6	73.4	-17.2	40.6	39.7	-0.9
Kyrgyz Rep.	87.0	72.7	-14.3	79.1	69.1	-10.0	99.9	77.0	-22.9	77.3	36.9	-40.4	40.8	31.6	-9.2
Lao PDR	15.6	34.4	18.8	67.5	69.3	1.8	15.7	35.2	19.5	2.6	7.6	5.0	40.9	34.3	-6.7
Malaysia	66.8	52.4	-14.4	37.9	56.6	18.7	82.1	80.2	-1.9	56.6	64.7	8.1	24.4	23.3	-1.2
Mexico	62.2	62.5	0.4	49.0	74.8	25.8	69.7	85.6	15.9	38.6	66.8	28.2	23.9	25.6	1.7
Nicaragua	57.4	64.0	6.5	64.9	81.6	16.7	62.7	68.0	5.3	31.1	30.1	-1.0	23.9	28.2	4.3
Pakistan	11.0	40.2	29.2	55.7	65.4	9.7	11.2	40.8	29.6	2.0	7.1	5.1	36.7	43.1	6.4
Panama	49.7	58.1	8.4	76.5	97.5	21.0	62.3	76.3	14.0	42.0	57.9	15.9	16.7	22.7	5.9
Paraguay	64.7	59.8	-4.9	74.2	64.2	-10.0	86.7	78.3	-8.4	69.3	58.8	-10.6	29.5	22.8	-6.8
Peru	64.9	60.3	-4.6	6.1	63.3	57.2	71.4	79.8	8.4	37.3	59.1	21.9	25.6	22.4	-3.1
Philippines	37.3	54.6	17.3	59.9	64.2	4.3	38.5	58.3	19.8	11.0	24.5	13.5	29.5	26.0	-3.5
Sri Lanka	48.4	73.0	24.6	64.5	62.0	-2.5	49.4	76.1	26.8	11.0	30.1	19.1	36.0	34.1	-1.9
Thailand	55.2	77.0	21.8	17.8	68.3	50.5	58.7	91.9	33.2	23.8	63.2	39.5	27.7	30.0	2.3
Uruguay	46.1	46.7	0.6	75.7	67.0	-8.7	80.0	76.8	-3.2	71.1	67.3	-3.8	27.3	24.8	-2.5
Venezuela	55.5	66.9	11.4	77.8	68.5	-9.3	74.4	82.8	8.3	53.2	59.3	6.1	19.4	25.7	6.3
Vietnam	14.5	55.7	41.1	69.2	74.2	5.0	14.7	57.4	42.7	3.0	17.2	14.3	34.8	33.5	-1.3
Average	47.2	57.1	9.9	54.8	65.5	10.6	57.7	70.8	13.1	36.0	46.2	10.2	28.5	27.0	-1.5

Source: World Bank -PovcalNet

Table 5: Middle-Class Mean Incomes, Levels and Growth (in 2005 PPP USD) - Selected Measures

Country	Mean Incomes (in 2005 PPP USD)																	
	MC1			MC2			MC3			MC4			MC5			MC6		
	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ
Argentina	2.3	2.3	0.9	2.8	2.8	0.5	3.9	3.9	1.65	4.1	2.9	-29.2	5.5	6.2	12.5	5.2	5.7	9.6
Bangladesh	1.1	1.1	5.9	1.1	1.2	7.6	1.1	1.2	10.9	2.0	2.3	11.5	0.3	0.5	29.4	0.3	0.5	66.7
Bolivia	1.7	1.8	5.7	1.9	2.0	8.6	2.1	2.4	13.45	2.8	3.0	8.7	1.5	1.7	8.0	1.4	1.5	7.1
Brazil	1.7	1.9	11.7	1.9	2.2	14.2	2.3	2.8	24.39	3.0	3.2	4.8	1.5	2.8	81.0	1.3	2.5	92.3
Chile	1.7	2.2	30.9	1.9	2.6	38.0	2.2	3.2	45.79	3.2	3.3	1.3	1.7	3.8	117.4	1.5	3.4	126.7
China	0.9	1.7	83.5	0.9	1.8	99.8	0.9	2.0	118.63	1.6	2.7	67.2	0.4	1.3	265.7	0.3	1.2	300.0
Colombia	1.8	1.8	2.5	1.9	2.1	6.8	2.3	2.5	7.84	2.9	3.1	5.7	1.9	2.1	9.4	1.7	1.8	5.9
Costa Rica	1.6	2.1	29.8	1.8	2.5	39.2	2.0	3.0	54.93	2.7	3.4	26.8	1.4	3.3	130.4	1.4	2.9	107.1
Dominican Rep.	1.6	1.9	14.8	1.8	2.1	20.0	1.9	2.5	28.20	2.6	3.1	16.3	1.2	2.1	77.0	1.1	2.0	81.8
Ecuador	1.8	1.9	6.0	2.0	2.1	7.7	2.2	2.5	12.21	2.9	3.0	7.36	1.6	2.2	38.2	1.5	2.0	33.3
El Salvador	1.8	1.8	-1.1	2.0	2.0	-1.0	2.2	2.3	0.9	2.9	2.9	0.6	1.6	1.8	12.5	1.5	1.7	13.3
Guatemala	1.4	1.7	24.2	1.4	1.9	30.0	1.6	2.2	38.8	2.5	2.9	13.5	0.5	1.5	221.7	0.4	1.3	225.0
Honduras	1.5	1.8	20.9	1.6	2.0	27.5	1.7	2.4	38.9	2.6	3.1	17.8	0.6	1.5	138.9	0.6	1.3	116.7
Indonesia	1.1	1.3	22.2	1.1	1.4	26.1	1.1	1.4	30.7	1.9	2.3	19.4	0.4	0.8	104.6	0.4	0.8	100.0
Kazakhstan	2.6	1.9	-23.8	3.0	2.1	-30.4	3.6	2.3	-37.5	3.7	2.6	-28.5	3.7	2.1	-44.1	3.6	2.0	-44.4
Kyrgyz Rep.	1.9	1.5	-23.0	2.1	1.6	-25.1	2.3	1.7	-27.0	2.7	2.4	-9.8	2.1	1.3	-39.3	2.0	1.2	-40.0
Lao PDR	1.1	1.2	6.0	1.1	1.2	6.4	1.1	1.2	9.7	2.1	2.3	6.7	0.4	0.6	36.6	0.4	0.5	25.0
Malaysia	1.8	2.0	10.7	2.0	2.4	16.8	2.4	3.0	28.2	3.0	3.6	18.6	2.0	3.5	75.0	1.9	3.2	68.4
Mexico	1.6	2.0	21.9	2.8	2.3	-19.4	2.0	2.7	37.9	2.7	3.2	17.7	1.3	2.6	102.9	2.8	2.5	-10.7
Nicaragua	1.8	1.8	-2.4	2.6	2.6	-2.8	1.8	1.8	(2.4)	2.6	2.6	(2.8)	0.9	1.1	19.8	1.0	1.0	0.0
Pakistan	1.1	1.1	0.5	1.1	1.1	0.1	1.2	1.2	(0.2)	2.3	2.2	(2.5)	0.4	0.7	77.1	0.4	0.6	50.0
Panama	1.8	1.9	8.6	2.1	2.2	7.9	2.4	2.7	9.5	3.1	3.1	2.4	1.5	2.4	53.1	1.4	2.1	50.0
Paraguay	2.0	2.0	-3.4	2.3	2.2	-2.1	2.8	2.7	(3.9)	3.1	3.1	0.15	2.7	2.2	-18.0	2.4	2.1	-12.5
Peru	1.6	1.9	20.3	1.7	2.2	28.4	1.9	2.7	40.8	2.6	3.2	22.9	1.3	2.3	82.6	1.2	2.1	75.0
Philippines	1.3	1.4	13.7	1.3	1.5	16.3	1.4	1.7	19.8	2.4	2.5	7.0	0.6	0.9	44.9	0.6	0.8	33.3
Sri Lanka	1.2	1.4	19.0	1.2	1.5	21.1	1.3	1.6	23.4	2.2	2.3	4.6	0.7	1.1	52.8	0.7	1.1	57.1
Thailand	1.4	1.8	29.3	1.5	2.0	35.7	1.6	2.3	43.4	2.5	2.9	14.7	0.9	2.1	123.1	0.8	1.9	137.5
Uruguay	2.2	2.2	-1.3	2.7	2.6	-2.7	3.4	3.3	(2.7)	3.7	3.6	(1.9)	3.9	4.1	3.9	3.7	3.7	0.0
Venezuela	1.9	1.9	1.3	2.2	2.1	-1.1	2.7	2.4	(8.0)	3.3	3.0	(9.4)	2.5	2.0	-17.9	2.2	1.9	-13.6
Vietnam	1.2	1.3	11.5	1.2	1.4	11.9	1.2	1.4	16.6	2.2	2.3	6.50	0.4	0.8	117.1	0.4	0.8	100.0
Average	1.6	1.8	8.8	1.8	2.0	8.4	2.0	2.3	13.8	2.7	2.9	5.0	1.5	2.0	34.3	1.5	1.9	27.2

Source: World Bank - PovcalNet

Table 6: Middle-Class Income Shares, Levels and Growth (%) - Selected Measures

Country	Income Shares (%)																	
	MC1			MC2			MC3			MC4			MC5			MC6		
	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ	1985	2010	Δ
Argentina	10	8	-20	17	13	-24	36	29	-19	35	28	-20	45	46	2	19	17	-11
Bangladesh	28	43	54	28	45	61	28	47	68	7	16	129	51	58	14	36	31	14
Bolivia	84	45	-46	97	57	-41	100	71	-29	90	63	-30	17	13	-24	17	16	-6
Brazil	37	24	-35	46	34	-26	61	49	-20	50	46	-8	37	37	0	10	12	20
Chile	36	19	-47	43	27	-37	56	42	-25	44	41	-6.8	27	38	41	11	15	36
China	17	60	252	17	71	317	17	81	376	1	63	6200	67	45	-33	38	16	-58
Colombia	18	11	-39	51	41	-20	67	56	-16	58	48	-17	45	37	-18	18	11	-39
Costa Rica	84	23	-73	94	32	-66	95	48	-49	72	45	-38	55	40	-27	27	14	-48
Dominican Rep.	59	40	-32	68	51	-25	78	67	-14	59	58	-2	44	43	-2	16	16	0
Ecuador	50	38	-24	61	49	-20	74	64	-14	63	57	-10	44	41	-7	15	15	0
El Salvador	67	48	-28	84	59	-30	100	73	-27	93	62	-33	59	43	-27	20	17	-15
Guatemala	52	42	-19	57	50	-12	63	62	-2	38	50	32	39	37	-5	53	25	-53
Honduras	53	38	-28	59	48	-19	68	64	-6	45	54	20	37	38	3	11	33	200
Indonesia	28	69	146	28	74	164	28	77	175	7	39	457	49	49	0	32	25	-22
Kazakhstan	25	71	184	34	83	144	78	94	21	94	81	-14	57	53	-7	41	33	-19
Kyrgyz Rep.	90	74	-18	68	59	-13	100	88	-12	100	60	-40	60	51	-15	48	25	-48
Lao PDR	25	54	116	25	53	112	24	58	141	5	24	380	54	48	-11	41	26	-37
Malaysia	43	22	-48	53	32	-40	68	52	-24	59	48	-19	41	44	7	16	16	0
Mexico	53	19	-64	57	26	-54	62	42	-32	33	41	24	46	29	-37	63	1	-98
Nicaragua	51	60	18	59	69	17	69	77	12	51	55	8	62	44	-29	20	16	-20
Pakistan	26	58	123	26	58	123	28	61	118	10	19	90	49	51	4	29	37	28
Panama	40	32	-20	52	42	-19	64	58	-9	55	53	-4	38	40	5	11	14	27
Paraguay	46	34	-26	60	45	-25	85	60	-29	80	54	-33	58	39	-32	31	14	-55
Peru	60	37	-38	68	49	-28	78	67	-14	58	60	3	44	44	0	18	15	-17
Philippines	57	63	11	57	63	11	65	78	20	32	50	56	46	44	-4	21	18	-14
Sri Lanka	66	62	-6	66	62	-6	71	75	5.6	28	47	68	51	53	4	29	28	-3
Thailand	66	54	-18	70	66	-6	74	81	9.5	42	69	64	46	47	2	19	21	11
Uruguay	11	19	72	19	28	47	41	46	12	40	44	10	45	44	-2	17	17	0
Venezuela	1	33	3200	6	53	783	23	79	243	23	81	252	30	53	77	7	31	342
Vietnam	27	71	162	28	75	168	26	80	207	8	41	412	49	49	0	26	27	4
Average	44	42	124	50	50.4	48	60.9	64.2	36	46	49.9	264	46.4	43	-4	25	20	3

Source: World Bank - PovcalNet

As observed in the tables, all four absolute measures suggest increases in the sizes, mean incomes and income shares of the middle-class over the past 25 years. The growth of the middle-class over this period averaged 8.5% according to the four absolute measures, with MC3 ($4-$20 per day) experiencing the highest growth rate at 13% (see Table 4). This is a reasonable finding, as this measure has the widest income thresholds, therefore capturing a larger share of the population. As per the mean income and the income share, all measures have also experienced increases over the same period. These trends not only suggest that the middle-class has grown in size in the selected countries, but that its importance and welfare have also increased over the past 25 years. As per the composition effect, for all measures the increase in the size of the middle-class was a result of a decrease in the share of the population comprised in poverty, and of a slight increase in the size of the upper-class.[14]

According to the two relative measures, the evolution of the middle-class during the period is slightly different. For MC6 (75%-125%), the size of the middle-class has remained similar, but its mean income has increased considerably, at an average rate of 27% over the past two decades. This is comparable to the average mean income growth of MC5 (Q3-Q5) of about 34%. While the income shares have increased for all the absolute measures, they slightly decreased by 4% for MC5 (Q2-Q4) and remained relatively stable for MC6 (75%-125%). As such, while the middle-class has experienced an increase in its mean income, its relative welfare has remained pretty much stable or has even slightly decreased in certain cases. This finding suggests that the relative measures are sensible to relatively unequal income distributions.

Using MC1 ($2-$10 per day) indicates that the middle-class has grown at an average 10% over the past 25 years. Using this definition, the mean income and income share also have both increased during the same period, by respectively 8.8% and 17% (excluding Venezuela) on average. From one country to another, the trends in the size and growth of the middle-class vary widely. This measure seems more appropriate for lower-income countries as its income thresholds are often close to their median incomes. In fact, with MC5 (Q2-Q4) and MC6 (75%-125%), the lower and upper income thresholds are generally in between the income thresholds of MC1 ($2-$10) or at even lower levels (see Table 23). This measure also suggests considerably larger middle-class sizes for the Asian countries than for the Latin American countries. While MC2 ($2-$13) has income thresholds close to MC1 ($2-$10), we observe some divergences in the patterns conveyed by both measures due to the higher upper income threshold of $13. Indeed, on average, the former measure captures a larger share of the population (65% vs 57%), and has experienced a greater

[14] Changes in the sizes of the lower and upper-classes are not included in Table 4, for simplicity. However, since the middle-class is defined as the share of the total population comprised in this middle-income group, an increase (decrease) in its size can either correspond to an decrease (increase) in the share of the lower class, a decrease (increase) in the share of the upper-class, or a mix of both.

increase in income share in the past 25 years. For the purpose of the analysis and based on to the composition of the panel, MC1 ($2-$10) is selected as one of the two absolute measures that will be used in the baseline model.

MC3 ($2-$20) and MC4 ($4-$20) share the same upper bound of $20 per day, but the difference in their lower bound ($2 vs $4) causes some divergences between both measures. Defined with MC3 ($2-$20), the middle-class has the largest size (70.79%) across all the other measures. Yet, the average growth rate of the middle-class is similar when measured using either MC3($2-$20) or MC4($4-$20), at approximately 10% to 13%. By definition, these two absolute measures have the highest mean incomes, given their higher upper income threshold of $20. While in an absolute sense, MC3($2-$20) has higher levels both in terms of the size of the middle-class and its income share, the growth rates of the middle-class sizes and income are very similar using either MC3 ($2-$20) and MC4 ($4-$20). Theoretical considerations, related to the fact that MC4($4-$20) has a slightly higher minimum income threshold leads to the selection of MC4($4-$20) as the second middle-class measure. Indeed, this relatively higher threshold better reflects the economic security criterion, as there is a lower probability that the population comprised above this income level of $4 falls back into poverty, compared to a $2 minimum. Moreover, it could lead to interesting comparisons with MC1 ($2-$10) to have a different minimum threshold.

In terms of the relative measures, the mean incomes have significantly increased for both MC5 (Q2-Q4) and MC6 (75%-125%) at average rates of respectively, 34% and 27% from 1985 to 2010. Mean income levels are slightly above MC1 ($2-$10) and very close to MC2 ($2-$13). The income share for MC5 (Q2-Q4) is in the average range of the absolute measure, whereas it is considerably below for MC6. The middle-class, measured using MC6 (75%-125%), had an increase in its mean income, but it experienced no changes in its overall welfare. Similarly, with MC5 (Q2-Q4), the middle-class also had a rise in its mean income with almost no improvement in welfare. Overall, this suggests general improvements in the economic development, positively affecting the middle-class, but without a significant shift in the income distribution.

From their relative natures, both measures have varying income thresholds every year. We generally find that the relative measures have lower income thresholds than the absolute measures (see Table 23). More precisely, the income thresholds are generally comprised in between the MC1 ($2-$10) minimum and maximum income levels, or at even lower levels, with the exception of certain higher-income countries such as Argentina and Uruguay. For practical purposes, the MC6 (75%-125%) measure will be kept for the rest of the analysis, as it is more easily introduced in the main models due to its varying size over time and its comparability with the other measures. Moreover, it is interesting to contrast this relative measure with the absolute ones, due to its divergent trends both in terms of the size of the

middle-class and its welfare over time.

Table 7: Correlations Matrix - Sizes of the Selected Middle-Class Measures

	MC1 ($2-$10)	MC2 ($2-$13)	MC3 ($2-$20)	MC4 ($4-$20)	MC6 (%75-%125)
MC1($2-$10)	1				
MC2 ($2-$13)	0.9776	1			
MC3 ($2-$20)	0.9152	0.9778	1		
MC4 ($4-$20)	0.7449	0.8497	0.9277	1	
MC6 (%75-%125)	-0.4425	-0.4886	-0.5086	-0.4455	1

Note: MC5 (Q2-Q4) is excluded from the correlation matrix due to its constant size over time.
Source: World Bank -PovcalNet

As expected, we observe in Table 7 that the correlation between MC1 ($2-$10), MC2 ($2-$13) and MC3 ($2-$20) is very high. This finding suggests that choosing either of these three measures should lead to similar results in the baseline model. MC4 ($4-$20) is moderately less correlated with the other absolute measures, and this makes it an interesting measure to choose. The negative correlation between MC6 (%75-%125) and the absolute variables confirms that this relative middle-class measure captures a different segment of the income distribution.

Overall, this analysis suggests that the middle-class in developing countries is sizable and growing. However, there are differences across the various definitions with some measures better reflecting the economic security of the middle-class over time. In this paper, I search for the drivers of these apparent differences, and try to conclude whether the measures capture different segments of the population. For the remainder of the analysis, I mainly use two absolute measures, MC1 ($2-$10) and MC4 ($4-$20), and a relative measure, MC6 (75%-125%). Nonetheless, the three other middle-class measures are used to conduct a sensitivity analysis of the results for both the baseline and logit models.

3.2 Middle-Class and Economic Growth

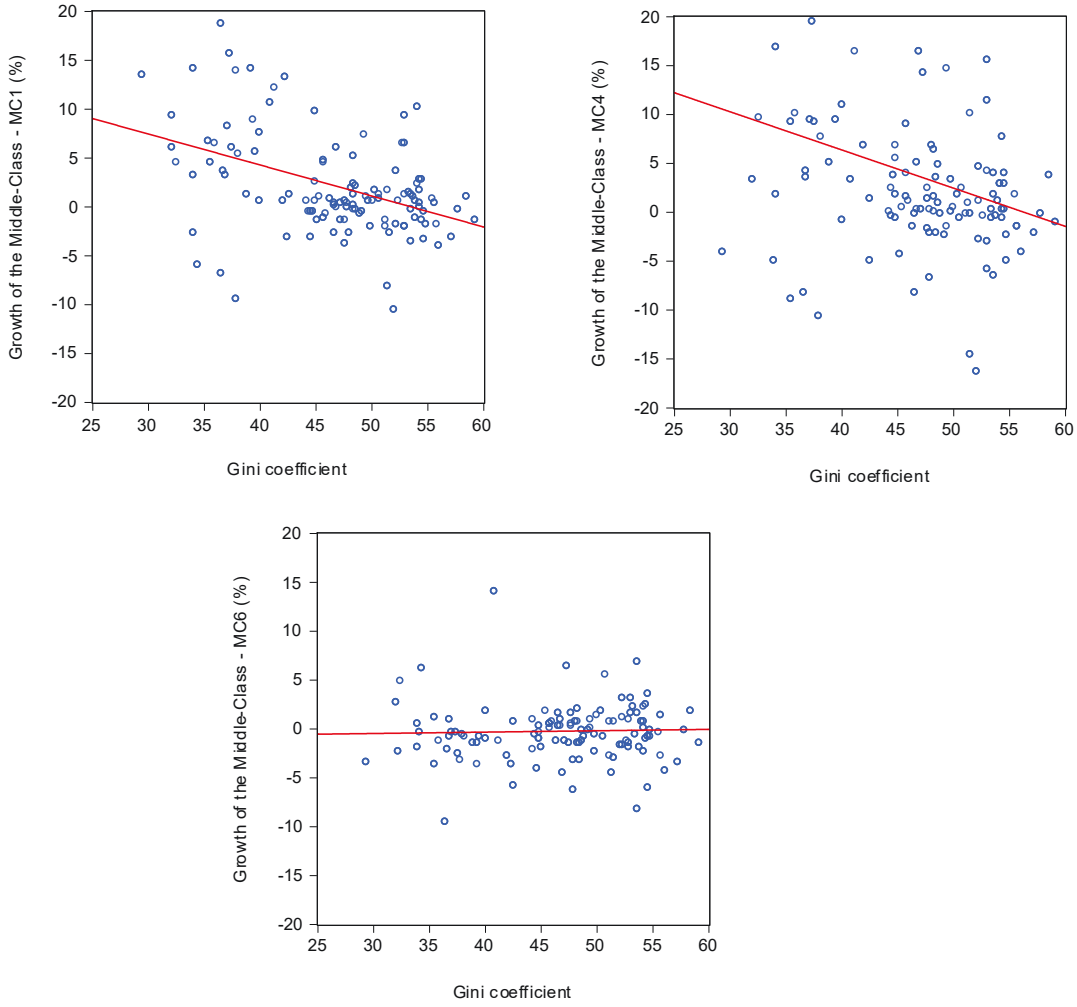
This study aims to determine if there exists a relationship running from the middle-class to the economic growth, defined as the growth of the real GDP per capita. In the literature, the Gini coefficient is frequently used as an income distribution variable (Birdsall, Graham and Pettinato, 2000). As such, it is interesting to understand the relationship that exists between the middle-class and the inequality measures, to assess the implications of using this alternative income distribution measure in the growth model.

The Gini coefficient is one of the most commonly used measure of inequality. It is based on

the Lorenz curve that measures the relationship between the cumulated income shares and the cumulated population shares of a given income distribution. Its values range between 0 and 1, with 0 reflecting perfect equality and 1, a situation of perfect inequality (World Bank, 2015). Mathematically, it is a weighted average of all the individual absolute differences with respect to the distribution of per capita incomes (Milanovic and Yitzhaki, 2002). The Gini coefficient fluctuates with the income distribution, but does not depend on what happens at the bottom and at the tail of the distribution, such that it is often described as an average measure of the income distribution (Barro, 2000).

By contrast, a middle-class variable takes into account the dynamics in the tails of the income distribution. Importantly, it can more precisely measure specific changes to the income distribution, and assess whether there is an income concentration or an income dispersion effect (Voitchovsky, 2015). From their different definitions, the Gini coefficient and the middle-class variable could rank the same income distributions differently (World Bank, 2015). As such, it is reasonable to expect that the replacement of the Gini coefficient by a middle-class variable could lead to different results in the baseline growth model. Across the different middle-class variables, some empirical differences are also expected due to their different definitions. The literature review revealed some theoretical arguments to explain these divergences, but an empirical assessment of the question will also be insightful.

Figure 2: Gini Coefficient & Growth (%) in the Middle-Class (5-year averages)



Source: Unu-Wider-WIID and World Bank - PovcalNet

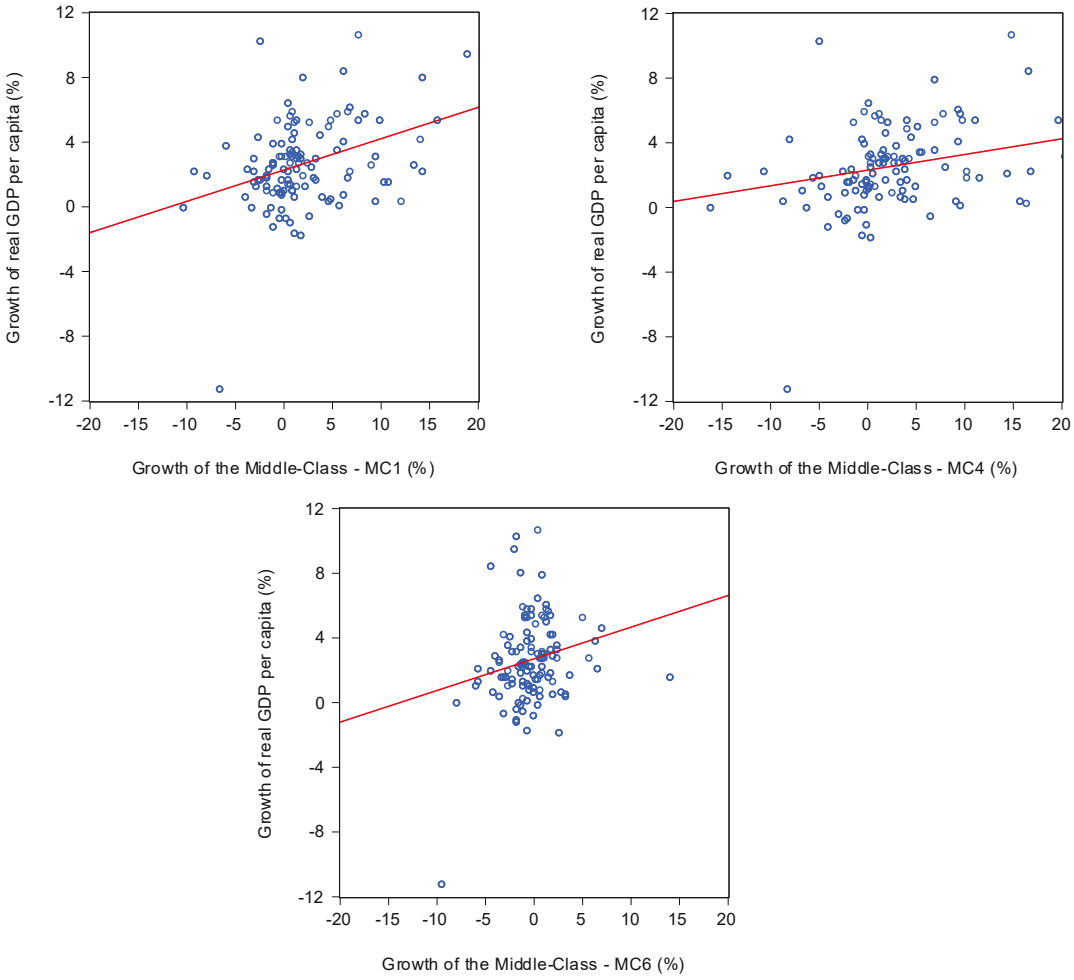
Figure 2 shows the relationship between the three middle-class measures and the Gini coefficient, over the past 25 years. There is a moderately strong negative relationship between the inequality variable and the growth of the middle-class, measured using either the MC1 ($2-$10) or MC4 ($2-$13) measures. This negative correlation could be related to the fact that the absolute measures better reflects the changes at the bottom of the income distribution.

The relationship between the Gini coefficient and the growth in the size of the middle-class is relatively flat for MC6 (75%-125%). By definition, the size of the middle-class measured using MC6 (75%-125%) depends on the inequality levels, as with rising inequalities a smaller share of the population is comprised in between 75% and 125% of the median

income. However, while the correlation between the size of MC6 (75%-125%) and the inequality is negative, it does not imply that its growth of the middle-class is necessarily always negatively correlated with inequality, as can be seen from Figure 2. In certain countries, increased economic growth can indeed lead to an increased middle-class, even if the inequality levels are relatively high (see Tables 24 and 25). It suggests that other factors may influence the relationship between inequality and growth, such as the role of the state, the macroeconomic conditions and the globalization (Birdsall, Graham and Pettinato, 2000). Controlling for these various determinants in the growth model should help acquiring a better understanding of how these factors are interrelated.

In the growth literature, the relationship between inequality and growth varies widely according to the model specifications (see Section II). Depending on the estimation method, the relationship can be either positive or negative in the short-run, but it is generally found to be negative in the long-run. For the middle-class variables, I expect this relationship to be positive over both the short and long-term periods, as suggested by the literature review on the subject. This hypothesis is further supported by the negative correlation between the middle-class measures and the inequality variable (see Figure 2). However, as I use three different definitions of the middle-class, the strength of this relationship could vary. From Figure 3, we note a positive relationship between the middle-class and growth across all three measures. Interestingly, despite the fact that MC4($4-$20) captures a slightly richer middle-class than the other measures, the figure suggests that it is less correlated with growth. Despite its relevance in several middle-income countries, it is possible that MC4($4-$20) is less representative of the income situation of the overall panel. MC6 (75%-125%) has the greatest correlation with growth and less dispersion around the mean trend. Controlling for several socio-economic indicators, it will be interesting to validate whether these observations still hold while analyzing the results from the baseline model.

Figure 3: Growth (%) in the Middle-Class & in Real GDP per capita (5-year averages)



Source: World Bank - WID and World Bank - PovcalNet

3.3 Country-specific cases

In this paper, I study the relationship between the middle-class and the economic development of selected developing countries. An underlying question is whether the middle-class has a positive impact on a country's probability of avoiding the middle-income trap. While the main econometric models are based on a panel of 30 countries, it is interesting to examine country-specific cases to gain insights from their respective development experiences. In this subsection, I discuss the middle-income trapped countries' experiences with respect to inequality, the sizes of their respective middle classes and economic growth, and compare it with China.

Based on the 2010, World Bank's GNI per capita classification (in USD, Atlas method), 12

countries are considered as lower middle income, and 16 countries (including China) are classified in the upper middle-income category (see Table 8).[15] From the Felipe, Abdon and Kumar (2012) classification (see Figure 11), I find that from these 28 middle-income countries, 14 are trapped in the MIT, including only two Asian countries and 12 Latin American countries. While only very few are actually in the MIT, several Asian countries are at risk for the MIT, including China. For the remainder of this descriptive analysis, the focus is on the MIT countries as their historical experiences could be insightful in assessing the risks of a MIT in China and in these other countries.

Table 8: Income Classification of our Sampled Countries - GNI per capita (in 2010, Atlas Method)

Income Classification		**Countries**
Low income ($1,005 and less)		Bangladesh ($640), Kyrgyz Rep. ($880)
Middle income	**Lower ($1,006-$3,975)**	Bolivia ($1,790), El Salvador ($3,360), Guatemala ($2,750), Honduras ($1,880), Indonesia ($2,580), Lao PDR ($1,010), Nicaragua ($1,460), Pakistan ($1,050), Paraguay ($2,940), Philippines ($2,050), Sri-Lanka ($2,290), Vietnam (1,100)
	Upper ($3,976 - $12,275)	Argentina ($8,450), Brazil ($9,930), Chile ($9,940), China ($4,260), Colombia ($5,510), Costa Rica ($6,580), Dominican Rep. ($4,860), Ecuador ($4,510), Kazakhstan ($7,440), Malaysia ($7,900), Mexico ($9,330), Panama ($6,990), Peru ($4,390), Thailand ($4,210), Uruguay ($10,590), Venezuela ($11,520)
High income ($12,275 and above)		

Source: World Bank Income Classification, in 2010 USD (with the Atlas Conversion Factor)

Table 9: Middle-Income Trapped (MIT) Countries and Countries at Risk Within the Sample

MITcountries	**Asia**	Malaysia, Philippines
	Latin America	Bolivia, Brazil, Colombia, Dominican Rep., Ecuador, El Salvador, Guatemala, Panama, Paraguay, Peru, Uruguay, Venezuela
Countries at risk	**Asia**	China, Indonesia, Pakistan, Thailand, Vietnam
	Latin America	Costa Rica, Honduras, Mexico

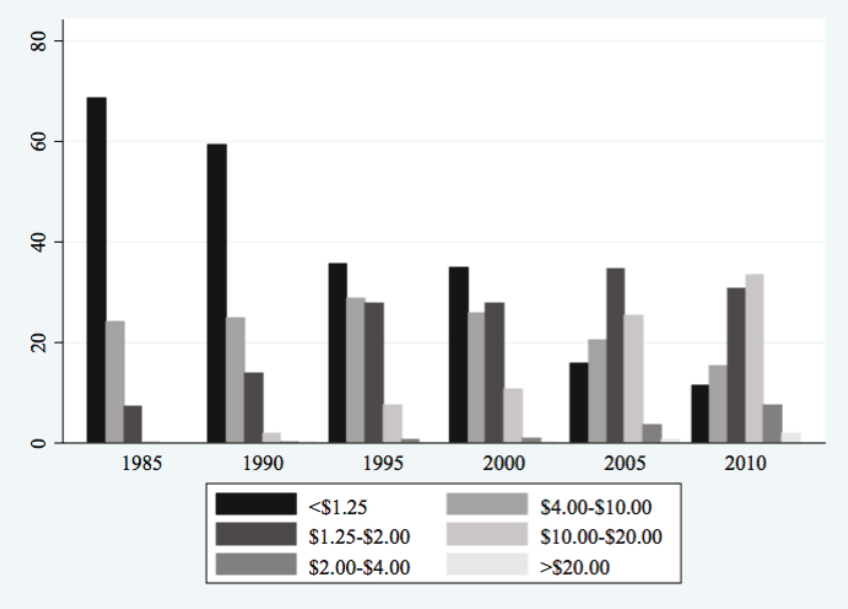
Source: Felipe, Abdon and Kumar (2012)

[15] As explained, the World Bank reviews its income classification every year. For the purpose of this paper, since the study covers the period from 1985 to 2010, I choose to use the latest classification available for 2010.

China

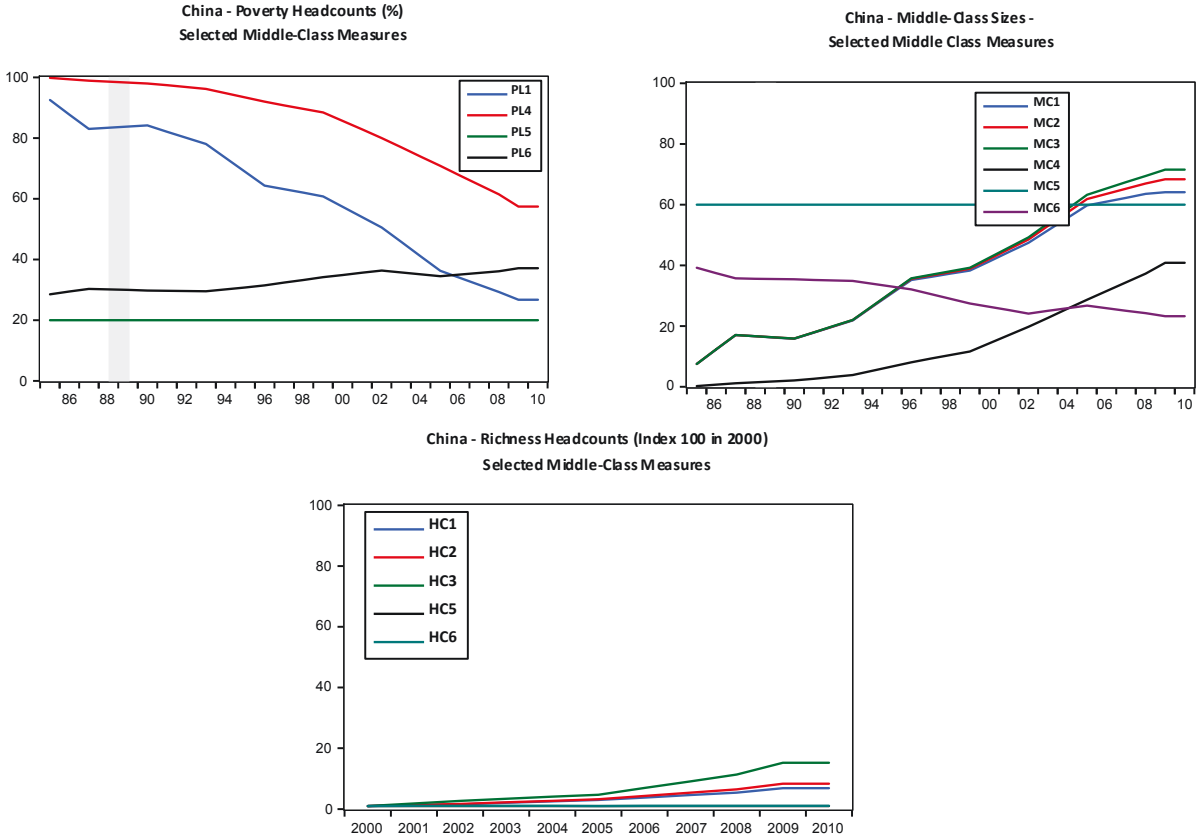
In the past two decades, the Chinese middle-class has considerably grown in size. Using the first absolute measure, MC1 ($2-$10), we find significant growth is the size of the middle-class, from 7.5% to 64% in 2010. The second measure, MC4 ($4-$20), also suggests a significant increase in the size of the group, from 0.2% to 41%. In absolute terms, these measures suggest middle-class sizes of respectively 856 and 548 million people (as of 2010). Therefore, the Chinese middle-class population, defined using MC1 ($2-$10), is about 25% greater than the total Canadian population in 2010, at approximately 34 millions (World Bank - WDI, 2014). Interestingly, the relative measure, MC6 (75%-125%), suggest a considerably different trend as the middle-class size decreased by about 15% during the same period, and accounts for only 23.2% of the Chinese population. Figures 4 and 5 depict the historical evolution of the size of the middle-class, as well as the poor and rich headcounts (%), measured using the six alternative definitions.

Figure 4: China - Poverty headcount (%)- Varying Income Threholds (in 2005 PPP USD)



Source: World Bank - PovcalNet

Figure 5: China - Poverty Headcounts, Middle-Class Sizes and Richness Headcounts (%) from 1985 to 2010

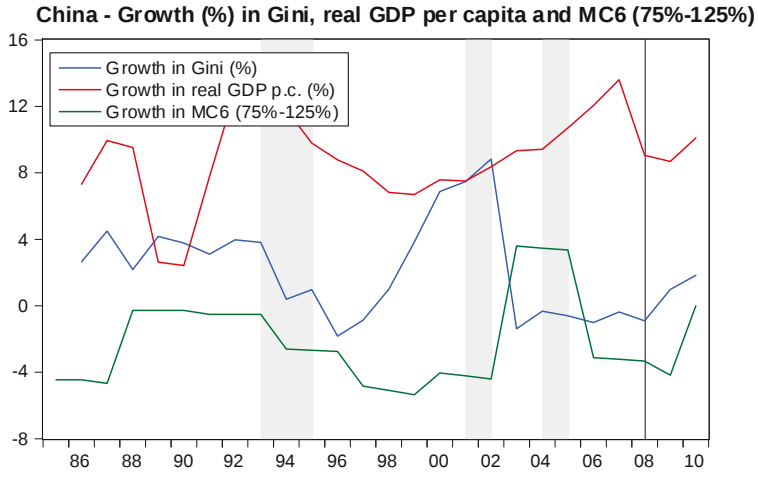


Source: World Bank - PovcalNet

Figure 4 indicates a significant decrease in China's absolute poverty ($1.25) since 1985. Another interesting observation is the increase of the share of the population living above $2 per day. Moreover, most of the shifts in the income distribution seem to have taken place since the end of the 1990s. Figure 5 conveys similar patterns and suggests a significant decrease in poverty for the share of the population living below $2 and $4 per day. Moreover, there is a significant increase in the size of the middle-class, as measured by the share of the population earning from $2 up to $20 per day. As expected, the levels and growth of MC1 ($2-$10), MC2 ($2-$13) and MC3 ($2-$20) are very similar. MC4 ($4-$20) follows a similar temporal evolution as the other absolute measures, but its level is lower due to its higher upper-income threshold. As suggested by Figure 4, the upper-class, earning above $20 per day, has emerged in the mid-2000s and is still considerably small. Again, the relative measure - MC6 (75%-125%) - conveys a very different pattern than the absolute measures. Over the past 25 years, while the relative size of the middle-class has

decreased, the share of the population comprised below 75% of the median has increased. An underlying hypothesis is that during this period, while the overall income levels (GNI per capita) have increased in China, the middle-class share as not increased accordingly, given the surge in inequality levels.

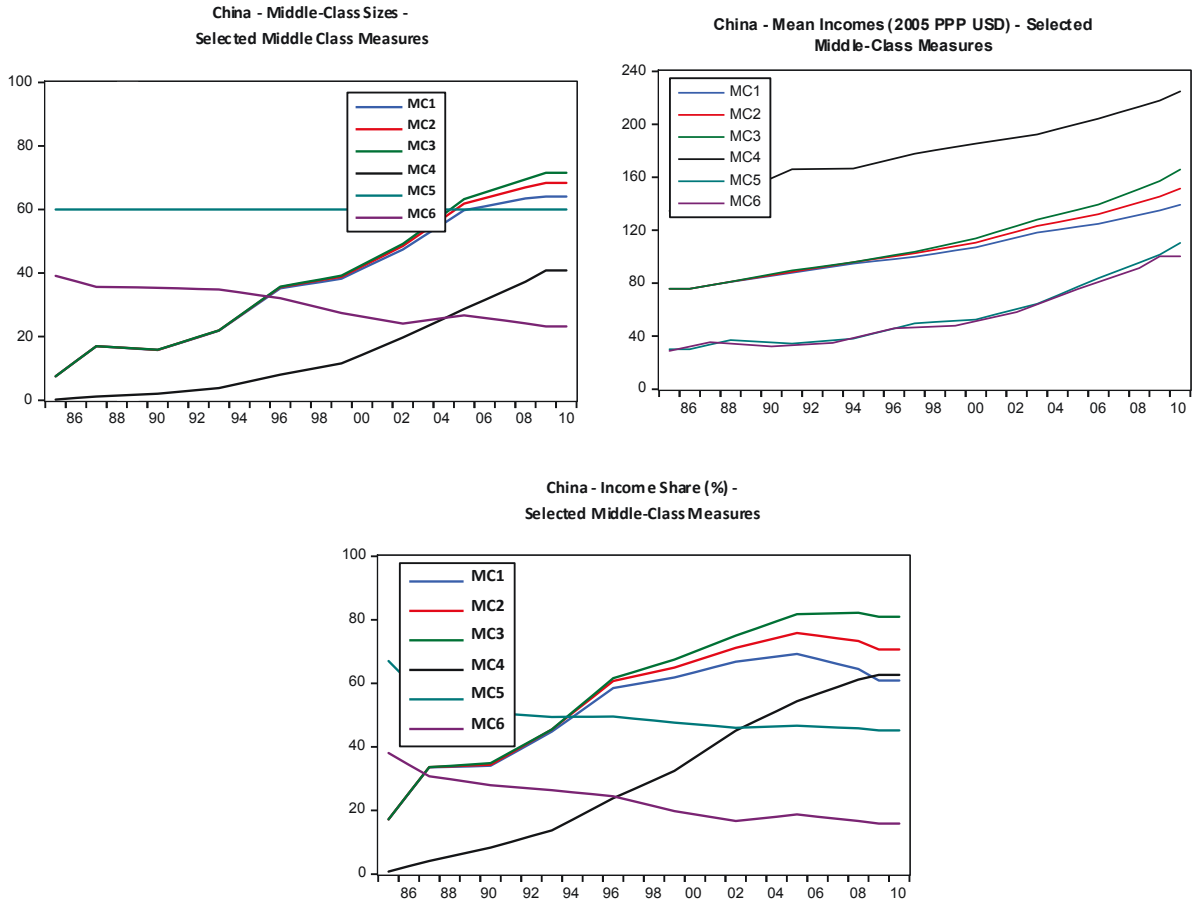
Figure 6: China - Growth (%) in Gini, real GDP per capita and MC6 (75%-125%)



Grey areas and vertical lines indicate the periods when China experienced stock market crashes, as identified by Reinhart and Rogoff (2010): 1993-1995, 2001-2002, 2004-2005 and 2008.
Sources: World Bank-WID, Unu-Wider-WIID and World Bank- PovCalNet

Figure 6 and Table 25 help acquire a better understanding of the relationships between growth, inequalities and the growth of MC6 (75%-125%). Over the past 25 years, growth in real GDP per capita has averaged 8.8%, and this economic expansion has been accompanied by continuous increases in the Gini coefficient, of about 67.5% during the same period. Despite the impressive growth rates, the size of the middle-class, measured using the relative measure MC6 (75%-125%) has decreased by about 2%. From Table 24, we note that the declines in the sizes and growth of the middle-class for every 5-year period was accompanied by continuous increases in the inequality levels. Moreover, as depicted in Figure 6, the growth in the size of the middle-class follows a similar pattern to the growth in real GDP, but its level is considerably lower due to the presence of inequalities.

Figure 7: China - Middle-Class Sizes, Mean Incomes and Income Shares from 1985 to 2010



Source: World Bank - PovCalNet

From Figure 7, we note that mean incomes has generally increased for all the middle-class measures, but their levels differ markedly. From their similar definitions, MC1($2-$10), MC2($2-$13) and MC3($2-$20) have very similar mean incomes, and MC4 ($4-$20) has a slightly higher level of mean income. As expected, MC5 (Q2-Q4) and MC6 (75%-125%) have very low mean income levels.

Several trends emerge from the analysis of the income shares. Over the past two decades, while the income share of MC4 ($4-$20) has continuously increased, for the three other absolute measures this increase has reached a maximum point in 2004-2005 and has then started to decrease. For both relative measures, as suggested by their lower mean income levels, the income shares have also been declining.

MIT countries

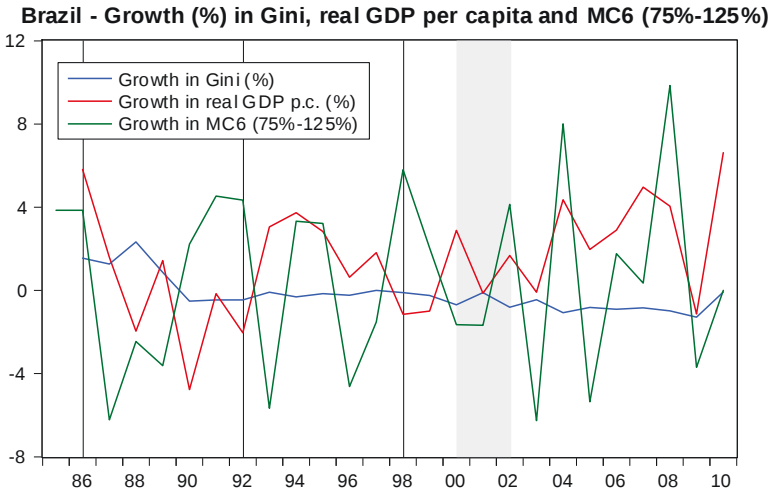
In the analysis of the Chinese situation, we note several divergences between the patterns conveyed by the absolute and relative middle-class measures. While the size of the middle-class has generally increased, when measured using the absolute measures, with MC6 (75%-125%), it rather suggest a decrease. Moreover, despite the general increases in mean incomes, the fact that the income shares have decreased for all measures except for MC4 ($4-$20) tend to confirm that China is experiencing economic growth with inequality. From Table 25, we note that the inequality levels in China are now close to the middle-income trapped countries' and the Latin American countries' inequality levels. As of 2010, in the 14 countries considered trapped in the middle-income, the average Gini coefficient is 47.6, whereas the average for the overall panel is 45.7 and the Chinese Gini is of 50.1. Moreover, the average Gini in the LAC is of 48.3, whereas it is only 41.9 in the Asian countries (see Table 25).

For the sake of comparison, Figures 12-14 depict the sizes, mean incomes and income shares of the middle-class, measured using the various definitions, for the fourteen middle-income trapped countries. In general, these countries have greater middle-class sizes, but the growth in their sizes is much more stable than in China. Similarly, MC6 (75%-125%) is the measure that captures the smallest share of the population as part of the middle-class. Across all measures, in these fourteen countries the middle-class has higher mean incomes than the average. However, their income shares are lower than average, except for MC4 ($4-$20). Combining this result to the observation that these countries generally have higher inequality levels, further support the idea that even if the middle-class is important in size, if its welfare and income are relatively small it does not support sustainable economic growth.

As another BRIC, Brazil is an interesting country to compare with China given its relatively high inequality levels. Over the past two decades, inequality remained relatively stable in Brazil, but it is still at high levels with a Gini of 53.8 (as of 2010). During this period, the average increase in the middle-class size was less considerable than in China. Yet, the average size of the middle-class is at comparable levels in both countries, with the difference that a greater share of the Brazilian population is comprised in the "richer" middle-classes, as measured by MC3 ($2-$20) and MC4 ($4-$20). Moreover, a significantly lower portion of the population is comprised in MC6 (75%-125%). On average, the Brazilian middle-class has considerably higher mean incomes, but also has lower income shares than the Chinese middle-class. This interesting finding further supports the idea that income disparities are a significant problem in Brazil. Indeed, even if Brazil has about twice the GNI per capita of China, its middle-class is not significantly larger and does not have a greater welfare, due to

inequality's persistence.

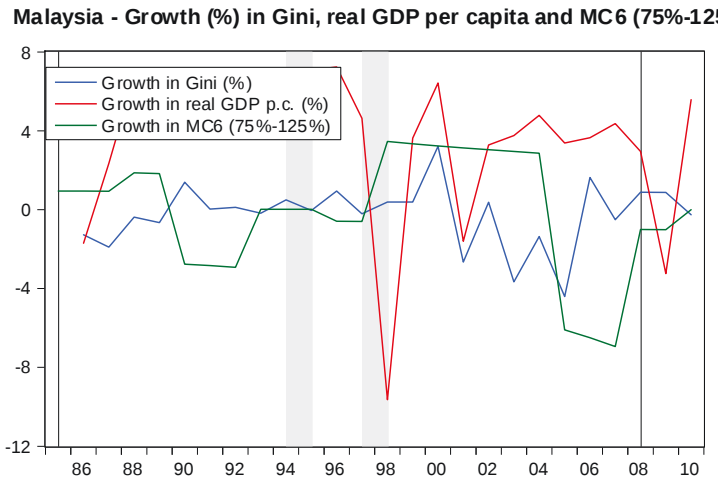
Figure 8: Brazil - Growth (%) in Gini, real GDP per capita and MC6 (75%-125%)



Grey areas and vertical lines indicate the periods when Brazil experienced stock market crashes, as identified by Reinhart and Rogoff (2010): 1986, 1992, 1998, 2000-2002 and 2008.
Sources: World Bank- WID, Unu-Wider - WIID and World Bank -PovCalNet

Malaysia is also a relevant country to examine due to its close geographic proximity with China. Before the 1997 Asian crisis, Malaysia was one of the best performing world economy and as a result, it achieved substantial reductions in its poverty rates (Woo, 2011). However, in the subsequent years, due to a failure to adopt the necessary structural reforms to maintain its competitiveness, Malaysia's growth and economic development stagnated to the point where it become trapped in the middle-income. The size of its middle-class is comparable to China's, but the share of the population comprised in MC3 ($2-$20) and MC4 ($4-$20) is significantly larger. On average, the Malaysian middle-class has higher mean income levels but lower income shares than the Chinese middle-class. This is the same finding as for Brazil, and it further supports the hypothesis that the middle-class needs to have both a sizable mean income and relative welfare to have a significant impact on growth.

Figure 9: Malaysia - Growth (%) in Gini, real GDP per capita and MC6 (75%-125%)



Grey areas and vertical lines indicate the periods when Malaysia experienced stock market crashes, as identified by Reinhart and Rogoff (2010): 1985, 1994-1995, 1997-1998 and 2008.
Sources: World Bank- WID, Unu-Wider - WIID and World Bank -PovCalNet.

Both Brazil and Malaysia have smaller shares of their populations comprised in the middle-class when measured with the relative measure, even though using the absolute definitions suggest that they have sizeable middle-classes. This is a reasonable result as MC6 (75%-125%) has lower maximum income thresholds than MC3 ($2-$20) and MC4 ($4-$20). Indeed, MC6 (75%-125%) suggests that the middle-class in Brazil and Malaysia respectively have incomes between $5.4-$9.0 and $6.8-$11.3 per day. Indeed, in Table 10, the median incomes are considerably lower than the GDP per capita in almost all the selected countries.[16] An underlying explanation for the discrepancies between the median and the mean income is the presence of inequalities. Following the hypothesis that the middle-class has a positive influence on growth, it will be interesting to validate whether the relative middle class measure, MC6 (75%-125%), supports the idea that inequalities are detrimental to long-term economic growth.

[16]It is important to mention that this is only an approximate comparison to get an understanding of the differences between the annual median income and GDP per capita. A comparison with the GNI per capita would have been more relevant, but the annual median income is expressed in 2005 PPP USD and the GNI per capita is in 2010 Atlas dollar. As such, values would have differed considerably due to differences in the years and unit of references, such that I choose to do comparison with GDP per capita instead.

Table 10: Annual Median Income and GDP per capita, 2010 (in 2005 PPP USD)

Country	Median	GDP p.c.	Country	Median	GDP p.c.
Argentina	5,832	7,144	**Kyrgyz Rep.**	1,200	561
Bangladesh	490	615	**Lao-PDR**	576	642
Bolivia	1,536	1,205	**Malaysia**	3,264	6,354
Brazil	2,592	5,581	**Mexico**	2,592	8,035
China	1,248	2,891	**Nicaragua**	1,008	1247
Chile	3,456	8,678	**Pakistan**	634	762
Colombia	1,872	3,984	**Panama**	2,160	6,243
Costa Rica	2,976	5,504	**Paraguay**	2,189	1,795
Dominican Rep.	2,016	4,572	**Peru**	2,160	3,561
Ecuador	2,074	3,283	**Philippines**	864	1,409
El Salvador	1,699	3,037	**Sri Lanka**	1,104	1,610
Guatemala	1,354	2,210	**Thailand**	1,930	3,150
Honduras	1,354	1,539	**Uruguay**	3,792	6,873
Indonesia	778	1,564	**Venezuela**	1,920	6,020
Kazakhstan	2,016	4,733	**Vietnam**	816	900

Sources: World Bank - PovcalNet and World Bank- WID

This preliminary analysis suggests that at different levels of development and inequality, the middle-class has a varying importance for economic growth. Although the graphical and correlations analysis can provide a useful starting point, the use of statistical models will help determine whether there really exist a relationship between the growth of the middle-class and the economic growth. Also, we can expect that various factors channel the influence of the middle-class on growth, such that the inclusion of control variables in the econometric models should further help understanding the strength of this relationship.

4 Methodology and Data

In this section, I present the methodology and the data to fulfill the two following research objectives: 1) to examine the evolution of the middle-class and its influence on economic growth; 2) to assess whether there is a relationship between the middle-class and the risk of a middle-income trap.

I first introduce the baseline model. A variety of techniques are used to estimate the relationship between the middle-class and the economic growth using a reduced-form growth model. I start with the most basic estimation method of OLS and then evaluate alternative methods: the fixed and random effects, and the system GMM. Then, several control variables are added to the baseline model, to assess whether they influence the relationship between the middle-class and the economic development. These variables are selected from a review of the literature on the subject, and on the basis of their moderate correlation with growth and the income distribution variables. As the properties and the qualities of the panel data can highly influence the results, several tests and robustness checks will be conducted.

Then, to estimate the probability of a country falling into a middle-income trap, a binary logit model is estimated using a similar specification as the baseline model. Several control variables are added to the model as to examine the influence of selected socio-economic determinants on the MIT risk.

4.1 Baseline Model

The baseline model used to validate the empirical predictions is specified following Forbes (2000):

Baseline Model

$$\begin{aligned} Growth_{i,t} = \beta_1 Income_{i,t-1} + \beta_2 MiddleClassGrowth_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} \\ + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t-1} \end{aligned} \quad (2)$$

Where i denotes the individual countries, and t the time periods (with t=1,2, ..., T, and t-1, 5 years apart). $Growth_{i,t}$, the dependent variable is the average growth of real GDP per capita, $Income_{i,t-1}$ is the log of real GDP per capita, $MiddleClassGrowth_{i,t-1}$ is the growth in the share of the middle-class, $FemaleEducation_{i,t-1}$ and $MaleEducation_{i,t-1}$ are the male and female average secondary educational attainment levels, $PLI_{i,t-1}$ is a measure

of the price level of investment, and $\varepsilon_{i,t-1}$ is an error term. α_i is a country-specific term and η_t a time-period dummy.

The base model follows from the general growth literature, where average growth is regressed over the lagged values of the initial income, an inequality variable and selected control variables. The model usually includes an inequality term, that I replace by the growth of the middle-class variable (see Section III).

This model is selected due to its wide popularity for estimating the relationship between inequality and growth. Moreover, I chose it as my base model for comparability purposes with well-known studies and for parsimony. Due to the limited amount of data for income distribution, I choose to include less variables to maximize the number of degrees of freedom while using more sophisticated estimation methods (Forbes, 2000). Several alternative control variables could be added to this base model, and I examine some variations in Section VI.

Following Forbes (2000), the model is estimated in the period from 1985 to 2010, using 5-year periods, as dictated by the common practice, and by the availability of the inequality and income distribution data. Moreover, taking the average of the growth variable eliminates some of the serial correlation from business cycles (Forbes, 2000). [17] Additionally, most countries conduct household surveys every few years, such as the income distribution data that is collected every 5 years, which makes it a reasonable choice to select this period length (Barro, 2000). As a robustness check, the model is also estimated over 3-year and 10-year periods; choosing these different estimation periods could also help in understanding the difference between the short-term and the long-term impacts of the middle-class on economic growth.[18].

Equation 2 is first estimated using OLS to understand the basic relationships between the variables. However, the OLS estimation is likely to be biased and non-appropriate for this growth model. In fact, the model is likely to suffer from an omitted variable bias due to unobserved country-specific divergences across the panel. Also, there is likely an additional bias due to the presence of a lagged dependent variable (initial income) (Forbes, 2000). Overall the results from OLS, should yield inconsistent estimates.

Thus, estimation is also made with the means of regular panel estimation techniques, to control for this unobserved heterogeneity: 1) the Fixed Effects (or within estimation) and 2) the Random Effects. The difference between both approaches is in the information used for

[17] However, for all independent variables in the model, I take the observations every 5th year, instead of averaging to avoid introducing serial correlation (Acemoglu, Johnson, Robinson and Yared, 08). Whenever the 5th year data is not available, I take the closest observation in that period.

[18] In the literature, it is not clear whether 3-year and 10-year periods respectively represent the short-term and the long-term. However, they are generally found to lead to different results, suggesting different trends across alternative time lengths (Forbes, 2000).

estimating the baseline model, given the different assumption about the specific individual effect (Baltagi, Bresson and Pirotte, 2003). Using the random-effects, the individual effects are assumed to be random and uncorrelated with the independent variables. On the opposite, the fixed effects approach allows for some correlation between the individual effects and the independent variables (Baltagi, Bresson and Pirotte, 2003).

To discriminate between the fixed effects and random effects models, I conduct the Durban-Wu-Hausman test. In this test, the null hypothesis is that the random effects model is appropriate. If the test fails to reject the null hypothesis, one can conclude that the random effects model is efficient, but the fixed effects model still remains consistent (Baltagi, Bresson and Pirotte, 2003). If the null hypothesis is rejected, then the fixed effects model is consistent whereas the random effects model is not.

Yet, both the fixed effects and random effects are generally found to be inconsistent in estimating growth equations due to the presence of a lagged endogenous variable (the initial income term) (Bond, Hoeffler and Temple, 2001). Indeed, the model likely suffers from a dynamic panel bias where the strict exogeneity hypothesis is likely to be violated. Following Forbes (2000), we can see this from re-expressing growth as the difference in income levels (and adding back $Income_{i,t-1}$ on both-sides to maintain the equivalence), in Equation 2:

$$Income_{i,t} = (\beta_1 + 1)Income_{i,t-1} + \beta_2 MiddleClassGrowth_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \mu_{i,t-1} \quad (3)$$

Where: $\mu_{i,t-1} = \alpha_i + \eta_t + \varepsilon_{i,t-1}$.

By construction, when estimating Equation 3 by the means of the OLS and random-effects, the current levels and past changes are correlated; both $Income_{i,t}$ and $Income_{i,t-1}$ depend on α_i and $Income_{i,t-1}$ is correlated with the error term, $\mu_{i,t-1}$ (Banerjee and Duflo, 2003). The fixed-effects estimator is also inconsistent as $Income_{i,t-1}$ and $\mu_{i,t}$ are correlated, such that both terms depend on the error term, $\mu_{i,t-1}$.

A widely used approach proposed to correct for the endogeneity, of the regressor and between the error term and the lagged dependent variable, is to use the GMM techniques (Bond and al., 2001; Roodman, 2009). As part of the GMM techniques, we can distinguish between the two-stages least-squares (and three-stages least-squares) instrumental variable approach as a special case of the more general GMM, and between the difference and system GMM. A major difficulty of using the two-stages least-squares (and three-stages least squares) is finding suitable instruments for the endogenous income distribution variables

(Perotti, 1996).[19] The difference and system GMM are the most widely used approaches in the growth literature, and the system-GMM is generally preferred despite its greater complexity. While, the fixed and random effects don't necessarily help in assessing the causal relationship between inequality and growth, the GMM estimation method is useful in providing insights to this central question (Acemoglu and al., 2008).

Dynamic Panel Estimation

We can distinguish between two types of dynamic panel model GMM estimation methods: the difference GMM, from Arellano and Bond (1991), and the system GMM, from Arellano-Bover/Blundell-Bond (1995). The difference GMM takes the first difference of the linear panel regressors to remove the individual-specific effects, and then apply the GMM estimation. More precisely, the past levels of the regressor act as instruments for the current first differences of the dependent variable to control for its endogeneity (Roodman, 2006, 2009). On the other hand, the system GMM encompasses the difference GMM method, as it also uses lagged first-differences as instruments for equations in levels, and lagged levels as instruments for equations in first differences. In general, while the system GMM conveys more assumptions and is more complex than the difference GMM, it is still preferred over the difference GMM for its greater efficiency as it allows introducing more instruments in the estimation (Roodman, 2009).

Following Forbes (2000), the model specification using the difference-GMM is:

$$(Income_{i,t} - Income_{i,t-1}) = \gamma(Income_{i,t-1} - Income_{i,t-2}) + (X'_{i,t-1} - X'_{i,t-2})B + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \tag{4}$$

Where i denotes the individual countries, and t the time periods (with t=1,2, ..., T, and t-1, the previous 5-year period). X' is the set of control variables, including the growth rate of the middle-class variable. The other variables are specified as in Equation 2.

In this equation, variables are now expressed as deviations from their period means. The difference-GMM instruments the first-differenced endogenous and predetermined variables using their lagged levels, and the exogenous variables are used as their own instruments. However, lagged levels can be poor instruments when the autoregressive process is too

[19] In this paper, he 2SLS method is not presented as an estimation method. However, this method is frequently used in the growth literature. Yet, it may be difficult to find valid instruments, and the performance of the IV estimates may be even lower than with the OLS in the presence of weak instruments (Roodman, 2009).

persistent, as is generally the case for income and education variables (Roodman, 2009). As such, in Equation IV endogeneity may still potentially be present as the lagged income term, $Income_{i,t-1}$ may be correlated with the error term, $\varepsilon_{i,t-1}$.

To overcome this problem, the system-GMM uses additional moments conditions in the estimation by assuming that the first difference of the instrumental variable is uncorrelated with the fixed effects (Roodman, 2009). As such, given this additional assumption, the first differenced lagged values can also be used as instruments in the equation in levels (Bond and al., 2001).

As the standard errors from the GMM estimation can be downward-biased in small-samples, the Windmeijer finite-sample correction is often applied (Roodman, 2009). When the number of observations in a given panel is relatively low, the standard-errors are generally downward biased and with the Windmeijer correction the standard errors provide a much more reliable inference (Windmeijer, 2005).

Several numbers of lags can be included as instruments in the system-GMM. For the system-GMM, as long as the number of lags used for the change in the dependent variable are greater than or equal to 1, the specification is valid (Blundell-Bond, 2008). The choice of the number of lags has a significant influence as the coefficients obtained from the estimation usually varies greatly according to the number of lags used (Roodman, 2009). By including too many lags, there is a risk of overidentification, where the estimation overfit the dependent variable by introducing two many instruments, which can easily increase in number as the time periods increase (Roodman, 2009). As such, there is a tradeoff between the lag length (T) and the sample length (N). In this paper, I will report the number of instruments used in the various GMM estimations, as well as include the results from using alternative number of lags for robustness.

Additionally, I will report the Sargan tests to assess the validity of the moment conditions (identifying restrictions) used in the estimation. More precisely, this test is used when an equation is overidentified to assess whether the instrumental variables, both excluded and included, are independent of the error process and that they are properly excluded from the model (Baum, Schaffer and Stillman, 2013). The null hypothesis of this test is that the overidentifying restrictions are valid, under the hypothesis that the instruments from the exactly identified model are exogenous. A rejection of the null hypothesis implies a model misspecification as the GMM would produce inconsistent estimates. A major weakness of the Sargan test is that it is consistent only when the errors are homoskedastic, an hypothesis that is rarely respected in this context (Roodman, 2007). Also, the test has poor size properties and may have a low power to reject the null hypothesis when the sample size is too small (Roodman, 2007). As such, while performing this widely-used test can still be

insightful for the analysis, its results need to be interpreted with caution and in conjunction with other tests.

A second important test to perform after the estimation is the test for autocorrelation developed by Arellano and Bond (Blundell-Bond, 2008). This test is applied to the residuals in differences, and tests for the first order and second order autocorrelation. An important assumption underlying this test is that the number of observations is large (however, the definition of large is not specified), such that caution needs to be applied when evaluating the tests results in a restricted sample. The null hypothesis of this test is that there is no autocorrelation, whereas a rejection of this hypothesis leads to the conclusion that there is evidence of autocorrelation in the model. At the first-order, a rejection of the null hypothesis does not imply a model misspecification. On the other hand, at the second order, if there is evidence of autocorrelation, the model is rejected.

Despite its efficient estimation, a main disadvantage of the system GMM is its complexity. As such, in addition to reporting both test results, I will conduct several robustness check in Section VI to assess the validity of the baseline model estimates.

4.2 Logit Model

If the relationship between the middle-class and the economic development can be quantified, we can make an assessment of the risk of countries falling into the middle-income trap. To assess this risk, following Eichengreen and al. (2012) and Ozturk (2015) I build a logit model to estimate the probability of a country moving up from an income category to another. The dataset and the explanatory variables used are the same as those from the base model presented in the previous section.

The binary logit model is a non-linear regression model, estimated by Maximum Likelihood (MLE), that measures the relationship between a categorical dependent variable and a set of independent variables. More precisely, the logit model estimates the probability of success for a dependent binary variable (probability that it takes a value of 1) (Hsaio, 1996). In this study, I construct a binary variable, y_i the transition variable, where the variable takes a value of 1 when the country has successfully transitioned from a lower-income to a higher income category over a given 5-year period, and of 0 otherwise. The variable is built based on the World Bank's income classification, measured by the GNI per capita. [20]. The transition variable is specified as follows:

[20] While it would have been more relevant to assess the specific probability of a country moving from the middle-income to the high income category, for statistical reasons and due to the nature of the panel, I examine the more general case where countries move up from an income category to another one. This distinction could lead to different results, but I expect the signs of the relationship to be similar and the coefficients to vary only slightly in magnitude.

y_i → 1, if the country successfully transitions to an upper-income category

y_i → 0, otherwise (remains at the same income level, or transitions downward

The probability that $y_i = 1$ can be expressed as:

$p_i = \text{Prob}(Y_i = 1 | \, x_i) = F(x_i)$

Where $F(x_i)$ is the logistic function. The logit model is specified as follows:

Logit Model

$$Log(\pi/(1-\pi)) = \alpha + \beta_1 Income_{i,t-1} + \beta_2 MiddleClass_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t-1} \quad (5)$$

Where: $Log(\pi/(1-\pi))$ is the log-odds ratio of success for the income transition variable with a one unit increase in a given independent variable, $\varepsilon_{i,t-1}$ is an error term distributed by the standard logistic distribution. The other variables are defined similarly to the baseline model, where the independent variables are the initial income, the average growth of the middle-class, the male and female secondary attainment education variables and the market distortions. The coefficients in this equation express the expected changes in the log-odds ratio of the transition variable for a unit increase in a given independent variable, holding everything else constant.

As they are more easily interpretable, we can express the coefficients as odds ratios by exponentiating Equation 5:

$$(\pi/(1-\pi) = exp(\alpha + \beta_1 Income_{i,t-1} + \beta_2 MiddleClass_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t-1}) \quad (6)$$

Solving for the probability (π), we can also re-express equations 5 & 6 as the cumulative logistic distribution:

$$Pr(y_j \neq 0 | x_j) = \pi = \frac{exp\{\beta_1 Income_{i,t-1} + \beta_2 MiddleClass_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t-1}\}}{1 + [exp\{\beta_1 Incomei, t-1 + \beta_2 MiddleClass_{i,t-1} + \beta_3 X_{i,t-1} + \varepsilon_{i,t-1}\}]} \quad (7)$$

Where (π) is the probability of a country moving up to an upper income category. Increasing the odds ratio leads to an increased probability of success, where success is defined as the country's transition to an upper-income level.

The binary model expressed in Equation 5 is first estimated by MLE, to acquire an understanding of the relationship between the variables. However, it can be expected that with this estimation there remains some unobserved heterogeneity due to the presence of country-specific factors in the panel. As such, the logit model is also estimated by the means of the two panel-specific methods: 1) the fixed effects and 2) the random effects (see Section 4.1 for a detailed explanation of both approaches). Again, a Hausman test will be performed to determine whether the fixed or random effects estimation should be preferred. This consideration will be assessed in the next Section.

4.3 Data

The panel is composed of 30 East Asian and Latin American low and middle-income countries (see Table I). The countries were chosen based on their regional classification and economic development levels, to be able to draw comparisons with China. The panel covers the period from 1985 to 2010, with the selection of this time period being mainly dictated by the data availability with respect to the income distribution and inequality variables. The analysis is performed using an unbalanced panel, where the time lengths between each socio-economic surveys differ per country and from one country to another. The choice to use the unbalanced panel, as opposed to using interpolation methods, is made to avoid introducing serial correlation and to preserve the original data (Chun and al., 2011). A more detailed explanation of the interpolation methods is included in a following subsection.

Compared to other empirical studies, the sample of 30 countries is relatively small. This choice is made due to data availability, and for several other reasons. First, this paper has the objective to examine various developing countries' middle-class measures and their impacts on economic growth. The inclusion of developed countries would make the selection of a middle-class variable more difficult, and less applicable to the lower-income countries. Second, the availability of income distribution data largely limits the number of developing countries that can be included in the panel, as there is a tradeoff between the number of countries and the time frame covered. To be able to use a larger number of estimation methods, and to estimate the model over a longer time period, I chose to include fewer countries but with a higher number of data points. As such, for data availability, countries with population of less than 2 million, and countries with missing income data points for more than seven consecutive years are excluded from the panel. All developed economies, African, Oceanic, Eastern European and other Latin American and Asian economies are excluded from the panel.[21]

In the following pages, I include a description of the main variables and controls used in both the baseline and logit models. I also discuss the expected signs between these different variables and the dependent variable, growth of real GDP per capita. A summary of these expected relationships, as well a correlation matrix and a table of the main summary statistics are included, in Tables 11, 12 13 at the end of the discussion.

[21] Despite the interesting features of the African countries, they are excluded from the analysis as data coverage on income distribution and inequality in this region is relatively poor. Eastern European countries are not as directly comparable to the Asian and LAC in large part due to their long history of authoritarian regimes (Birdsall, 2010). The other economies have limited data coverage, and I choose not to include them.

4.3.1 Baseline Model

The baseline model is composed of 5 variables: the growth in real GDP per capita, the initial income, the upper education of both male and female and a measure of market distortions. These are the most standard regressors in the growth literature, as explained in the literature review.

The dependent variable is the growth in real GDP per capita measured in PPP terms (base year in 2005) from the World Development Indicator (WDI) database. The annual GDP growth is averaged over five 5-year periods: 1986-1990, 1991-1995, 1996-2000, 2001-2005 and 2006-2010.

The second variable, initial income, is measured by the log of the real GDP (in 2005 PPP USD), and is also taken from the WDI. The initial income is measured at the beginning of each 5-year period. This variable is typically included in the growth models to account for the convergence toward the steady state. From previous work, and from its negative correlation with growth (see Table 12), I expect the sign of this variable to be negative.

The upper education variables are defined as the average years of secondary schooling respectively completed by male and female aged over 15, from the Barro and Lee (2010) dataset on educational attainment. This widely used database covers over 146 countries, from 1950 to 2010, and provides disaggregated data by sex and age for several education-related measures. The two educational attainment variables are included in the base model as reasonable proxies for the stock of human capital. In theory, the levels and distribution of educational attainment impact several economic and social outcomes (Banerjee and Duflo, 2008). Most empirical studies posit a positive link between the education levels and the economic development. However, Forbes (2000) finds opposite signs between the male and female variables. From Table 12, both variables have positive correlations with growth, and I therefore expect both their signs to be positive.

The choice to include the educational attainment levels, as opposed to the school enrollment rates, is based on the fact that the attainment levels are usually designated as better measures of the stock of available human capital (Barro and Lee, 2010). Yet, the impacts of including alternative education-related variables are also evaluated and the results are included in Section VI.

The market distortions variable is defined as the price level of investment in a given country with respect to the United States, the base country, and is sourced from the Penn World Tables version 8.1. More precisely, it is a measure of the purchasing power parity value of the investment deflator relative to the US, with the base year in 2005. From previous work

on the subject, and the negative correlation of the variable with growth (see Table 12), I expect the sign of this variable to be negative.

Measurement of the Size & Growth of the Middle-Class

In this study, as both absolute and relative measures of the middle-class are examined, I collect data on income distribution and inequality from two different databases, the PovcalNet dataset rendered accessible by Dykstra, Dykstra and Sandefur (2014) and the World Income Inequality Database (WIID) by the Unu-Wider. The lack of comparable data on inequality has long been a problem for studies on inequality, since there are no international organizations that collect uniform data on inequality (Forbes, 2000; Atkinson and Brandolini, 2011). As a general rule, surveys used to collect information on the distribution of income should be based on households, not individuals, because of the scope of this study. The source of data should also have comprehensive coverage for all sources of income or uses (expenditures), and should be representative of the whole population. Based on these criterion, I choose to use the PovcalNet dataset on the distribution of income.

For the construction of most of the middle-class measures, I use the detailed income distribution from the PovcalNet dataset by the World Bank, but in the version rendered more easily accessible from the Center for Global Development, developed by Dykstra, Dykstra and Sandefur (2014).[22] Traditionally, authors analyzing income inequality have used the PovcalNet database developed by the World Bank. This online database compiles survey data collected by various national governments and national organizations, and it is the most important data resource on poverty and inequality. From distributional data on national income, the software uses the parametric specification of an underlying Lorenz curve to compute any desired poverty measures. [23] However, the public (non-World Bank researchers) is only offered a limited access to the underlying datasets. In an attempt to facilitate the use of the PovcalNet database and to make it more accessible to the public, Dykstra, Dykstra and Sandefur (2014) have reproduced it in a more useful format. Using a Python script that queried the PovcalNet over 23 million times, they generated a dataset of distributions composed of 10,000 points from the cumulative distribution function (CDF) of income or consumption in each survey year. More precisely, their dataset lists the percentage of people (X) who live on less than or equal to some income or consumption level per month (Z); the percentage of people (X) is estimated for each income of consumption level (Z) at increments of $0.01 in 2005 PPP dollars. Their dataset

[22] Available on the Harvard's Institute for Quantitative Social Science (IQSS)'s Dataverse network.

[23] From a parametrized Lorenz curve, PovCal Net reports the consumption or income share of a fraction of the population. The software tests the fit of two alternative parametrizations: the general quadratic function and the beta function.

includes 942 World Bank's available surveys and covers 127 countries from the period over 1977 to 2012. For the purpose of this study, I select the headcount ratios of the population who have monthly income or consumption of less than or equal to $60 and up to $600 per month, for the period from 1990 to 2010; this covers the ranges defined by the selected absolute measures and by one of the relative measure, MC6 (75%-125%).

For the second relative measure of the middle-class, MC5 (Q2-Q4), I use the World Income Inequality Database (WIID) version 3b from the United Nations University - World Institute for Development Economics Research (Unu-Wider 2014). This database compiles secondary data from household surveys on several income distribution measures, such as the Gini coefficient and the income quantiles. Even if the data originates from various sources and is measured using different methods and definitions, data quality indicators are included in the dataset. The WIID is widely used in the empirical literature on inequality and is a continuation of the well-known Deininger and Squire (1996) work. From this database, I select only the high quality data following the quality criteria established by the authors of the database. In the years where two values are available for the income quantiles, I select the highest quality data and in the event that both are of the same quality levels I average them. The second measure of income inequality, the Gini coefficient is also selected from this database. If the Gini coefficient is not available for a given year, the observation is taken from the closest-year in the five-year period ending in the stated year.

For the aforementioned reasons (see Section III), in both the baseline and logit models, it is the growth of the middle-class that is introduced in the models, and not its size. Moreover, in both databases, inequality can be measured using either consumption or income. Whenever both measures are available, consumption is often preferred over income due to the smoothing effect of consumption (Atkinson and Brandolini, 2011). In general, low-income countries measure inequality using household consumption-based surveys whereas high-income countries measure inequality using household income-based surveys, but given that this study includes country-specific controls this should not have a large impact on the results (Chun, 2010).

4.3.2 Alternative Control Variables

In addition to the middle-class, the initial income and the control variables, a variety of variables are added to the baseline and logit models to validate the different channels by which the middle-class influences growth. As such, various data sources are used to construct the unbalanced panel. The choice of these variables is based on theoretical considerations and empirical evidence from the previous studies on the subject.

Human Capital Variables

To measure the influence on the middle-class on economic growth, three human capital variables are included to the models: the fertility rate, the life expectancy and the share of the working age population.

The fertility rate is a frequently used variable in the growth literature (Barro, 2000, 2008). Following the WID's definition, the fertility rate is defined as the total expected number of births for a woman during her childbearing age. From theoretical considerations, related to the relationship between the education and fertility decisions, I expect this variable to have a negative impact on growth. However, as the correlations between this variable and the three middle-class measures vary, I expect some variations in the magnitude and signs of the variable in the model (see Table 26).

The life expectancy variable is included as a measure of health outcomes, but more importantly as a measure of well-being in a given society. Following the WID, the life expectancy is defined as the number of years a newborn (male or female) could expect to live if patterns of mortality were to remain the same throughout his life. Empirically, a positive relationship between increased income and higher life expectancy has been found, as an increase in living standards is often related to better heath practices and better overall living conditions (Barro, Mankiw and Sala-i-Martin, 1995). However, and contrarily to this prediction, the correlation between this variable and the growth of MC1($2-$10) and MC4 ($4-$20) is negative (it is slightly positive with MC6 (75%-125%) suggesting that the relationship between life expectancy and growth, by the influence of the middle-class, can vary at different levels of economic development (see Table 22).

Finally, in the WID, the working age population is defined as the share of the population aged between 15 and 64 that can be potentially economically active, but that is not necessarily employed. Since the age structure of the population is generally correlated with the income distribution, with lower income amongst the retirees and population aged below 15, I expect the sign of this variable to be positive (Perotti, 1996).

Political Variables

Two political variables sourced from the Center for Systemic Peace (CSP) are included in the model: the Polity II and the Coups d'état.

The Polity II variable, from the Polity IV project, is one of the most widely used indicator for studying and measuring the impacts of regime changes. This variable is constructed from two indicators, the annual measures for institutionalized democracy and for autocracy,

where the autocracy measure is subtracted from the democracy measure to construct the overall Polity score. The variable has values that range from -10 (strongly autocratic) to +10 (strongly democratic). The Polity II variable is an improved version of the original Polity (first version) variable, where extreme data points are corrected to obtain a more uniform distribution. To standardize the variable, I divide its values by its maximum ranges. I expect the sign of this variable to be positive, as from theoretical considerations when a society becomes more democratic it should lead to positive development outcomes.

The Coups d'état variable is a binary variable that indicates the presence of a successful coup d'état in the year of record for a given country. I expect the sign of this variable to be negative, as a lack of social organization and cohesion should have a detrimental influence on growth (Pressman, 2007).

Gender-Related Variables

The gender-related variables included in the models are: the differentials in female and male life expectancy and in secondary educational attainment levels, and the number of seats held by women in national parliaments.

The differential in female and male life expectancy variable is constructed from the WDI, by subtracting the life expectancy for males from the life expectancy of females. The interest of including this variable is that, with greater gender equality, not only should the overall life expectancy be higher, but also the female life expectancy. Following Dollar and Gatti (1999) I construct the variable as the difference between male and female life expectancies to accentuate gender-differences. As it is a measure of overall improvement in health, I expect the sign of this variable to be positive.

The differentials in female and male secondary educational attainment is also constructed in a similar fashion, with the educational attainment of male subtracted from the educational attainment of females. Compared to the baseline model, the education variables are defined exactly in the same way, but I take their differences instead of including them individually to the model. This should eliminate the possibility of a multicollinearity problem between the two variables and should amplify the gender differences in education. As aforementioned, gender inequality in education should have a negative impact on economic growth as it lowers human capital and productivity levels, leading to negative consequences for economic growth and development (Dollar and Gatti, 1999; Klasen, 1999). As such, I expect the sign of this variable to be negative. Yet, as in Dollar and Gatti (1999)'s findings, I expect some variations in results according to the countries' development levels.

The number of seats held by women in national parliaments is also taken from the WID,

and is defined as the percentage of parliamentary seats in a single or lower chamber held by women. Following Dollar and Gatti (1999)'s results, and the consideration that a larger middle-class values women empowerment, I expect the sign of this variable to be positive.

Macroeconomic Variables

To control for the influence of the macroeconomic environment, I introduce three variables from the WID to the models: the share of gross savings, the urban ratio and the terms of trade.

The share of gross savings (as a % of GDP) is measured by subtracting total consumption to the gross national income, and adjusting for the net transfers. A society that has a sizable middle-class, with stable employment and salary, should have a higher savings rate than a relatively more unequal society. In turn, as explained in the literature review, increased savings rates are generally associated with higher and more sustainable economic growth (Aiyar and al., 2013). However, if savings rates are too high, as is the case in certain economies such as Japan, it can lead to detrimental impacts on growth. As such, this variable should have a positive impact on growth, but I expect this relationship to vary by development levels.

The urban ratio is a measure of the share of the population living in urban areas as a percentage of the total population. From Table 26, we see that this variable has a negative correlation with the two absolute middle-class measures, whereas it is positively related to the growth of the relative measure, MC6 (75%-125%). From the differences between the two types of measures, it suggests that the urban ratio can yield different results at different levels of development. Indeed, the positive correlation with the relative measure could reflect the general idea that a sudden rise in urbanization is frequently accompanied by a large increase in inequality (Egawa, 2012, 2013).

Finally, the terms of trade is calculated as the percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000. As an outward-orientation of the economy generally leads to increased growth, I expect this variable to be positive (Barro, 2000, 2008).

4.3.3 Logit Model

In the Logit Model the dependent variable is the transition variable, a dummy variable that takes a value of 1 whenever a country successfully makes the transition from a lower income to an upper income category. To construct this variable, I use the World Bank's

income classification system, based on the GNI per capita measured in USD (with the Atlas conversion factor). Using the 2010 classification, we can group countries in four income categories: the low income (below $1,005), the lower ($1,006-$3,975) and upper middle income ($3,976-$12,275) and the upper income (above $12,276) (see Table 8). The World Bank also provides an historical classification dataset where it classifies 214 economies in the four income categories from 1987 to 2014.[24] Using this dataset, I construct the binary logit dependent variable based on the historical income transitions for the 30 countries included in the panel; the variable takes a value of 1 if in a given 5-year period (1985-1990, 1991-1995, 1996-2000, 2001-2005 and 2006-2010) the country has either moved from the lower to the lower-middle income, the lower-middle to the upper-middle income or from the upper-middle to the upper income category.

From Table 11, we note that on average very few countries have successfully made the transition to an upper-income level, as the average of the variable is 0.14. This is reasonable given that about half of the countries included in the panel are trapped in the middle-income (see Table 9). However, we can still expect to find interesting results from the logit analysis as the standard deviation is quite appreciable at 0.35. The other variables included in the logit model are the same as in the baseline model.

[24] Since the classification starts in 1987 and the panel is constructed for the period from 1985 to 2010, I use apply the 1987 classification to the years 1985 and 1986. As the income transition usually takes a relatively long time, and as the regressions are conducted over 5-year periods, this should not alter the results considerably.

Table 11: Summary Statistics

Variables	Mean	Standard Dev.	Min.	Max.	Observations
Base Model					
Growth in real GDP per capita	2.44	2.82	-11.21	10.70	147
Growth in MC1 ($2-$10)	1.84	4.84	-11.83	18.96	150
Growth in MC4 ($4-$20)	3.78	9.45	-21.30	73.79	150
Growth in MC6 (75%-125% of median inc.)	0.03	2.93	-9.40	14.15	150
Log(gdp per capita)	7.48	0.90	5.50	9.00	150
Average educational attainment - Female	1.79	1.23	0.15	6.87	150
Average educational attainment - Male	2.15	1.13	0.62	6.70	150
Price level of investment	0.57	0.60	0.09	4.92	145
Logit Model					
Transition dummy variable	0.14	0.35	0	1	150
Human Capital Variables					
Life expectancy (total)	68.95	4.94	50.90	78.58	150
Fertility rate	3.29	1.08	1.51	6.41	150
Working age population	59.80	4.71	50.13	72.97	150
Political Variables					
Polity_II	0.39	0.59	0	1	150
Coups d'état	0.01	0.12	0	1	150
Gender Inequality Variables					
Differential in educational attainment	-0.36	0.65	-3.19	0.68	150
Differential in life expectancy	5.70	2.38	-0.99	13.01	150
Number of seats held by women in parliaments	12.61	7.44	0	38.6	115
Macroeconomic Variables					
Gross savings	20.09	9.41	1.81	52.76	144
Urban ratio	53.10	21.10	13.80	93.55	150
Growth of the terms of trade	0.61	6.45	-18.19	31.75	132

Sources: World Bank - WDI, World Bank - PovcalNet, World Bank (2015), CSP, Barro and Lee (2010), Penn World Tables (2014)

Table 12: Correlation Matrix - Baseline Model

	GDP growth	Income	Gr. MC1($2-$10)	Gr. MC4 ($4-$20)	Gr. MC6 (75%-125%)	Female ed.	Male ed.	P. level o
GDP growth	1.000							
Income	-0.174	1.000						
Growth in MC1 ($2-$10)	0.362	-0.366	1.000					
Growth in MC4 ($4-$20)	0.372	-0.351	0.821	1.000				
Growth in MC6 (75%-125%)	0.232	0.198	0.165	0.009	1.000			
Female education	0.203	-0.182	0.194	0.204	-0.002	1.000		
Male education	0.236	-0.124	0.227	0.215	-0.033	0.836	1.000	
Price level of inv.	-0.112	0.243	-0.150	-0.130	0.037	-0.115	-0.196	1.00

Sources: World Bank - WDI, World Bank - PovcalNet, Barro and Lee (2010), Penn World Tables (2015)

Table 11 includes the 5-year period summary statistics of the main variables used in the baseline and logit models. The yearly average growth rate of the GDP per capita, over a 5-year period, is 2.44% with considerable variation, as indicated by the large standard deviation of 2.82 and the wide dispersion across the minimum and maximum values of respectively -11.21% and 10.70%. There is also substantial variation within and between the three middle-class measures. The growth in MC4 ($4-$20) exhibits the largest dispersion, with a mean of 3.78% and a considerably large standard deviation of 9.45%. MC1 ($2-$10) and MC6 (75%-125%) have values that are relatively more centered around the mean. This

suggests that there are wide divergences across countries in terms of their economic growth and middle-class 'growth rates. MC4($4-$20) captures a slightly richer middle-class, and given the wide divergences in economic development across countries, it is natural to find such a large dispersion in its values. There is surprisingly less variation for the income levels, as the standard deviation is below 1, but this is a reasonable result as the measure is constructed by taking the log of the real GDP, to normalize its distribution.

For the other variables, several additional observations arise. There are considerably low levels of secondary education, both across male and female at averages of respectively, 2.15 and 1.79 years. At 69 years, the average life expectancy is low in comparison to Canada, as for the period from 2009 to 2011, Statistics Canada estimated the average life expectancy at 81.5 years (Statistics Canada, 2015). There is substantial variation in the political situation of the different countries, as suggested by the low average value, of 0.39, and large standard deviation of the Polity variable (values closer to 0 suggest a tendency toward more autocratic regimes). In terms of gender differences, the data in Table 11, suggests that while on average male have higher educational attainment levels they have lower life expectancies than females. Finally, while there are wide variations in the gross savings and terms of trade, on average countries tend to have a larger share of their population living in urban areas than in rural regions.

Table 12 presents the correlation between the variables included in the baseline model, and Table 26 includes the correlations between the various other control variables and the middle-class variables. From these two tables, and the discussion in this section, I summarize the expected signs between the different variables in the baseline model in Table 12. The signs are expected to be the same for the logit model, as an underlying hypothesis of this study is that a variable having a positive influence on economic growth, should also lead to an increased probability for a country to move to an upper-income level.

Table 13: Expected Relationships - Economic Growth and Selected Variables

Variable	Expected Signs
Baseline Model	
Growth in MC1 ($2-$10)	+
Growth in MC4 ($4-$20)	+
Growth in MC6 (75%-125%)	+
Initial Income	-
Average educational attainment, male and female	+/-
Price level of investment	-
Alternative Control Variables	
Life expectancy	+
Fertility rate	+
Share of working age population	+
Polity II	-
Coups d'état	-
Differential in educational attainment	+/-
Differential in life expectancy	+/-
Number of female seats in parliament	+
Gross savings	+
Urban ratio	+/-
Growth of the terms of trade	+

Note: A +/- sign indicates an uncertain relationship between economic growth, measured by the growth in real GDP p.c. and the selected variable.

Balanced and Unbalanced Panel

The methodology is applied to both a balanced and an unbalanced panel, where in the unbalanced panel the number of observations per time periods varies (Chun and al., 2011). As aforementioned, the unbalanced panel is preferred to the balanced panel, as it enables keeping the original data in estimating the models. More precisely, since the data is expected to be missing non-randomly, interpolating it could lead to efficiency losses and to the possibility of biasing the results. Even though the unbalanced panel has several missing data points, this is not a great consideration as 5-year period averages are used for the estimation models, and as Stata offers ways to counter the problem in estimating the different panel models. However, the balanced panel is still used as a robustness check, and a discussion of the results is included in the next section.

Several interpolation methods are used to construct the balanced panel. As there is no specific theory related to the choice of an interpolation method for macroeconomic variables, a statistical approach is used to determine which method to use. The balanced panel is constructed such that each variable is interpolated using its own "best" approach. As such, for each variable, four interpolation methods are used and then tested using a missing-at-random approach, to assess which method performs better. Two linear interpolation methods are used, the first one using the closest points as an estimation method to interpolate the missing values ("nearest neighbor approach"), and the second one using a linear

regression to predict the missing values. A third approach is the cubic spline estimation where values are interpolated based on the exact fitting of a cubic curve to two data points before and two data points after the missing values. The final approach is the piecewise cubic Hermite estimation where a third-degree polynomial is fitted to interpolate the missing data points.

In the baseline model, all the five middle-class measures (MC5 (Q2-Q4) is excluded as its size remains constant over time) were best approximated using the nearest neighbor approach, and this result was robust after conducting five missing-at-random estimations. For the education variables, the cubic splines provided a better approximation. The growth, initial income and price level of investment variables did not require the use of any interpolation methods.

In the set of control variables, the interpolation methods used vary widely. No interpolation methods were required for the political variables as these variables are binary variables with less variation in values and more available data points. For the macroeconomic and human capital variables, the linear approaches generally better approximated the original values (with the exception of the education variables). In fact, these variables are generally slow to change, and it seems plausible that a linear model would best approximate their trends. Finally, for the gender-related variables, a mix of both linear and cubic splines approaches used to interpolate the data. The results from using a balanced panel to estimate the econometric models are discussed in Section VI.

5 Empirical Results

In this section, I present the empirical results, which are twofold. First, I examine the results from the baseline model, to assess the relationship between the growth of the middle-class and the economic growth. Second, I analyze the results from the logit model to evaluate the probability of countries falling into a middle-income trap. The results are presented for each of the three middle-class measures: MC1 (\$2-\$10), MC4 (\$4-\$20) and MC6 (75%-125%).

5.1 Results - Baseline Model

Reference Equation

Equation 2 is the reference equation for the baseline model. In this equation, the 5-year average growth of real GDP per capita is regressed on the lagged values of initial income, the growth of the middle-class and the other control variables. The variables and the model are described in greater details in Section IV.

$$Growth_{i,t} = \beta_1 Income_{i,t-1} + \beta_2 MiddleClassGrowth_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t-1}$$

Empirical Results

Tables 14, 15 and 16 respectively report the results from the estimation of the baseline model for MC1 (\$2-\$10), MC4 (\$4-\$20) and MC6 (75%-125%). Whenever possible, the regressions include robust and country-clustered error terms. In all three tables, column 1 reports the results of the estimation by OLS, and columns 2 and 3, the results from the fixed-effects and random-effects estimations. Columns 4 and 6 include the results from the system-GMM estimations, respectively using 1 and 2 period lags, along with indications of the number of instruments used and the outcomes from the Sargan test of overidentifying restrictions and the Arellano-Bond test for autocorrelation. Columns 5 and 7 also report the GMM estimation results, but after applying a Windmeijer correction. For simplicity, GMM will be referred to as GMM(1) and GMM(2) when respectively using one and two lags.

The OLS estimates for the coefficient of the middle-class are positive and significant across the three measures. However, as explained, these estimates are likely biased as the OLS does

not control for the country-specific variation. The fixed and random-effects middle-class estimates are also generally positive and significant, with the fixed effects estimates being generally considerably lower than for the random-effects. An Hausman test is performed to determine whether the fixed-effects or random-effects should be preferred. For the three middle-class measures, the test rejects the null hypothesis and suggests that the fixed-effects is consistent and to be preferred to the random-effects model.[25] However, from the literature review, and the previous work on the subject, it can be expected that the first three estimation methods - OLS, FE and RE - are likely biased from the presence of the endogenous lagged income variable in the model. As explained in Sections 2 & 4, the presence of the lagged income variable creates an endogeneity problem, as both the dependent variable and the lagged income variable are correlated with the error term.

The GMM estimation is thus the preferred method, and it is performed using alternative lags specifications, of one and two lags. In both cases, the middle-class variable is treated as endogenous, the lagged income variable as a predetermined variable, and the control variables as exogenous. Other specifications where some control variables, such as education, could be treated as endogenous are also tested, and a discussion of these results is included in Section VI. Given the lack of theoretical considerations on the ideal number of lags to include in GMM models, both lags of 1 and 2 periods are used, to contrast the results. As a robustness check, I also compare the results obtained from using a higher number of lags. Whenever possible, the Windmeijer finite-sample correction is applied to obtain robust standard-errors.

To assess the validity of the results from the GMM estimations, the Sargan and Arellano-Bond tests are both performed. While when using two-lags, both tests are satisfied for all measures, it is not always the case with one lag. With both lags specifications, the two tests are satisfied for MC4 ($4-$20) and MC6 (75%-125%), while for MC1 ($2-$10) the Sargan test is only satisfied after applying the Windjmeijer correction to obtain robust standard errors.[26] From the theoretical considerations and based on the results from the two tests, the system-GMM estimates are consistent and efficient, so the remainder of the discussion will focus on the results obtained from this estimation method. Moreover, for consistency in the results, and for comparability across all three measures, the results from the two-step GMM estimation after applying the Windjmeijer correction (when possible) is preferred.[27]

[25] χ^2 for MC1($2-$10) is 41.60, for MC4 ($4-$20) it is 245.38 and for MC6 (75%-125%) it is 14.17.

[26] The Sargan test of overidentification's null hypothesis is that the overidentifying restrictions are valid. A rejection of the null hypothesis therefore indicates that the model may be misspecified. For MC1 ($2-$10), with GMM(1) the χ^2 is 0.064 and after applying the Windmeijer correction, the χ^2 is 0.401. With GMM(2), the χ^2 is 0.091 and it becomes 0.113 after applying the correction.

[27] The system-GMM including the estimation of a standard errors weighting matrix is referred to as the two-step GMM, whereas the system-GMM without this correction is referred to as the one-step GMM (or simply GMM for simplicity). A widely used correction for finite-sample is the Windmeijer standard errors correction.

Using either GMM(1) or GMM(2) results in a difference in the available degrees of freedom; GMM(2) significantly reduces the available degrees of freedom, as it uses more lags and subsequently, more instruments. Moreover, across the three measures, there is a wide difference in the significance of the estimates. As expected from theory, the OLS estimates are generally upward biased due to the presence of the lagged income term in the estimation model. On the other hand, the fixed-effects estimation generally leads to downward biased coefficients. As such, a widely-used approach to validate the system-GMM estimates is to assess whether they are in the range in between the OLS and FE estimates (Baltagi, 2013). As such, the following discussion will contrast the estimates obtained from both GMM(1) and GMM(2).

Given the purpose of this study to examine the relationship between the middle-class and the economic growth, the main coefficient of interest in Tables 14, 15 and 16 is the coefficient of the growth of the middle-class. Across all three middle-class measures, the coefficients are positive but their magnitudes and significance vary widely. MC6 (75%-125%) estimates the highest coefficient for the growth of the middle-class, and MC4 ($4-$20) estimates the lowest one. Using GMM(1), the coefficients are generally significant, except for MC6 (75%-125%). On the other hand, with GMM(2), both MC1 ($2-$10) and MC6 (75%-125%) are generally significant and have higher coefficients than with GMM(1).

Using MC1 ($2-$10) as the middle-class measure, with the GMM(1) we observe that a 1% increase in the growth rate of the middle-class leads to an average 0.173% increase in the real GDP growth rate over each 5-year periods (see Table 14, column 5). The GMM(2) estimation suggests a greater influence of the middle-class (0.234% vs 0.173%), but the estimate is less significant (see Table 14, column 7). The estimate from the two-step GMM(1) seems more accurate as it is comprised in between the OLS and FE estimates, and both the overidentification and autocorrelation tests are satisfied. However, in the one-step GMM(1), there is evidence of serial correlation from the result of the Sargan test.

Using MC4 ($4-$20), the GMM(1) estimation suggests that a 1% increase in the growth rate of the middle-class leads to a 0.076% increase in economic growth on average per 5-year periods (see Table 15, column 5). The GMM(2) estimation yields non-significant coefficients. Both coefficients are comprised in between the OLS and FE estimates, and both tests are satisfied.

Using MC6 (75%-125%) as the middle-class measure, the GMM(1) estimation suggests that a 1% increase in the growth rate of the middle-class yields a 0.324% increase in the real GDP growth rate over a 5-year period (see Table 16, column 5). Yet, the GMM(2) estimation suggests that a 1% increase in the growth rate of the middle-class yields a considerable increase of 0.371% in the real GDP growth rate over a 5-year period (see Table 16, column

7). These estimates are considerably above the OLS and FE coefficients, but both the Sargan and Arellano-Bond tests are satisfied.

As for the control variables, the coefficient of the initial income is negative, and this result is robust across most estimation methods and middle-class measures. However, the coefficient's significance varies across the three measures. For MC1($2-$10), the coefficient is always negative and significant, whereas this result only holds with GMM(1) for MC4 ($4-$20). For MC6 (75%-125%), the coefficient is generally negative but non-significant.

With both GMM(1) and GMM(2), the other control variables - male and female educational attainment levels, and the price level of investment - are not significant using either middle-class measures. Under the other estimation methods, these coefficients are also generally non-significant. The male and female educational attainment variables have different signs, similarly to the results obtained by Forbes (2000), with the former being positive and the later negative. As expected, the price level of investment is generally negative.

While for MC1 ($2-$10), the GMM(1) results suggest coefficients for the middle-class that are in the range of the OLS and FE estimates, for MC4($4-$20) both GMM(1) and GMM(2) leads to this result, and for MC6 (75%-125%), none of the coefficients are comprised in this ideal range. Moreover, for MC1($2-$10), the Sargan test is not satisfied for the one-step GMM coefficients, but only for the second-step results. As such, for the subsequent analysis with additional control variables, and for the sensitivity analysis, I report the estimates from GMM(2).

Table 14: Growth and Middle-Class: Baseline Model - MC1 ($2-$10)

	1	2	3	4	5	6	7
Estimation methods	**OLS**	**FE**	**RE**	**GMM A&B(1)**	**GMM A&B(1)**	**GMM A&B(2)**	**GMM A&B(2)**
Growth of the MC	0.197***	0.009	0.147***	0.160*	0.173***	0.231	0.234*
	(0.073)	(0.047)	(0.059)	(0.085)	(0.081)	(0.142)	(0.117)
Income	-0.136	-4.895***	-0.320	-8.920***	-9.630***	-17.027***	-19.488***
	(0.357)	(1.861)	(0.369)	(3.345)	(3.131)	(4.419)	(8.180)
Male education	0.384	-0.359	0.274	0.576	0.694	2.588	0.291
	(0.423)	(1.832)	(0.456)	(0.717)	(1.880)	(2.620)	(4.063)
Female education	-0.085	3.235*	0.078	-0.268	-0.360	-2.014	0.316
	(0.356)	(1.857)	(0.382)	(1.394)	(1.647)	(-2.673)	(4.295)
Price level of investment	-0.103	-0.728***	-0.241	1.407	1.227	-1.665	-1.733
	(0.196)	(0.276)	(0.188)	(1.739)	(1.814)	(1.299)	(2.085)
Constant	2.748	34.808***	4.246*	6.146*	6.335***	-5.087	-2.082
	(2.348)	(12.748)	(2.462)	(3.322)	(2.524)	(7.526)	(12.315)
R^2	0.149	0.220	0.139				
Observations	115	115	115	113	113	84	84
Countries	30	30	30	30	30	30	30
Instruments				29	29	21	21
Sargan				0.064	0.401	0.091	0.113
AR(1)				0.011	0.035	0.364	0.586
AR(2)				0.381	0.497		

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. AR(1) and AR(2) are the p-value from the Arellano-Bond autocorrelation tests for the first and second order; Sargan is the p-value for the Sargan over identification test. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Reported R^2 are the overall R^2 for both OLS random-effects, and is the within-R^2 for the fixed-effects estimation.

Table 15: Growth and Middle-Class: Baseline Model - MC4 ($4-$20)

	1	2	3	4	5	6	7
Estimation methods	**OLS**	**FE**	**RE**	**GMM A&B(1)**	**GMM A&B(1)**	**GMM A&B(2)**	**GMM A&B(2)**
Growth of the MC	0.097***	-0.028	0.080***	0.068*	0.076***	0.049	0.061
	(0.020)	(0.021)	(0.017)	(0.035)	(0.028)	(0.050)	(0.068)
Income	-0.145	-5.439***	-0.230	-7.339***	-7.120***	-9.188	-6.876
	(0.287)	(1.775)	(0.318)	(3.090)	(3.127)	(5.914)	(8.554)
Male education	0.315	-0.648	0.271	1.536	1.681	3.751	2.879
	(0.418)	(1.847)	(0.440)	(1.857)	(1.450)	(2.711)	(2.701)
Female education	-0.020	3.705*	0.037	-1.097	-1.166	-3.361	-2.228
	(0.315)	(2.011)	(0.329)	(1.557)	(1.105)	(2.745)	(2.587)
Price level of investment	-0.144	-0.670***	-0.222	0.754	0.852	-0.802	-0.177
	(0.207)	(0.278)	(0.193)	(1.235)	(1.124)	(1.547)	(2.421)
Constant	2.893	38.753***	3.630*	5.765	6.528	-14.618	-14.372
	(2.023)	(12.084)	(2.047)	(4.275)	(4.030)	(11.085)	(10.344)
R^2	0.156	0.229	0.154				
Observations	115	115	115	113	113	84	84
Countries		30	30	30	30	30	30
Instruments				29	29	21	21
Sargan				0.039	0.374	0.132	0.140
AR(1)				0.030	0.166	0.175	0.526
AR(2)				0.727	0.715		

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. AR(1) and AR(2) are the p-value from the Arellano-Bond autocorrelation tests for the first and second order; Sargan is the p-value for the Sargan overidentification test. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Reported R^2 are the overall R^2 for both OLS random-effects, and is the within-R^2 for the fixed-effects estimation.

Table 16: Growth and Middle-Class: Baseline Model - MC6 (75%-125%)

	1	2	3	4	5	6	7
Estimation methods	**OLS**	**FE**	**RE**	**GMM A&B(1)**	**GMM A&B(1)**	**GMM A&B(2)**	**GMM A&B(2)**
Growth of the MC	0.262***	0.208***	0.260***	0.324*	0.285	.370*	0.371***
	(0.123)	(0.073)	(0.108)	(0.170)	(0.208)	(0.219)	(0.130)
Income	-0.700*	-4.776***	-0.960***	-5.305	-6.002	1.758	-0.558
	(0.282)	(1.689)	(0.332)	(4.882)	(7.263)	(9.803)	(9.475)
Male education	0.319	0.416	0.305	2.124	2.013	1.987	0.985
	(0.427)	(1.898)	(0.484)	(2.053)	(0.301)	(2.649)	(2.735)
Female education	-0.094	1.862	0.135	-1.967	-1.543	-2.027	-1.390
	(0.329)	(1.811)	(0.355)	(1.998)	(2.016)	(2.406)	(2.498)
Price level of investment	-0.031	0.308*	0.175	2.097	1.673	3.054	0.619
	(0.155)	(1.141)	(0.372)	(2.332)	(3.699)	(4.009)	(2.951)
Constant	7.469***	33.583***	8.874***	12.148***	14.603*	13.131	11.744
	(2.574)	(11.717)	(2.451)	(3.467)	(7.502)	(9.588)	(9.196)
R^2	0.115	0.285	0.106				
Observations	115	115	115	113	113	84	84
Countries		30	30	30	30	30	30
Instruments				29	29	24	24
Sargan				0.141	0.222	0.888	0.769
AR(1)				0.008	0.076	0.368	0.683
AR(2)				0.446	0.562		

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. AR(1) and AR(2) are the p-value from the Arellano-Bond autocorrelation tests for the first and second order; Sargan is the p-value for the Sargan over identification test. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Reported R^2 are the overall R^2 for both OLS random-effects, and is the within-R^2 for the fixed-effects estimation.

5.2 Baseline Model - Alternative Control Variables

In addition to the control variables specified in Equation 2, four set of control variables are included in the baseline model, to assess the significance of the various indirect channels by which the middle-class could influence economic growth. Results are presented in Table 17 (see Section IV for the detailed descriptions and definitions of each variable). For simplicity, only the results of the two-step system-GMM estimation using two-lags is presented (GMM(2). The following discussion contrasts these results to the estimates from the 7^{th} column in the baseline model tables (see Tables 14, 15 16).

The estimated coefficients for the growth of the middle-class, compared to the results from the baseline model, remain positive, but their magnitudes vary widely depending on the set of control variables used. Again, the results also vary greatly when comparing them across the three middle-class measures. In the four alternative model specifications, both tests of overidentification and the first-order autocorrelation tests are satisfied.

To assess the indirect influence of human capital, three variables are added to the baseline model: the fertility rate, the life expectancy and the share of working age population. In this

alternative specification, the middle-class coefficient remains positive for all three measures, but is only significant for MC1 ($2-$10). Using this measure, the magnitude of the middle-class variable is slightly lower, at 0.191% comparatively to 0.234%, but it is more significant (see Table 17, column 1). Using MC4 ($4-$20), the coefficient slightly increases, but it is non-significant (see Table 17, column 2). With MC6 (75%-125%) it rather decreases but again, it is non-significant (see Table 17, column 3). None of the control variables are significant, but all the variables have the expected signs, apart from the fertility rate variable.

Turning to the indirect influence of the political variables, I include two variables to the model: the Polity II index and the number of coups d'état. Again, all three middle-class measures have a positive coefficient but only MC1 ($2-$10) is significant. In this model, its coefficient has a considerably lower magnitude, suggesting that a 1% increase in the growth rate of the middle-class only leads to an average 0.09% increase in growth, per 5-year period, compared to a 0.231% increase in the baseline model (see Table 17, column 4). Again, neither MC4 ($4-$20) or MC6 (75%-125%) are significant but they remain positive (see Table 17, columns 5 & 6).

To test whether gender-inequality has an indirect influence on the impact of the middle-class on growth, I add three variables to the model: the differentials in female and male educational attainment levels and life expectancy, as well as the number of seats held by women in parliament. In this model specification, all three middle-class measures are significant and positive. For both MC4 ($4-$20) and MC6(75%-125%), the middle-class coefficient slightly increases from 0.061% to 0.075%, and from 0.371% to 0.382% per 5-year period (see Table 17, columns 8 & 9). For MC1 ($2-$10) the coefficient remains approximately the same at 0.23% (see Table 17, column 7). Across the three measures, the number of seats held by women in parliament variable is positive and significant, suggesting that having female involved in the political decisions has a positive influence on economic growth. The other measures have the expected signs, but are not significant.

Finally, to assess whether the macroeconomic conditions have an indirect influence on the relationship between the growth of the middle-class and the economic growth, I include three measures to the baseline model: the gross-savings, the urban ratio and the terms of trade growth. Similarly to the human capital and political variables results, all three middle-class measures remain positive but only MC1 ($2-$10) is significant. In this specification, the middle-class has a reduced influence on economic growth, with a 1% increase in growth of the MC yielding a 0.187% increase in growth over a 5-year period (see Table 17, column 10). While non-significant, both MC4($4-$20) and MC6 (75%-125%) also have decreased coefficients for the middle-class (see Table 17, columns 11 & 12). Across all three measures, the gross savings variable is positive and very significant, suggesting that increasing the share of savings in a given economy has positive influence on growth. As expected, the

urban ratio is negative but it is non-significant. Finally, the growth in the terms of trade is only positive and significant for MC1($2-$10).

In all the alternative model specifications, MC1 ($2-$10) is the only middle-class measure that consistently remained significant. Across all four models, its coefficient decreased compared to the results obtained from the system-GMM in the baseline model. This could suggest that the baseline model suffers from an omitted variable bias, where the middle-class coefficient is inflated due to the omission of some key variables that have a significant influence on economic growth. Interestingly, MC4($4-$20) and MC6 (75%-125%) only have significant coefficients in the gender-inequality model specification, and their coefficients slightly increase. From the eleven variables added to the model, only three have an indirect relationship with the middle-class and a significant impact on economic growth: the gross-savings ratio, the number of female seats in parliament and the growth in the terms of trade. As expected, in all three cases the signs of the coefficients are positive, suggesting that increasing the gross savings, the number of female involved in political decisions and the trade liberalization all lead to increased growth.

In the Section IV, I assess whether these results are robust to alternative model specifications and variables definitions.

Table 17: Baseline Model - Alternative Control Variables

	1	2	3		4	5	6
Channels	**Human Capital Channel**				**Political Channel**		
Middle-class Variable	**MC1**	**MC4**	**MC6**		**MC1**	**MC4**	**MC6**
Estimation Method	**GMM A&B**	**GMM A&B**	**GMM A&B**		**GMM A&B**	**GMM A&B**	**GMM A&B**
Growth of the MC	0.191***	0.073	0.228	**Growth of the MC**	0.090*	0.062	0.342
	(0.091)	(0.058)	(0.212)		(0.046)	(0.071)	(0.418)
Income	-7.589	-6.067	-4.601	**Income**	-9.823*	-9.847	-4.579
	(5.264)	(5.067)	(6.906)		(5.061)	(6.972)	(12.340)
Male education	0.006	0.591	-0.854	**Male education**	0.277	3.980	2.316
	(1.659)	(1.543)	(1.608)		(1.891)	(2.902)	(3.508)
Female education	-0.089	-0.873	-0.165	**Female education**	-1.287	-3.635	-2.915
	(1.633)	(1.462)	(1.528)		(2.504)	(2.995)	(3.262)
Price level of investment	-1.636	-1.280	0.567	**Price level of investment**	-0.978	-0.541	1.742
	(0.999)	(1.182)	(1.842)		(1.543)	(1.378)	(3.233)
Fertility rate	0.138	-0.267	1.767	**Polity_II**	0.863	-0.457	-0.681
	(2.801)	(2.836)	(3.336)		(1.217)	(1.067)	(2.449)
Life expectancy	0.404	0.393	0.192	**Coups d'Ãl'tats**	-0.101	-2.637	-0.076
	(0.251)	(0.241)	(0.246)		(1.591)	(3.521)	(3.437)
Share of working age population	0.211	0.144	0.456*				
	(0.239)	(0.635)	(0.073)				
Constant	-27.650	-29.744	-19.741	**Constant**	-2.483	-15.263	8.071
	(18.505)	(18.582)	(21.045)		(6.055)	(-15.263)	(13.053)
Observations	84	84	84	**Observations**	84	84	84
Countries	30	30	30	**Countries**	30	30	30
Instruments	24	24	24	**Instruments**	29	23	23
Sargan	0.339	0.478	0.796	**Sargan**		0.199	0.911
AR(1)	0.156	0.146	0.662	**AR(1)**		0.337	0.891

	7	8	9		10	11	12
Channels	**Gender Inequality Channel**				**Macroeconomics Channel**		
Middle-class Variable	**MC1**	**MC4**	**MC6**		**MC1**	**MC4**	**MC6**
Estimation method	**GMM A&B**	**GMM A&B**	**GMM A&B**		**GMM A&B**	**GMM A&B**	**GMM A&B**
Growth of the MC	0.230**	0.075*	0.382*	**Growth of the MC**	0.187*	0.003	0.246
	(0.113)	(0.041)	(0.278)		(0.109)	(0.108)	(0.275)
Income	-17.071**	-10.611*	-6.962	**Income**	-0.994	-4.242	-4.866
	(4.729)	(5.641)	(9.627)		(5.472)	(4.265)	(6.980)
Diff. in female and male educational attain.	-1.923	-2.573	-1.544	**Male education**	2.672	3.138	2.185
	(2.164)	(2.037)	(2.310)		(3.124)	(2.810)	(2.620)
				Female education	-2.318	-2.619	-2.401
					(3.109)	(2.974)	(2.695)
Price level of investment	-3.480*	-2.385	-0.096	**Price level of investment**	-0.046	-1.732	1.108
	(1.880)	(2.103)	(2.691)		(1.110)	(1.084)	(1.892)
Diff. in female and male life expectancy	0.136	-0.123	-0.400	**Gross savings**	0.140***	0.121***	0.139***
	(0.575)	(0.721)	(0.933)		(0.041)	(0.045)	(0.065)
Number of female seats in Parliament	0.118***	0.099***	0.120***	**Urban ratio**	-0.058	-0.057	-0.038
	(0.045)	(0.038)	(0.055)		(0.101)	(0.088)	(0.164)
				Growth of the terms of trade	0.069	-0.010	-0.032
					(0.088)	(0.109)	(0.097)
Constant	-0.049	-5.824	12.809	**Constant**	-9.539	-19.099	8.870
	(8.084)	(8.931)	(14.212)		(16.338)	(19.860)	(21.506)
Observations	82	82	82	**Observations**	77	77	77
Countries	30	30	30	**Countries**	30	30	30
Instruments	22	22	22	**Instruments**	24	24	24
Sargan	0.537	0.582	0.990	**Sargan**	0.756	0.4534	0.877
AR(1)	0.555	0.173	0.973	**AR(1)**	0.238	0.236	0.961

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. AR(1) and AR(2) are the p-value from the Arellano-Bond autocorrelation tests for the first and second order; Sargan is the p-value for the Sargan over identification test. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

5.3 Results - Logit Model

Reference Equation

We now turn to the estimation of the logit model. This model estimates the influence of the middle-class and its related determinants on the probability of a country moving to an upper-income level, measured by the GNI per capita. The reference equation for the logit model is Equation 5, where the dependent variable is a binary variable that takes a value of 1 whenever a country successfully makes a transition to an upper-income level over a given 5-year period, and of 0 otherwise. The variables and the model are described in more details in Section IV.

$$Log(\pi/(1-\pi)) = \alpha + \beta_1 Income_{i,t-1} + \beta_2 MiddleClass_{i,t-1} + \beta_3 FemaleEducation_{i,t-1} + \beta_4 MaleEducation_{i,t-1} + \beta_5 PLI_{i,t-1} + \alpha_i + \eta_t + \varepsilon_{i,t-1}$$

Empirical Results

The results from the estimation of this model are presented in Table 18, where coefficients are expressed as log-odds ratios. For all three middle-class measures, the results are reported for all the estimation methods: the MLE, and the fixed and random-effects estimations. Whenever possible, the results are presented using the robust and country-clustered standard errors.

Table 18: Middle-Class and Middle-Income Trap: Logit Model - Selected Middle-Class Measures

	1	2	3	4	5	6	7	8	9
Middle-class variables	**MC1 ($2-$10)**			**MC4 ($4-$20)**			**MC6 (75%-125%)**		
Estimation Methods	**MLE**	**FE**	**RE**	**MLE**	**FE**	**RE**	**MLE**	**FE**	**RE**
Growth of the MC	0.168**	0.26*	0.168***	0.060**	0.031	0.060**	0.036	0.116	0.036
	(0.053)	(0.141)	(0.065)	(0.029)	(0.038)	(0.030)	(0.069)	(0.141)	(0.095)
Income	0.968***	3.379	0.968***	0.845***	2.152	0.845***	0.479*	1.088	0.478
	(0.341)	(2.336)	(0.436)	(0.305)	(2.218)	(0.421)	(0.258)	(1.921)	(0.372)
Male education	-0.140	-0.552	-0.140	-0.187	-0.811	-0.187	-0.242	-0.533	-0.242
	(0.351)	(2.491)	(0.515)	(0.269)	(2.474)	(0.497)	(0.275)	(2.391)	(0.489)
Female education	-0.213	-0.273	-0.213	-0.098	0.323	-0.098	-0.124	0.479	-0.124
	(0.260)	(2.304)	(0.467)	(0.209)	(2.297)	(0.444)	(0.220)	(2.221)	(0.437)
PPP	-0.767	-2.005	-0.767	-0.882	-0.900	-0.882	-1.030	-0.974	-1.029
	(0.643)	(3.484)	(1.247)	(0.759)	(2.785)	(1.315)	(0.815)	(2.795)	(1.334)
Constant	-8.766***		-8.768***	-7.651***		-7.651***	-4.335***		-4.334*
	(2.461)		(3.220)	(2.441)		(3.125)	(2.017)		(2.533)
Observations	116	52	116	116	52	116	116	52	116
Countries	30	30	30	30	30	30	30	30	30
R^2	0.112			0.085			0.036		

Notes: Dependent variable is a binary variable that takes a value of 1 if a given country has successfully transitioned to an upper-income category, in a 5-year period, and 0 otherwise. Coefficients are expressed as log-odds ratios. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

The MLE estimates for the middle-class measures are positive and significant for both MC1 ($2-$10) and MC6 (75%-125%). Across the fixed and random effects estimation results, there is a lot of variation with MC1($2-$10) generally having higher log-odds coefficients than the other measures, and MC6 (75%-125%) having non-significant estimates. As expected, the Hausman test reveals that the random-effects model is to be preferred to the fixed-effects model, for all three middle-class measures.[28] As aforementioned, the fixed effects estimation requires considerable variation in the dependent variable within countries over time, whereas it is more probable that the income transitions are slow to occur and less frequent within than across countries.

Importantly, the MLE and random-effects estimates are the same, with the exception of the standard errors[29]. This result is not surprising as there is not much within or between variation across countries with respect to the frequency of income transitions (see Table 11). As such, the discussion focuses on the estimates from the MLE estimation.

Across all three measures, there is considerable variation in the coefficients for the growth of the middle-class. The magnitude of the coefficients varies, with MC1 ($2-$10) having considerably larger log odds ratios than the other two measures. For MC1 ($2-$10) and MC4 ($4-$20), the coefficient is positive and significant, suggesting that over a 5-year period a 1% increase in the growth rate of the size of the middle-class leads to increased odds for the country to reach an upper-income level, of respectively 1.183 ($e^{0.168}$) and 1.061($e^{0.060}$), holding everything else constant (see Table 18, columns 1 & 4). Thus, as expected, increasing the size of the middle-class has a positive incidence on growth but also on the countries' ability to escape the middle-income trap. However, while the results for MC6 (75%-125%) also suggest a positive relationship between both variables, the coefficient is non-significant (see Table 18, column 7).

The coefficient for the initial income is positive, and significant in both the MC1 ($2-$10) and MC4 ($4-$20) models. This result suggests that a higher initial income increases the log-odds ratio of this country reaching a new income level. In other words, an increase in the initial income increases the odds ratio of this country making a successful upward transition by a factor of 2.632 ($e^{0.968}$) when measured by MC1 ($2-$10) , and by 2.328 ($e^{0.845}$) when measured by MC4 ($4-$20) over a 5-year period (see Table 18, columns 1 & 4). For MC6 (75%-125%), the coefficient is positive but non-significant (see Table 18, column 7). This result is in line with the initial expectations, as it is reasonable to assume that a country with a higher income endowment has a greater probability to become richer. However, this does

[28] For MC1 ($2-$10), the χ^2 is 0.8995 , for MC4 ($4-$20) χ^2 is 0.1437 and for MC6 (75%-125%) it is χ^2 is 0.9478.

[29] This is related to the fact that with the random-effects logit estimation in Stata, the clustered and robust errors option is not available. As such, it can be expected that both the MLE and RE would yield the same results.

not imply that the higher initial income has a positive influence on growth, as suggested by the baseline models results. Since the income classification is based on the level (and not growth) of income, it is reasonable to find that a higher initial level of income increases this probability.

5.4 Logit Model - Alternative Control Variables

I also assess whether the influence of an increased middle-class size on the odds of a country's income transition could be related to the indirect influence of selected growth determinants and other key variables. In Figure 1, I identified some key determinants of the middle-income traps, and in this section, I include selected variables in the logit model to test these various hypotheses. As inequality and income distribution are major factors underlying several of these determinants, the control variables are the same as those used in the baseline model. Their definitions are included in Section IV.

The share of human capital plays an important role in shaping a country's institutions, productivity levels, and general economic development. As such, to assess the role of human capital, in addition to the male and female education variables, I include three variables to the model: the fertility rate, the life expectancy and the share of working age population. In this model specification, the growth of the middle-class only has a positive influence on the odds ratio when measured using MC1 ($2-$10). Following a 1% increase in the growth rate of the middle-class, the odds of a successful income transition increase by a factor of 1.175 ($e^{0.161}$) (compared to 1.183) over a 5-year period (see Table 31). None of the other middle-class measures and control variables have significant coefficients.

Political decisions have a great influence on the quality of institutions and governance, and ultimately on the economic growth. Including the Polity Index and the numbers of coups d'état in the model, I find that both MC1 ($2-$10) and MC4 ($4-$20) have slightly lower odds ratios of success, of respectively 1.168 ($e^{0.155}$) and 1.050 ($e^{0.048}$) for a 5-year period (see Tables 31 & 32). For both measures, an increase in initial income is also related to increased odds ratios of a country moving to an upper-income threshold by factors of 1.346 ($e^{0.}$) and 1.180 ($e^{0.}$). Polity is the only control variable that is significant, suggesting that an increase in the democratic orientation of the economy leads to an increased odd that the country becomes richer. This odds is slightly greater in the MC1 ($2-$10) model specification, with a one unit increase in the Polity measure leading to an increased odds by a factor of 0.36 ($e^{-1.029}$) over the 5-year period.

While not directly identified as a determinant of the MIT in the literature, for comparability with the results of the baseline model, I also assess whether gender inequality has an impact the MIT incidence, by including the number of female seats in parliament variable and the

differential in both male and female educational attainment and in life expectancies. From its influence positive on growth, it is reasonable to make the hypothesis that gender equality also has an influence on economic development. Indeed, the odd of an income transition increased to 1.235 ($e^{0.257}$). for a 1% increase in the growth of MC1 ($2-$10) over a 5-year period, while holding everything else constant (see Table 31). The coefficient slightly decreased for MC4 ($4-$20), at an odds-ratio of 1.053 ($e^{0.063}$) (see Table 32). None of the control variables are significant.

To control for the macroeconomic variables, I include the share of gross savings, the growth of the terms of trade and the urban ratio indicators in the model. The coefficient for MC1 ($2-$10) slightly increases, with a 1% increase in the growth of the middle-class yielding a 1.191 ($e^{0.213}$) odds of a successful transition over a 5-year period, whereas it decreased to 1.054 ($e^{0.064}$) with MC4 ($4-$20) (see Tables 31 & 32). Again, none of the control variables have a significant impact on the probability of a country reaching an upper-income level.

Overall, across the alternative model specifications, there is little variation in the odds ratio of success from an increase in the growth of the size of both MC1 ($2-$10) and MC4 ($4-$20). While always positive and significant, the odds for MC1 ($2-$10) slightly increase when controlling for the gender inequality and macroeconomic channels. On the other hand, for MC4 ($4-$20) the odds from the middle-class growth are positive and significant in all alternative specifications, apart from the first one. There is no significant influence on the odds ratio for MC6 (75%-125%) in either specifications (see Table 33). Of the eleven additional variables included in the logit model, only the Polity measure is significant, and it has a positive influence on the probability of the country reaching an upper income level.

Similarly to the results from the baseline model, the other variables included the model are non-significant. The impacts of using alternative model specifications and variables definitions are measured to assess the robustness of these results, in Section VII.

6 Sensitivity Analysis - Baseline Model

I conduct a sensitivity analysis on the baseline model to assess whether the relationship between the middle-class and growth is robust. The importance of performing several robustness checks is supported by the literature review, which revealed that using different models specifications leads to a variety of conclusions related to the causality (or non-causality) between both variables. As such, in this section, I compare the results obtained from the baseline model while using alternative datasets and variables definitions. I also include a note on alternative estimation approaches. As the results were presented for the three middle-class measures, this analysis also includes a distinction in the results from MC1 $2-$10), MC4 ($4-$20) and MC6 (75%-125%).

6.1 Alternative Datasets

The methodology is applied to alternative datasets to validate whether the baseline model results are consistent. Various datasets are constructed following a distinction by: 1) Inequality Levels, 2) Regional Groups, 3) Income Groups, 4) Balanced and Unbalanced panel, and 5) Time Periods. The results of this analysis is presented in Tables 27, 28 and 29.[30]. Finally, I also test for the presence of influential observations by removing outlier countries from the panel one at a time.

All four estimation methods (OLS, fixed & random-effects and system-GMM) are applied to the alternative datasets, but for simplicity, not all the results are included. For the system-GMM, only the estimation results obtained from using 2-lags are presented.

Inequality Levels

From Kazakhstan (Gini of 30.6) to Brazil (Gini of 53.8), there is considerable dispersion in the inequality levels from one country to another (see Table 25). Moreover, over the past 25 years, the inequality levels have varied widely, with some countries experiencing continuous increases in inequality, such as China, and others experiencing decreases, as in Thailand. As such, it is interesting to evaluate whether the baseline model results are affected by differences in inequality levels. Stated differently, I evaluate whether the influence of an increased middle-class size on economic growth is mitigated by the presence of inequalities. As such, I construct two panels, based on the countries' inequality levels in 2010, as measured by the Gini coefficient. The first panel includes countries with Gini

[30]The results obtained from the balanced panel are not included in this paper, for simplicity as they are very similar to the results obtained from the unbalanced panel.

coefficients at or below 0.45. While it is arguable that at 0.45 countries still have relatively high inequality levels, this threshold is determined based on the composition of the panel, as to assess whether there is a difference in the results obtained when countries have very high inequality levels. Thirteen countries are included in this first panel: Argentina, El-Salvador, Indonesia, Kazakhstan, Kyrgyz Republic, Lao PDR, Malaysia, Nicaragua, Pakistan, Peru, Sri-Lanka, Thailand, Venezuela and Vietnam. The remaining 17 countries, with "high" inequality levels, are included in the second panel. Table 18 includes the results from the estimation of the baseline model, for these two distinct panels. While this table only includes the results for the MC6 (75%-125%) measure, the approach is also applied to the other two middle-class measures.

Table 19: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - Inequality Levels

	Coefficient on the middle-class	SE	Countries	p-value	Obs.	Estimation methods
Moderate inequality						
Growth of MC6 (75%-125%)	0.340**	0.244	13	0.021	47	OLS
Growth of MC6 (75%-125%)	0.196	0.140	13	0.186	47	FE
Growth of MC6 (75%-125%)	0.345***	0.129	13	0.007	47	RE
Growth of MC6 (75%-125%)	0.275	0.171	13	0.108	35	GMM - A&B
High inequality						
Growth of MC6 (75%-125%)	0.149**	0.064	17	0.034	68	OLS
Growth of MC6 (75%-125%)	0.123**	0.053	17	0.034	68	FE
Growth of MC6 (75%-125%)	0.153***	0.041	17	0	68	RE
Growth of MC6 (75%-125%)	0.125	0.186	17	0.503	47	GMM - A&B

Notes: The model has the same specification as the baseline models, with the average growth in real GDP per capita as the dependent variable. GMM is defined as in the other models, using two-lags and defining the middle-class as endogenous, the initial income as predetermined and the other control variables as exogenous. For the analysis, moderate inequality is defined as a Gini coefficient below 0.45, whereas high inequality corresponds to a Gini coefficient above 0.45 as of 2010.
*** p<0.01, ** p<0.05, * p<0.1.

This analysis shows interesting results, with the first panel exhibiting considerably higher coefficients for the middle-class. However, in both panels the coefficient for MC6 (75%-125%) is not significant when applying the GMM estimation method, and this is very likely related to the relatively low number of observations. Similar results are reached for the other two middle-class measures, with the coefficients for MC1 ($2-$10) and MC4 ($4-$20) also becoming larger - but to a lesser extent than for MC6 (75%-125%) - for all estimation methods in the first panel.

These results indicate that the baseline model results are not robust to changes in the inequality levels across countries. Moreover, it suggests that the influence of the middle-class on economic growth is mitigated by the presence of inequalities. This seems to be particularly the case for MC6 (75%-125%). In fact, given its relative nature, the size of MC6 (75%-125%) depends on the level of inequality, such that with increased inequality

there is more dispersion around the median and less individuals are considered to be part of the middle-class.

Regional Groups

Latin American countries and Asian countries are separated in two distinct panels, to validate if a regional bias could alter the results (Forbes, 2000). When estimating the baseline model, for both panels the middle-class coefficient remains positive across all three measures and estimation methods, with some exceptions for the fixed effects and the GMM in Asia (due to the limited number of data points). However, the magnitude and the significance of the coefficient changes significantly across all three measures and most importantly, across both panels. In the Asian panel, there is substantial variation in the coefficients across all three estimation methods, while in LAC this variation is more moderate. The coefficient is generally greater and more significant for the LAC countries.

These regional divergences suggest that the results are not robust when controlling for the countries'regional groups. However, a main concern with this approach is the limited number of data points in both panels. Again, this considerably limits the validity of the results obtained from the different estimation methods, and more specifically, from the GMM.

Income Groups

To validate whether the misrepresentation of poor countries in the panel could have influenced the results, I construct two distinct panels based on income groups (Forbes, 2000). More precisely, I divide the sample by income levels following the MIT classification, such that the first panel is composed of the fourteen countries classified as part of the MIT, and the second panel comprises the remaining sixteen countries (see Table 9).

For the MIT countries, MC1 ($2-$10) and MC4 ($4-$20) generally have slightly higher coefficients than for the non-MIT countries. However, with the third measure, MC6 (75%-125%), the results tend to be in the opposite direction with the influence of the growth of the middle-class on economic growth being greater in non-MIT countries. Again, substantial variations exist in the results obtained from the two panels, and this is also likely related to the limited amount of data in both panels which is a considerable limitation to the analysis. As such, no clear conclusions can emerge from this analysis, but it further supports the idea that at varying economic development levels, the middle-class has a changing influence on

growth. Moreover, this result highly depends on the middle-class definition used.

Balanced Panel

I replicate the analysis from the baseline model using the balanced panel, to assess whether it leads to significant results in comparison with the unbalanced panel. Using this panel, the results from the baseline model estimation don't significantly differ from the original analysis. As explained in Section IV, when using a balanced panel, the advantages of having more data points have to be balanced against the costs of altering the original data and possibly introducing serial correlation in the panel. Therefore, using the unbalanced panel is likely to be a reasonable choice.[31]

Alternative Time Periods

From the previous studies on the subject, it is very likely that conducting the analysis over alternative time periods could alter the results. As such, I re-estimate the baseline model using 3-year and 10-year periods averages, instead of the 5-year periods used in the main analysis.[32]. Several panels are constructed, to take into account these different time periods: 1) two unbalanced panels with 3-year and 10-year periods, 2) two balanced panels with 3-year and 10-year periods, 3) 2 unbalanced panels with 3-year and 10-year periods for LAC, and 2 for Asian countries, and finally 4) 2 unbalanced panels with 3-years and 10-year periods for MIT, and 2 for non-MIT countries. Tables 27, 28 and 29 include the results from this analysis. For simplification, only the general results are presented.

Over the 10-year period, the coefficient on the middle-class is positive, significant and considerably larger than for the original baseline model, for the first two middle-class measures, MC1 ($2-$10) and MC4 ($4-$20). On the other hand, for the relative measure MC6 (75%-125%), while the coefficient is always positive it is not significant and lower in magnitude than in the main specification. The results of the GMM estimation are omitted, given the limited data availability while taking 10-years periods for a panel covering only 25 year of data.[33]

[31] The results from the logit model are also very similar while using the balanced panel, instead of the unbalanced one.

[32] As with the construction of the panel using 5-year periods, for all variables apart from the growth in GDP per capita, it is not their average but instead their values at the beginning of each periods that is measured.

[33] Following Forbes, the GMM and RE approaches are not presented in the sensitivity analysis for simplicity. Moreover, over a 25-year period only two 10-year periods are available, thereby significantly reducing the availability and validity of estimation methods. With the GMM, using only one lag results in a significant reduction of the available data, and using 2 lags is not possible.

Over the 3-year period, the results differ widely. For all three middle-class measures, while the coefficients for the middle-class are still positive, they are considerably smaller than in the 5-year baseline model. Interestingly, the coefficients for MC6 (75%-125%) have similar values in both the 3-year and 10-year period.

Outliers

In this paper, it can be suspected that the estimation results are highly influenced by the presence of outliers. In fact, the relatively low number of countries included in the panel makes it very likely that the empirical results are biased by the presence of influential observations (Forbes, 2000). I therefore re-estimate the main model, by eliminating the countries that I suspect to be outliers. As a first step, I identify these outliers by using a graphical examination of the data. Then, following Forbes (2000), I formally define outliers as the five countries above and below the mean observations for three different variables: economic growth, initial income, and the various middle-class variables. As a next step, I examine the empirical results of the model after eliminating these outliers, one at a time, and for each of the three variables.

Overall, this analysis results in changes in the coefficient of the middle-class, but it still remains positive and generally significant (in the cases where it was significant in the baseline model). More precisely, all estimation methods and measures confounded, the coefficient for the growth of the middle-class decreases when removing the most influential observations related to both economic growth and growth of the middle-class. However, for the two absolute measures, when taking off the outliers related to the initial income, we find that the coefficient for the middle-class increases.[34]

6.2 Alternative Definitions

Using alternative variable definitions could also alter the results obtained from the baseline model. As such, I re-estimate the base model using alternative definitions for the middle class, inequality, the education variables and the several other control variables.

Alternative Definitions of the Middle-Class

As aforementioned, there are various definitions for the middle-class. In this study, I

[34]Outliers - Growth of real GDP per capita: Chile, China, Ecuador, Kazakhstan, Kyrgyz Republic, Mexico, Nicaragua, Thailand, Venezuela and Vietnam. Outliers - Income: Argentina, Bangladesh, Chile, Kyrgyz Republic, Lao PDR, Mexico, Pakistan, Uruguay, Venezuela, Vietnam. Outliers for the growth of the middle-class variables vary per measures, and are not listed for simplicity.

perform the empirical analysis on three measures - MC1 ($2-$10), MC4 ($4-$20) and MC6 (75%-125%), but I also describe three other measures - MC2 ($2-$13), MC3 ($2-$20) and MC5 (Q2-Q4). To assess the robustness of the baseline model results to these alternative definitions, but also to validate whether these different measures suggest different trends, I conduct the analysis using these three alternative definitions.

Table 20: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - Alternative Middle-Class Measures

	Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
Standard analysis						
	0.188**	0.069	30	0.011	115	OLS
MC2 ($2-$13)	-0.010	0.055	29	0.857	115	FE
	0.215*	0.130	29	0.098	84	GMM - A&B
	0.186**	0.071	30	0.014	115	OLS
MC3 ($2-$20)	-0.028	0.059	29	0.638	115	FE
	0.213*	0.117	29	0.069	84	GMM - A&B
	0.120*	0.060	30	0.055	106	OLS
MC5 (Q2-Q4)	-0.109	0.136	29	0.431	106	FE
	0.274	0.589	28	0.642	68	GMM - A&B

Notes: The model has the same specification as the baseline models, with the average growth in real GDP per capita as the dependent variable. GMM is defined as in the other models, using two-lags and defining the middle-class as endogenous, the initial income as predetermined and the other control variables as exogenous. See Table XX for a description of MC2 ($2-$13), MC3 ($2-$20) and MC5 (Q2-Q4). *** p<0.01, ** p<0.05, * p<0.1.

As suggested by the correlation matrix (see Table 7), the MC1 ($2-$10), MC2 ($2-$13) and MC3 ($2-$20) variables are closely related. By choosing only one of these three measures for the baseline model, the intuition was that using either one of these three measures would lead to very similar results. The estimates from Table 20 confirm that replacing the MC1 ($2-$10) variable by the first two alternative measures, MC2($2-$13) and MC3($2-$20), leads to similar results, both in terms of the size of the coefficient and its positive sign. The most significant difference is between the coefficients from the fixed effects estimation; however, across all three measures, it is non-significant, and the preferred estimation method is the system-GMM which yields very similar estimates.

When comparing the two relative middle-class measures, there are notable differences in the results. The MC5 (Q2-Q4) variable is not measurable like the other five middle-class measures due to its constant size over time. Therefore, following the approach used by Easterly (2001), I estimated a variation of this measure using the income share of the second, third and fourth quintiles of the income distribution. The interest of analyzing the results obtained from using this measure are mainly for comparability purposes, due to the popularity of this relative measure. The coefficients for MC6 (75%-125%) are greater in magnitude than for MC5 (Q2-Q4), and while always significant for the former measure, the

significance varies across the estimation methods for the latter. Importantly, for the system-GMM, the MC5(Q2-Q5) coefficient is not significant, while its coefficient is significant for MC6(75%-125%).

This analysis suggests that across all six measures, while the magnitude of the coefficient changes, the growth of the middle-class has a positive influence on economic growth. Due to their different definitions, and construction, the strength of this relationship varies between the six measures. MC6 (75%-125%) and MC1 ($2-$10) yields the highest coefficients for the middle-class growth, MC4 ($4-$20) the lowest, and the other measures are in between. As such, while the analysis confirms the expected sign of the relationship, the results are highly dependent on the definition used and choosing one measure over another can yield different conclusions.

Alternative Inequality Definition

As aforementioned, the income distribution variable typically included in growth models is an inequality variable, measured by the Gini coefficient. Therefore, as this study uses one of the most widely used empirical growth model, it is natural to validate the results obtained by using the conventional model specification. As such, I estimate the baseline model by replacing the middle-class variable by the Gini coefficient (in level).

Table 21: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - Alternative Inequality Definition

Standard Analysis	Coefficient on inequality	Standard error	Countries	p-value	Observations	Estimation methods
	0.009	0.060	30	0.879	114	OLS
Gini	0.246***	0.066	29	0.001	114	FE
	0.054	0.124	29	0.661	83	GMM A&B (2)

Notes: The model has the same specification as the baseline models, with the average growth in real GDP per capita as the dependent variable. GMM is defined as in the other models, using two-lags and defining the inequality variable as endogenous, the initial income as predetermined and the other control variables as exogenous. *** p<0.01, ** p<0.05, * p<0.1.

The results in Table 21 suggest that the inequality coefficient is positive across all three estimation methods. However, the coefficient is only significant under the fixed effects estimation, which is likely biased for the aforementioned reasons. Compared to the results obtained by Forbes (2000), the signs of the coefficients are the same, but their sizes are considerably different. Forbes finds significant coefficients for inequality for both the fixed effects and difference-GMM, of respectively 0.0036 and 0.0013. However, it is important to mention that she does not estimate her model using the system-GMM, which as explained, better takes into account the persistence in income, inequality and education variables

(Castello and Climent, 2010).

While I apply the same model specification, the divergences in results is reasonable considering that her panel includes 45 countries, over the period from 1966 to 1995, whereas this paper includes 30 different countries and covers the period from 1985 to 2010. Moreover, while the variable definitions are very similar for the control variables, they differ for the main economic variables of growth and income, with the growth variable constructed from the Penn World Tables (instead of the WDI) and income measured in 1987 Atlas dollars (instead of the 2005 PPP USD).

The baseline model is also very similar to the model used by Perotti (1996). However, contrarily to Forbes (2000), he finds a negative relationship between the variables. Among other things, Forbes (1996) attributes these different results to the fact that Perotti (1996) uses a considerably larger datasets with 70 countries and focuses on the long-term influence of inequality on economic growth, by estimating his regressions over 25-year periods. His analysis is also based on a different time period, from 1960 to 1985.

As the GMM estimate from Table 21 is non-significant, conclusions on the influence of inequality on economic growth can hardly be formulated. However, from the literature review on the subject (see Table 2), previous empirical studies have also been inconclusive on the magnitude and the strength of the relationship between both variables. Moreover, their findings support the result that this relationship is highly dependent on the estimation method used and the model specification.

Education Variables

I also validate the robustness of the results while using alternative education definitions. First, I change the definitions for the two education variables - the male and female average secondary educational attainment levels - for the male and female average primary educational attainment levels, to assess whether the higher education levels impact the results in the baseline model. An underlying argument is that in highly unequal societies primary education is often less accessible and of lower quality than education at higher levels (Birdsall, 2010). In this new model specification, the coefficient for the middle-class remains positive but changes across all three measures. For both MC1 ($2-$10) and MC4 ($4-$20), the middle-class coefficient estimated from the GMM decreases to respectively: 0.184 (vs 0.234) and 0.038 (vs 0.061). Moreover, the male education variable has a greater coefficient and becomes significant. On the opposite, for MC6 (75%-125%), the coefficient for the middle-class remains significant and increases from 0.371 to 0.427.

Second, I re-estimate the model using the average years of primary and secondary schooling

completed by the overall population, regardless of gender. The coefficient for MC1 ($2-$10) increases to 0.252, while the coefficient for MC4 ($4-$20) slightly decreases to 0.041, but they both remain significant. For these two measures, both education variables are positive and significant. For MC6 (75%-125%), the coefficient also remains significant and increases to 0.419. In this specification, only the primary education variable is significant and positive.

Control Variables

In the analysis, several control variables are included in the baseline model to assess the various channels by which the middle-class potentially influences economic development. As a robustness check, the alternative definitions of these control variables are also included in the model. Similarly to the results obtained for the replacement of the education variables, while the results change, there are no considerable variations in the magnitude of the middle-class coefficients. This analysis confirms that the baseline model results are not robust to changes in the variables definitions. However, the sign and the strength of the relationship between the different middle-class measures and the economic growth is generally similar.

I also assess the changes in results obtained from including the various control variables individually to the baseline model. More specifically, I use a restricted form of the baseline model, where average growth in real GDP is regressed on initial income, the growth in the middle-class and a given control variable.[35] Across all three middle-class measures, the three variables that were significant in the original analysis - the gross-savings, the number of seats held by female in parliament and the share of working age population - remain positive and significant. While included individually, the fertility rate and life expectancy variables are now significant, with the former variable being negative and the latter being positive, as expected. With MC6 (75%-125%), the urban ratio and the growth in terms of trade both turn significant and negative.

6.3 Alternative Specifications

For the system-GMM estimation, as explained, several modifications can be used to estimate the baseline model. First, I include an additional lag to instrument the endogenous variables. However, from Table 30, we note that this considerably reduces the sample

[35] In the baseline model, three control variables are included in addition to the initial income and growth in the middle-class: the educational attainment levels of both male and female and the price level of investment. While examining the influence of additional control variables in the original analysis, these variables are included in addition to these three control variables.

size and that the estimates vary considerably and are all non-significant. The reduction in sample size is considerable, and would render the subsequent analysis with additional control variables and on the alternative panels difficult (if not impossible).

Second, I compare the estimates obtained from changing the endogenous variables specified in the model. In the baseline model, the initial income is defined as a predetermined variable, the middle-class as an endogenous variable and the other controls as exogenous. However, it is reasonable to assume that the education variables could also very likely be endogenous as well. Including them as endogenous variables changes the coefficients of all three middle-class measures. The coefficient on the growth of the middle-class decreases for both MC1($2-$10) and MC6 (75%-125%), to respectively 0.200 (from 0.234) and 0.233 (from 0.371) (see Table 30). For MC4 ($4-$20), the coefficient increases from 0.061 to 0.094, and more importantly, becomes significant (see Table 30). I also define a second alternative model specification, where all the control variables including the middle-class, are treated as endogenous and the initial term is still treated as predetermined. The only difference with the first specification is that I include the price level of investment as an additional endogenous term. In this alternative specification, the coefficients for the middle-class remain very similar to the one obtained from the first specification, with the exception of MC1 ($2-$10) for which the coefficient decreases significantly. However, all the coefficients are now non-significant.

This analysis confirms that the GMM estimation is sensible to variations in model specifications. Including more than 2 lags leads to a significant sample size reduction, and as such I prefer the original specification with 2 lags. Moreover, while with the alternative model specification, where more variables are treated as endogenous, the results are slightly different, the coefficients are still positive and of similar magnitudes to the results from the original model.

7 Sensitivity Analysis - Logit Model

Similarly to the analysis conducted for the baseline model, I perform a sensitivity analysis for the logit model using alternative datasets and variable definitions. The main results of this sensitivity analysis, for MC1 ($2-$10), MC4 ($4-$20) and MC6 (75%-125%), are included in Tables 31, 32 and 33. The estimates from the MLE and the random-effects estimation methods are the same, with the exception of the standard errors. The discussion therefore focuses on these estimates interchangeably.

7.1 Alternative Datasets

Regional Groups

The analysis is performed on two distinct panels, one for the Asian countries and the other one for the LAC.[36]. In the Asian countries, the coefficient for the middle-class, measured using the two absolute measures, is positive and significant. Holding everything else constant, a 1% increase of the growth rate of the middle-class, measured by MC1 ($2-$10) and MC4 ($4-$20), leads to respective increased odds-ratios of 1.309 ($e^{0.269}$) and 1.056 ($e^{0.066}$) that a given Asian country reaches the upper-income level over a 5-year period. Compared to the original logit model, the estimated odds-ratios are slightly higher for both measures. Again, the coefficient for MC6 (75%-125%) is non-significant.

In the LAC panel, only MC4 ($4-$20) has a positive and significant odds ratio for the middle-class variable. With this measure, a 1% increase in the growth rate of the middle-class yields an increased odds of 1.111 ($e^{0.105}$) for a given Latin American country to make a successful transition to the upper income level over a 5-year period. This odds ratio is also slightly higher than in the original logit model. The other two middle-class measures, MC1 ($2-$10) and MC6 (75%-125%) are non-significant.

As expected, across regions, the middle-class has a positive influence on a country's ability to reach a higher income level. However, it is interesting to find that the strength of this relationship depends on the measure used, with the lower income measure seemingly most appropriate for Asia and the richer middle-class measure for LAC. Again, in both regions the relative measure has no significant impact on a country's ability to escape the MIT.

Alternative Time Periods

[36] Results of this analysis are not included in this paper.

The analysis is performed over 3-year and 10-year periods, to assess whether a country's probability of moving to a higher income level with respect to changes in the sizes of the middle-class changes between short-term and long-term periods. Over the 10-year period, for an increase in the growth of the middle-class, measured using MC1 ($2-$10) and MC4 ($4-$20), the odds of a successful income transition increase when compared to the results obtained from the 5-year period. For MC1 ($2-$10), the increase is considerable as the odds of an upward income transition over a 10-year period, from a 1% increase in the growth of the middle-class, increase from 1.183 to a factor of 1.327 ($e^{0.283}$). For MC4 ($4-$20), the odds also increase, from 1.061 to 1.162 ($e^{0.150}$). Over the 3-year period, the odds ratios from an increased middle-class remain similar to those obtained from the 5-year estimation. For both MC1 ($2-$10) and MC4 ($4-$20) the odds slightly decrease to respective factors of 1.094 ($e^{0.09}$) and 1.031 ($e^{0.031}$).

Over both time periods, the coefficients of the log odds-ratios for MC6 (75%-125%) are not significant, suggesting that even if the middle-class increases in size there is no significant influence on a country'probability of reaching a higher income level. As expected, the middle-class influence on economic development is greater in the long-run as suggested by the higher odds ratios for the two other measures.

7.2 Alternative Definitions

Alternative definitions of the Middle-Class

The logit model is estimated using the three alternative definitions of the middle-class: MC2 ($2-$13), MC3 ($2-$20) and MC5 (Q2-Q4). The results from these estimations, expressed in log-odds ratios, are included in Table 22.

Table 22: Sensitivity Analysis: Middle-Class and Middle-Income Trap: Logit Model - Alternative Middle-Class Measures

	Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
Standard analysis						
MC2 ($2-$13)	0.232***	0.059	30	0	116	MLE
MC2 ($2-$13)	0.281***	0.139	30	0.043	52	FE
MC2 ($2-$13)	0.232***	0.078	29	0.003	116	RE
MC3 ($2-$20)	0.255***	0.057	30	0	116	MLE
MC3 ($2-$20)	0.256*	0.145	30	0.078	52	FE
MC3 ($2-$20)	0.255***	0.086	29	0.003	116	RE
MC5 (Q2-Q4)	0.527	2.248	30	0.815	107	MLE
MC5 (Q2-Q4)	0.527	2.297	30	0.859	50	FE
MC5 (Q2-Q4)	0.415	2.816	29	0.883	107	RE

Notes: Dependent variable is a binary variable that takes a value of 1 if a given country has successfully transitioned to an upper-income category, in a 5-years period, and 0 otherwise. Other control variables from the logit model are included but not displayed, and include the lagged values of: the initial income, the average educational attainment levels of both male and female and the price level of investment. Coefficients are expressed as log-odds ratios. *** p<0.01, ** p<0.05, * p<0.1.

As expected, the other two absolute middle-class measures lead to similar results to those obtained with MC1 ($2-$10). Moreover, MC2 ($2-$13) and MC3 ($2-$20) yield slightly higher odds ratios of an income transition following an increase in the growth of the middle-class than MC1 ($2-$10), over a 5-year period, of respectively 1.261 ($e^{0.232}$) and 1.290 ($e^{0.255}$). The differences between the first three absolute measures is reasonable, with MC3 ($2-$20) yielding the highest odd ratio given that it is also the measure with the highest income thresholds amongst the three. However, it is surprising that amongst all the absolute measures, MC4 ($4-$20) has the lowest odds factor at 1.062 . Yet, there is not much dispersion across the results, and the odds are considerably high regardless of the measure used. All four measures yield the conclusion that an increase in the growth of the middle-class leads to an increased ability to increase income levels.

Similarly to MC6 (75%-125%), the coefficient for MC5 (Q2-Q4) is non-significant. The finding that both relative middle-class measures are non-significant is puzzling. An hypothesis is that this result could be related to the presence of inequalities amongst the different countries. In the previous section, I find that the impact of the middle-class on growth is reduced in highly unequal countries, such that we can expect it to have a negative influence on economic development as well.

Control Variables

I also assess the validity of the results from the logit model by comparing the estimates from using alternative definitions for the various control variables. While the coefficients for the different variables change, the middle-class estimates vary only slightly and their signs remain similar.

I also examine the results obtained from including the various control variables individually to the model. I build a reduced-form of the logit model, where I only include the initial income, the growth of the middle-class and a selected control variable. From this analysis, the fertility rate and the life expectancy variables come out positive and significant across all three middle-class measures. For MC6 (75%-125%), two additional variables are significant, the share of working age population and the Polity index, at respective odds ratio of 1.160 and 0.409. Therefore, compared to the original model, I obtain slightly different results but the overall findings remain similar.

8 Discussion

In this section, I discuss the main findings from the two econometric models. I examine the empirical results in relation to the relevant literature, to provide answers to the two main research questions examined in this paper:

> 1) Is the middle-class important for growth and economic development in developing countries?
> 2) Is there a relationship between the middle-class and the incidence of a middle-income trap?

The last part of the discussion is specific to the situation in China. From the panel analysis, I find insights on the importance of the middle-class for economic growth, and discuss the importance for China to sustain the growth of its middle-class to support growth and economic development. I also contrast the experience of the middle-income trapped countries, and find that by reducing its inequality levels and implementing the necessary structural reforms, China increases its chance of successfully making the transition to a high income level.

8.1 The relationship between Middle-Class and Economic Growth

On average, over the past 25 years, the middle-class grew by 8.5% and its mean income also increased by 16% during the period, suggesting a heightened importance of the group in the selected countries.[37] Moreover, given its average increase in income share, the middle-class has also experienced improved welfare over the same period. Yet, each country's experience varies, and while some have witnessed improvements in the sizes, mean incomes and income shares of their middle-class, others have only seen progress in either the sizes or mean incomes of the group. Our empirical results confirm the hypothesis that that the middle-class has a positive influence on growth, and that this influence is greater in the long-run. Various factors influence the strength of this relationship, with increased trade liberalization and gross savings having a positive influence on growth. Interestingly, an increase in the number of females involved in political decisions also improve growth significantly.

A main finding of this study is that one has to be careful when making conclusions on the importance of the middle-class for growth, as the results vary considerably while using different definitions of the middle-class. In fact, significant differences are found in the results from the absolute and relative measures, and even across the results from

[37] This is an approximation from the average growth and mean incomes of the middle-class from all six measures and across all the 30 countries, from 1985 to 2010. Refer to Tables 4 & 5.

the different absolute measures. In general, all the absolute measures suggest a positive influence of the middle-class on economic growth, but their significances vary over different time periods and while assessing the indirect impacts of various channels. Using the first absolute measure, MC1 ($2-$10), we find that on average a 1% increase in the growth of the middle-class leads to a 0.234% average increase in economic growth over a given 5-year period from 1985 to 2010. From their similar definitions, the other two absolute measures, MC2 ($2-$13) and MC3 ($2-$20) yield very similar results, with respective increases in growth of 0.214% and 0.213% per 5-year periods, following a 1% rise in the growth of the middle-class. The most striking result is that the middle-class, defined by MC4 ($4-$20), has a lower influence on growth than the other three measures despite its higher income thresholds. This finding could be related to the measure's wide dispersion in income ranges and the fact that it also captures the smallest size of the middle-class compared to the other definitions. Moreover, this measure does not capture the share of the population comprised between $2 and $4 which seems to have a significant influence on growth, as suggested by the results obtained with the other measures. Yet, it is questionable that with incomes between $2 and $4 the population benefits from a reasonable level of economic stability (Ravaillon, 2009; Chun, 2010).

Defining the middle-class with one of the relative definition, MC6 (75%-125%), we find that a 1% increase in the size of the middle-class leads to a 0.371% increase in growth during a 5-year period from 1985 to 2010. This result is likely related to the variability of the size of the middle-class with respect to changes in economic growth and in the income distribution. Compared to the absolute measures, the income thresholds used to define the middle-class vary each year and this seems to better approximate the economic reality in the selected countries. However, a major drawback of this measure is that when there is a financial crisis, the median income also decreases such that even if it is poorer, the population comprised between 75-125% of the median is still considered part of the middle-class. Moreover, given the high inequality levels, the median income is often significantly lower than the mean incomes, as suggested by Table 10. As such, the various income thresholds are generally lower than those used to define the middle-class following the absolute measures (see Table 25). These considerations raise the concern that this measure may not be the most appropriate in the context of developing countries, following Ravaillon (2009).

It is interesting to find divergences in the results obtained from the different middle-class measures. Using either relative or absolute measures, one can reach different conclusions on the situation of the middle-class and its importance for growth in the selected countries. This is most likely related to the wide diversity of development experiences of the different countries included in the panel. Importantly, the differences stem from the wide income disparities in middle-income countries, as the relative measures are significantly affected

by the inequality levels. Moreover, each measure suggests different mean incomes and income shares for the middle-class. While the empirical findings confirm the prediction that using alternative middle-class measures would lead to some differences in results, it is not clear whether one measure is more appropriate than another. As aforementioned, the objective of this paper was to debate the merits of using either absolute or relative middle-class definitions, but not necessarily to develop a new measure or to select the best one. Overall, this analysis confirms that it is insightful and relevant to use several middle-class measures in a cross-country context.

A second finding of this study is that the influence of the middle-class varies with the economic development levels, as suggested by the different results obtained when estimating the model controlling for various growth determinants and using different income and regional groups. In Latin America, the middle-class is generally richer and larger than in Asian countries, but the inequality levels are also higher. As such, it is MC4 ($4-$20) that is the most representative measures for the LAC as it captures a slightly richer middle-class. Moreover, the relative measure MC6 (75%-125%) captures a lower share of the population as part of the middle-class and has a reduced importance for growth, compared to the Asian countries, given the relatively high inequality levels in LAC.

Moreover, this analysis suggests that even if the middle-class has a large and significant influence on growth, its impacts are mitigated by the inequality levels. In countries where inequality is considerably high, the income share and relative welfare of the middle-class are both significantly reduced. Also, there are significant differences in the impact of MC6 (75%-125%) on growth across the moderate and high inequality samples. In countries where inequality increases, there is generally more frequent and sudden decreases in the size of the middle-class, measured using MC6 (75%-125%), than there are increases when the inequality levels decrease (see Table 25). Indirectly, this implies that need to tackle inequalities for the middle-class to have a more sustainable and more significant impact on economic growth.

A third insight from this analysis is that the middle-class has a greater impact over longer time periods, and this result is robust across all the absolute measures. The empirical results confirms that the middle-class embodies distinctive values and characteristics that are better reflected in the long-run, as suggested by Birdsall (2010). Indirectly, the middle-class is associated with increased gross savings and a larger share of working population, which are both conducive to fostering strong and sustainable macroeconomic growth. The idea that the middle-class has distinctive values is also supported by its indirect relationship with an increased number of seats held by females in parliament. Again, this influence seems to be better reflected in the long-run. When assessing the long-term influence of the middle-class defined with MC6 (75%-125%), I find that it is not as important in the long-run and this

result is most likely related to the considerably lower mean incomes and welfare for the group, when defined using this measure.

8.2 The Middle-Class and the Prospects of a Middle-Income Trap

The empirical results from the logit model suggests that the middle-class has a positive influence on a country's probability of reaching an upper-income level. This impact is better reflected over long-term periods due to the intertwined effects on economic growth of selected variables, related to human capital and democracy. These findings suggest that countries should support increases in the sizes of their middle-classes to successfully escape the middle-income trap, the situation where fast-growing middle-income countries are unable to make the transition to the ranks of high-income countries.

As expected, these results depend on the definitions used to refer to the middle-class. The two selected absolute measures, MC1($2-$10) and MC4 ($4-$20), suggest increased odds ratios of making the transition of respectively 1.183 and 1.061 relative to a 1% in the growth of the middle-class, over a 5-year period, holding everything else constant. However, no significant relationship is found when measuring the middle-class using MC6 (75%-125%). This is an apparent contradiction, given the result that a 1% increase in the growth of the middle-class defined by MC6 (75%-125%) leads to an increased growth by 0.371%. Nonetheless, I also find that the size and growth of MC6 (75%-125%) are highly influenced by the inequality levels, and that its long-term influence on growth is not as significant as for the other measures.

Overall, in the middle-income trapped countries, the mean incomes and income shares are generally lower for the middle-class, than in the non-MIT countries, all measures confounded. As such, even if the middle-class is found to have a positive and significant impact on growth, it is also important to have a middle-class that has a sizeable income and welfare to ensure sustainable growth and development. Moreover, as suggested by several authors, these findings suggest that tackling inequalities should be a the very heart of a development strategy focused on avoiding the middle-income trap (Egawa, 2012, 2013; Kharas and Kholi, 2011). Indeed, in MIT the inequality levels are higher on average, and this is suggested by the non significant influence of the relative measure -MC6 (75%-125%) - on the probability of escaping the trap. This finding it related to the middle-class' lower mean incomes and income shares given the high inequality levels. Indeed, in Brazil and Malaysia, even if the absolute measures suggest considerable sizes and mean incomes for the middle-class, the relative measure portrays a complete different picture. Even if both countries have relatively high GNI per capita, their median incomes are significantly lower given their high inequality levels and their lack of adequate redistribution programs

to support increased mean income and income share for their middle-classes.

As suggested by the empirical results, the MIT can be the cause of several factors. The results slightly differ, from one middle-class measure to another, but human capital is generally found to have a great importance on the country's long-term economic growth. More precisely, a greater share of working age population and increased life expectancy both generally support sustained growth and a greater probability to escape the MIT. This finding confirms the hypothesis that countries benefit from a demographic dividend which is also indirectly related to increased savings rates, a variable found to have a significant influence on growth in the baseline model. As expected, improved government effectiveness and institutional quality also leads to improved economic conditions (Gill and Kharas, 2007).

8.3 Prospects for China

The Chinese middle-class has tremendously grown in size and in importance over the past 25 years. In 2010, 856 million persons were considered to be part of the middle-class and held about 60% of the overall income in China (measured with MC1 ($2-$10). However, inequality levels are high and have continuously increased in the past two decades, thereby decreasing the relative welfare of the middle-class. At a GNI per capita of $4,260 (in 2010, USD Atlas method), China is considered an upper middle-income country, and could very well become an upper-income country in the next few years. However, a risk scenario is that if inequality continuously increases, China could fall in the middle-income trap, similarly to the experiences of several Latin American Countries, such as Brazil and Venezuela.

Across all the middle-class measures, the empirical results suggest a positive and significant impact of the middle-class on economic growth. However, the strength of the relationship varies with some measures better reflecting the regional and development differences of the selected countries. In Asia, MC1 ($2-$10) generally captures better the economic reality of the middle-class, when compared to the other measures. The Chinese middle-class, defined by MC1 ($2-$10) has witnessed considerable growth and improvements in welfare over the past two decades. Yet, when measured using higher-income thresholds, with MC4 ($4-$20), the middle-class is significantly smaller. This finding suggests that despite the impressive growth of the middle-class, it is still relatively vulnerable as the bulk of its population earns between $2-$4, and is highly vulnerable to economic contractions and at risk of falling back into poverty.

Another important finding is that China needs to support increases in the mean incomes and the relative welfare of its middle-class to support its long-term economic growth. Despite the progress of the past few years, the Chinese middle-class generally has lower mean

incomes and income shares than the other middle-income countries. Yet, China still has impressive growth rates and the ability to put in place the redistribution mechanisms and targeted reforms to improve the welfare of its population (Kharas, 2010). In the long-run, the empirical findings suggest that China could benefit from a larger and wealthier middle-class, by the means of improved economic, social and political outcomes.

As aforementioned, the inequality levels and economic growth are not necessarily always negatively correlated (see Table 25). The emergence of a Chinese middle-class since China's transition to a market economy in the late 1970s can be attributed to a significant rise in wage levels and the apparition of inequalities within the different Chinese provinces (Yuan, 2012). Yet, inequality generally becomes a problem for middle-income countries as they reach a certain economic development level (Islam, 2015). Among other things, the empirical results suggest that one consequence of inequality is to dampen the impacts of the middle-class on growth, by significantly reducing its mean incomes and welfare. An assessment of the experiences of the MIT countries confirms the hypothesis that China needs to support the growth of its middle-class and to reduce its inequality levels to avoid this growth scenario. In general, as suggested from the empirical results of the logit model, the middle-class helps countries in making the transition from a lower to an upper income category. Yet, the selected relative measure, MC6 (75%-125%) is the measure that suggests the greatest importance for growth, but in the context of high inequality its influence is severely reduced such that it has no significant impact on a country's probability of escaping the MIT. The historical experiences of Brazil and Malaysia, further suggest that if inequality is left untreated, it can lead to significant welfare losses for the middle-class, and can eventually also have negative impacts on growth and development.

Overall, this analysis suggests that China needs to further invest in its human capital to sustain its economic growth and to ultimately avoid the middle-income trap. To maintain its international competitiveness and to boost its productivity levels, China could improve the access and quality to education and healthcare (Taylor, 2012). Indeed this analysis suggests that a high share of the middle-class, as well as a large working-age population and increased life expectancies, are important factors for a country's increased probability of making the transition to the ranks of the high-income countries. Greater investments in human capital should support the growth of the Chinese middle-class, a group associated with greater political stability and more democratic values. In turn, an improved institutional quality and a more democratic orientation should also help China in avoiding the MIT.

Among other things, China's one-child policy, implemented in the late 1970s, had the consequences of reducing the share of working age population and of accentuating gender inequality (Kwan, 2015). However, since 2013 the policies have been relaxed and now

allow women to have a second child if at least one spouse of a married couple is a second child (Kwan, 2015). The analysis suggests that a larger share of the middle-class generally supports greater women empowerment which can also lead to higher and more sustainable growth.

9 Conclusion

Given the recent interest in the middle-class situation in emerging countries, the objective of this study was to assess the relationship between the middle-class and economic growth in a panel of 30 East Asian and Latin American Countries including China. Employing various income-based middle-class definitions, I build a model where average growth of real GDP per capita is regressed on lagged values of income, the growth in the middle-class and selected control variables to assess the strength of this relationship. Several methods are employed to estimate the growth model, starting with the most basic OLS, the fixed and random effects and the system-GMM. In the second part of the analysis, I also examine whether the middle-class plays a role the probability of a middle-income trap using a logit model. A discussion of country-specific experiences, such as the middle-income trapped Brazil and Malaysia, is also included to understand how the middle-class, the inequality and the MIT are interrelated.

Overall, the analysis confirms that the middle-class has a positive and significant influence on economic growth. However, the strength of the relationship varies from one measure to another. Yet, as there is no official definition for the middle-class, an important finding of this study is that several measures should be used in a similar cross-country context. Even if it is no clear that one measure is better than the other, the analysis confirms that both the absolute and relative definitions have their own advantages and flaws and that a comparison of their respective results is insightful. Using the absolute measures suggest that the middle-class has generally been growing in size and has experienced increase incomes from 1985 to 2010. Given their different income thresholds, the different absolute measures suggest varying importance of the group for economic growth, but overall their influence is positive and generally significant. Moreover, the positive impacts of the middle-class are better felt in the long-run. On the other hand, when defining the middle-class using the relative measures, the group generally has a significantly lower size as well as lower mean incomes and welfare. Yet, when the middle-class is defined based on the dispersion around the median income, its importance for economic growth is greater than for the absolute measures.

The second part of the analysis confirms the hypothesis that the middle-class increases a country's probability to make the transition from a lower-income to an upper-income status. Again, the various middle-class definitions lead to a wide disparity in results. The absolute measures generally suggest a positive and significant influence of the middle-class on a successful income transition, and this relationship becomes even more important in the long-run. Yet, using the relative measures, suggest that the middle-class has no significant influence on a country's probability of avoiding the trap.

The perspectives for China's middle-class and economic growth are mixed. On one hand, the impressive growth rates of the past two decades have led to the emergence of a growing and sizable middle-class. The analysis reveals that the presence of a large middle-class has a significant and positive impact on economic growth, by the indirect influence of various outcomes such as improved macroeconomic conditions and institutional quality. On the other hand, China's market-transition has also been accompanied by a surge in inequality levels, which threatens the country's long-term economic stability, if it is left untreated. While there is no clear relationship between the inequality levels and the growth of the middle-class, the experiences of the selected middle-income trapped countries suggest that inequality generally reduces the middle-classes' relative mean incomes and welfare. Moreover, in the cases where inequality is relatively high, the middle-class has a significant reduced impact on growth. Also, despite its significant growth and its large size, the Chinese middle-class has relatively low income as it is mostly comprised in the income ranges from $2-$4 per day. As such, a significant share of the population in the middle-class is vulnerable to falling back into poverty. These findings suggest that among other things, China should put in place adequate redistribution mechanisms, such as fiscal transfers, and should improve the access to education and healthcare to support the growth and the welfare of its middle-class. The empirical findings also suggest that an increased middle-class leads to more sustainable growth and can help countries in avoiding the middle-income trap. Several factors other than inequality and income distribution can trigger a MIT, and an empirical analysis of these factors was outside the scope of this study, but the findings suggest that an increased middle-class can yield several positive outcomes, that can ultimately help a country in making the transition to the ranks of the upper-income countries.

There are several limitations to this study. As aforementioned, the sample selection and the model specifications can have a significant influence on the results. Moreover, while taken from a reliable and widely-used source, the inequality and income distribution data could still suffer from a measurement problem (Forbes, 2000). The availability of household data also largely limits the estimation methods, and the possibility to examine the relationship over longer-time periods.

While a panel analysis reveals relevant and insightful results, it has several limitations. There are a lot of cross-country variations such that we can expect some heterogeneity bias in the results (Forbes, 2000). Also, from the inclusion of only developing countries in the Latin American and Asian regions, the study likely suffers from a selectivity bias. In future research, it could be interesting to include more countries in the analysis to apply more sophisticated estimated techniques, for instance the system-GMM, while performing regional and income-based comparisons. Examining the relationship between the middle-

class and growth, as well as the middle-income trap, in a single-country context could also be very relevant. As aforementioned, in this study, the choice to perform a panel study instead of an analysis of China on a stand-alone basis was made due to the limited availability of the Chinese income distribution data. Yet, in a future research it could be interesting to extend Yuan and al. (2012)'s study, based on China's national income statistics, to examine the influence of the middle-class on economic growth and on the incidence of a middle-income trap.

As explained, the middle-class can be defined using both economic and sociological approaches. While for the measurement purpose of this study, I chose to include only income-based definitions of the middle-class, the middle-class is a socio-economic status that encompasses more than income. In a future research, it could be interesting to use alternative measures, based on socioeconomic characteristics such as the individuals' professions and ownership of assets. Moreover, it would also be insightful to use different economic definitions, such as Birdsall's hybrid middle-class measure, based on both absolute and relative thresholds.

While insightful, the analysis only reveals how the various channels indirectly influence the middle-class and economic growth. In a future research, it could be interesting to estimate a system of equations using the 2SLS or 3SLS estimation methods to acquire a better understanding of how the human capital, politics, gender-inequality and democracy determinants enter the relationship between economic growth and the middle-class.

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11 Appendices

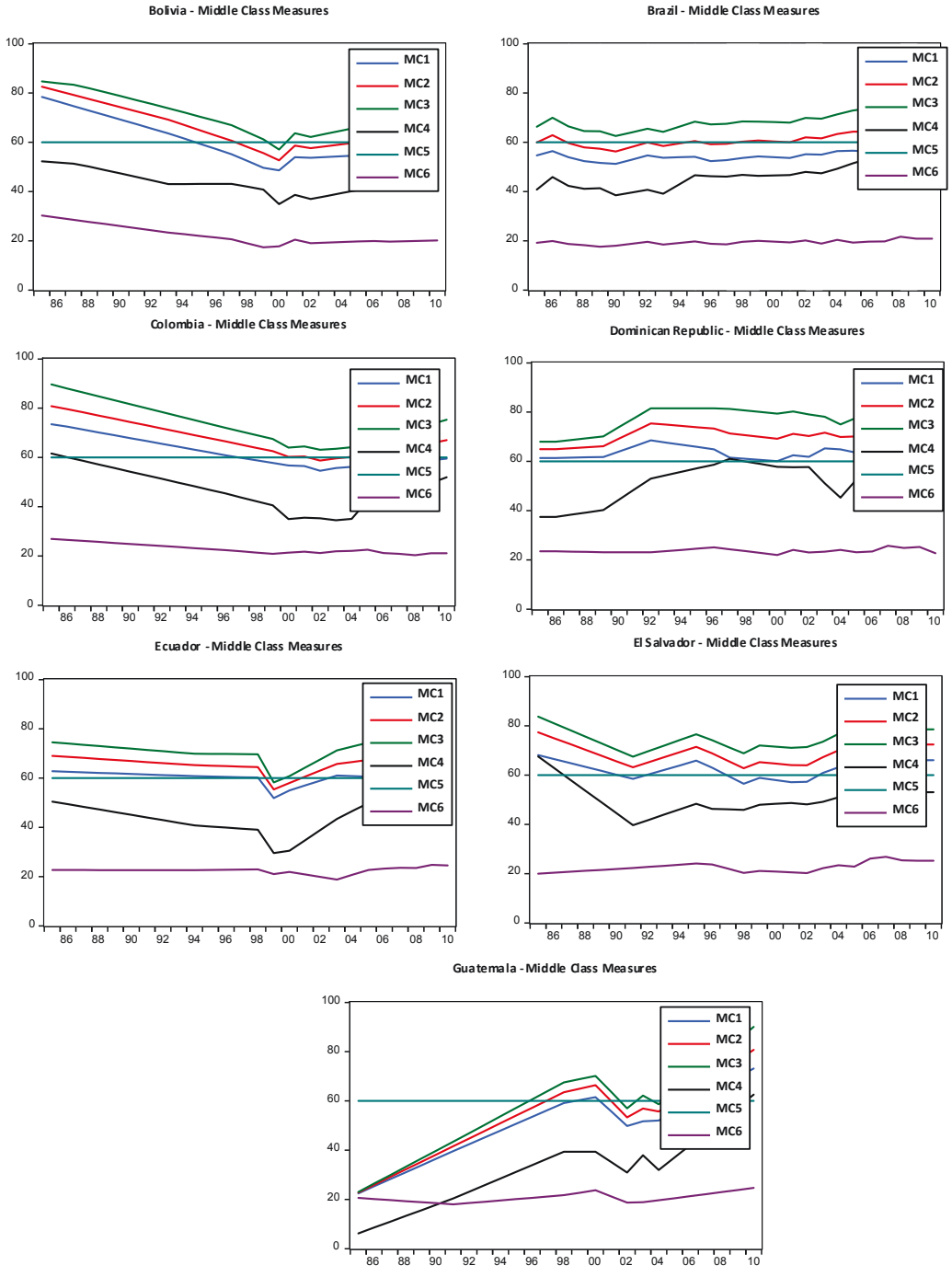
Figure 10: Middle-Classes: Economic Definitions and Measurement Methods

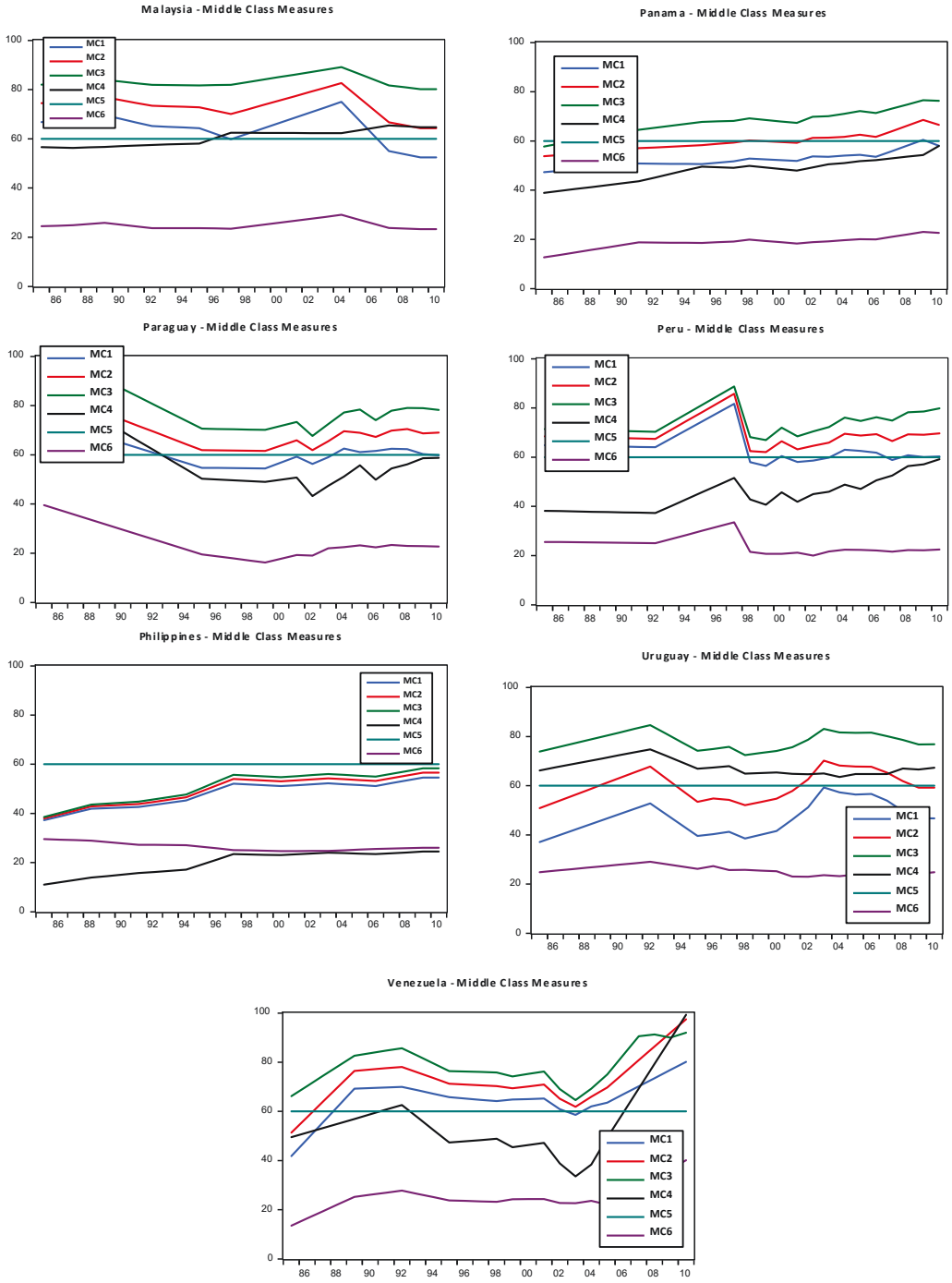
Types		Definitions	Thresholds		Methodology	Author(s)/Source(s)
			Lower	Upper		
Income-based Measures	**Absolute Measures**	Daily per capita income with respect to the average annual incomes of Brazil ($4,000) and Italy ($17,000) in 2000 PPP USD.	$12	$50	Using the national income/expenditure distribution data from 119 countries for the year 1993, decomposing total inequality by continents and regions.	Milanovic and Yitzhaki (2002)
		Lower bound defined as the moderate poverty line for developing countries, in 2005 PPP USD. Upper bound defined as the US poverty line, in 2005 PPP USD.	$2	$13	Using national household surveys for over 100 countries, from 1990 to 2005. The lower bound is measured using the median poverty line for 70 national poverty lines, drawn from in-country poverty measurement studies by the World Bank and national governments.	Ravaillon (2009)
	Relative Measure	Percentage of the per capita income with respect to the median household per capita income.	75%	125%	Pressman: examines the size of the middle-class for 11 developed countries, including the US.	Thurrow (1987); Birdsall, Graham and Pettinato (2000); Pressman (2007)
	Hybrid Measure (absolute and relative definition)	Lower (global and absolute) threshold defined with respect to a per capita income; Upper (relative and local) threshold defined as a percentile of the income distribution.	$10 USD in 2005 PPP	95th percentile	Using the household income or consumption per capita information from household surveys in various countries from the early 1990s to 2005. Data is sourced from the World Bank's PovcalNet.	Birdsall (2010)
Consumption-based Measures	**Absolute Measures**	Daily per capita consumption expenditures in 2005 PPP USD.	$2-$4	$6-$10	Using household surveys from the Living Standard Measurement Surveys and the Family Life Surveys, for 13 developing countries (Guatemala, India, Indonesia, Ivory Coast, Mexico, Nicaragua, Panama, Pakistan, Papua New Guinea, Peru, South Africa, Tanzania and East Timor).	Banerjee and Duflo (2008)
			$10	$100	Using household surveys of both developed and developing countries, from the World Bank, for over 145 countries to assess the size of the global middle-class.	Kharas (2010)
	Relative Measure	Percentiles of the consumption expenditures distribution function.	20th percentile	80th percentile	Easterly: Empirical testing of the middle-class consensus, by building a simultaneous equations model on growth and inequality, and by running two-stages least squares regressions on human and physical capital proxies, as well as political indicators. Using the Global Development Network Database from Easterly and Yu (2009).	Barro (2000) Easterly (2001, 2002);

Figure 11: Middle-Income Trap: Definitions and Empirical Testing Methods

Types		Definitions	Measure	Author(s)/Source(s)
Relative Definitions	**Convergence Approach**	Relative measure of the tendency of per capita income to growth faster in lower-income countries than in higher-income countries so that they eventually converge.	The catch-up growth index (CUI): the ratio of a country's income level to the United States income level. Low-income countries: CUI < 20%; Middle-income: 20% < CUI < 55%; High-income: CUI> 55%	Woo (2011, 2012)
	Inter-country Income Classification	Transition matrix analysis of the income distribution.	One-year transition probabilities	Quah (1993)
			Ten years transition probabilities	Im and Rosenblatt (2013)
		Establishment of a threshold number of years and growth rate required to transition from one income group to another, based on the historical experience of several countries.	4 income groups in 1990 PPP GDP per capita: Low-income: below $2,000 USD; Lower middle-income: $2,000-$7,250 USD; Upper middle-income: $7,250-$11,750 USD; High-income: above $11,750 USD	Felipe, Abdon and Kumar (2012)
Absolute Definitions	**Convergence Approach**	Defined as large and sustained deviations from a predicted growth path. Empirically, measured using regressions of the individual per capita gross domestic product growth rates on the lagged income levels and on standard measures of physical and human capital to obtain each country's predicted growth rates.		Aiyar and al. (2013)
	Income Classification	Establishes absolute thresholds number of years and growth rates required to transition from one income group to another.	4 income groups in GNI per capita (2010): Low-income: below $1,005 USD; Lower middle-income: $1,006-$3,975 USD; Higher middle-income: $3,976-$12,275; High-income: above $12,275 USD	World Bank (2013)
			4 income groups in GNI per capita: Low-income: below $995 USD; Lower middle-income: $995-$3,945 USD; Upper middle-income: $3,945-$12,195 USD; High-income: above $12,195 USD	Vandenberg and Zhang (2012) – The Asian Development Bank
	Growth Slowdowns Approach	Define the middle-income trap as a special case of growth slowdowns, where slowdowns are prolonged periods of stagnation or recession that represent a substantial deviation from the previous norm of a country	For an episode to be a growth slowdown, GDP must satisfy three conditions: (1) the 7-years average growth rate must be 3.5% of greater prior to the slowdown; (2) the decline in the seven-year average growth rate must be by at least 2 percentage points; (3) per capita GDP is greater than $10,000 in 2005 constant prices.	Eichengreen, Park and Shin (2013)
			Two periods overlapping generations (OLG) model of economic growth with two types of labor (basic and advanced), two types of infrastructures (basic and advanced) and endogenous occupational choices.	Agenor and Canuto (2012)
	Growth Accelerations Approach	Examination of the growth acceleration periods to identify the turning points in the growth performance of several countries.	A growth acceleration period is defined as sustaining a per capita income growth rate of at least 2 percent for a minimum of 8 consecutive years.	Haussman, Pritchett and Rodrik (2004)

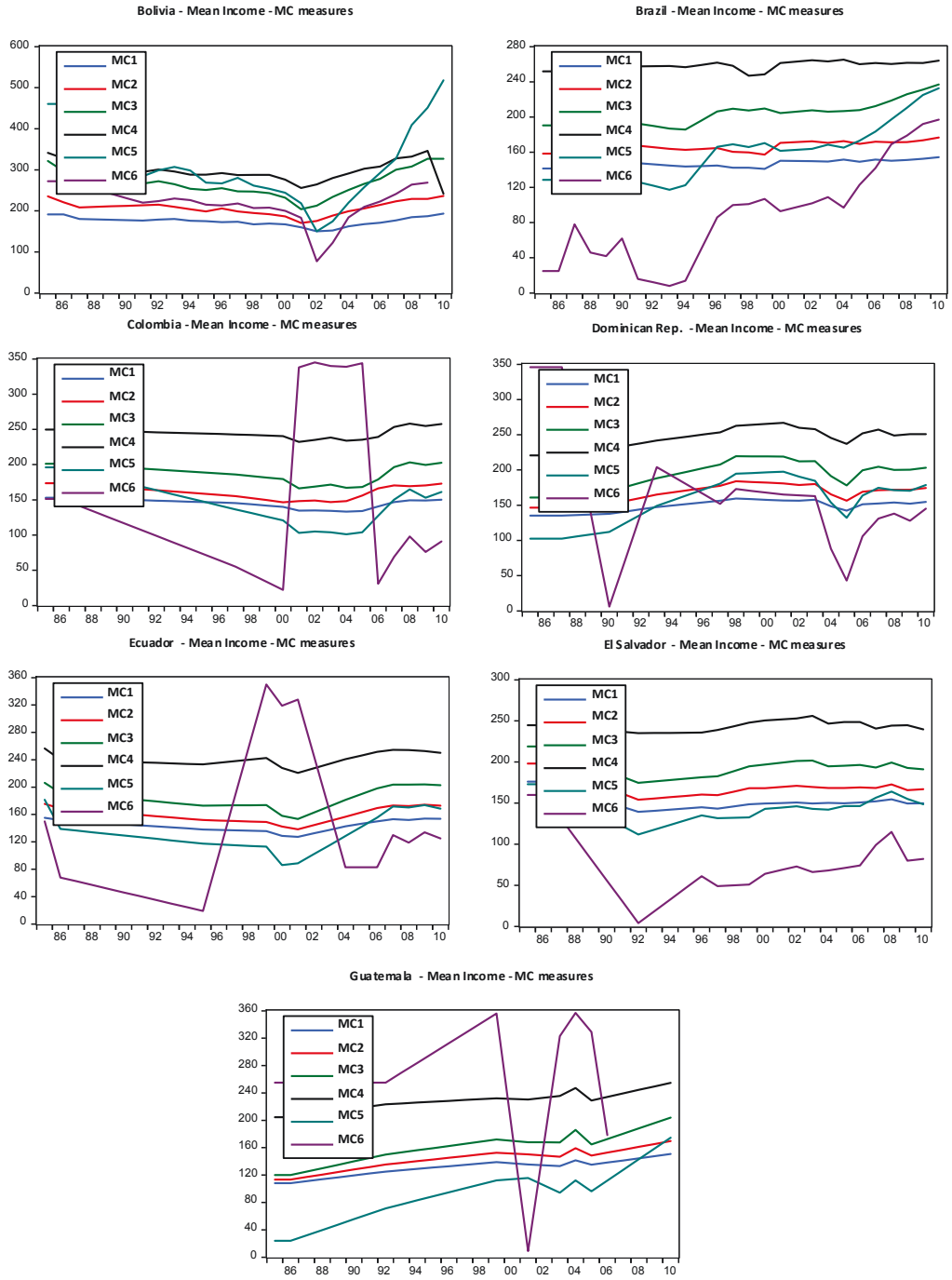
Figure 12: Middle-Income Trapped Countries - Middle-Class Sizes (%)

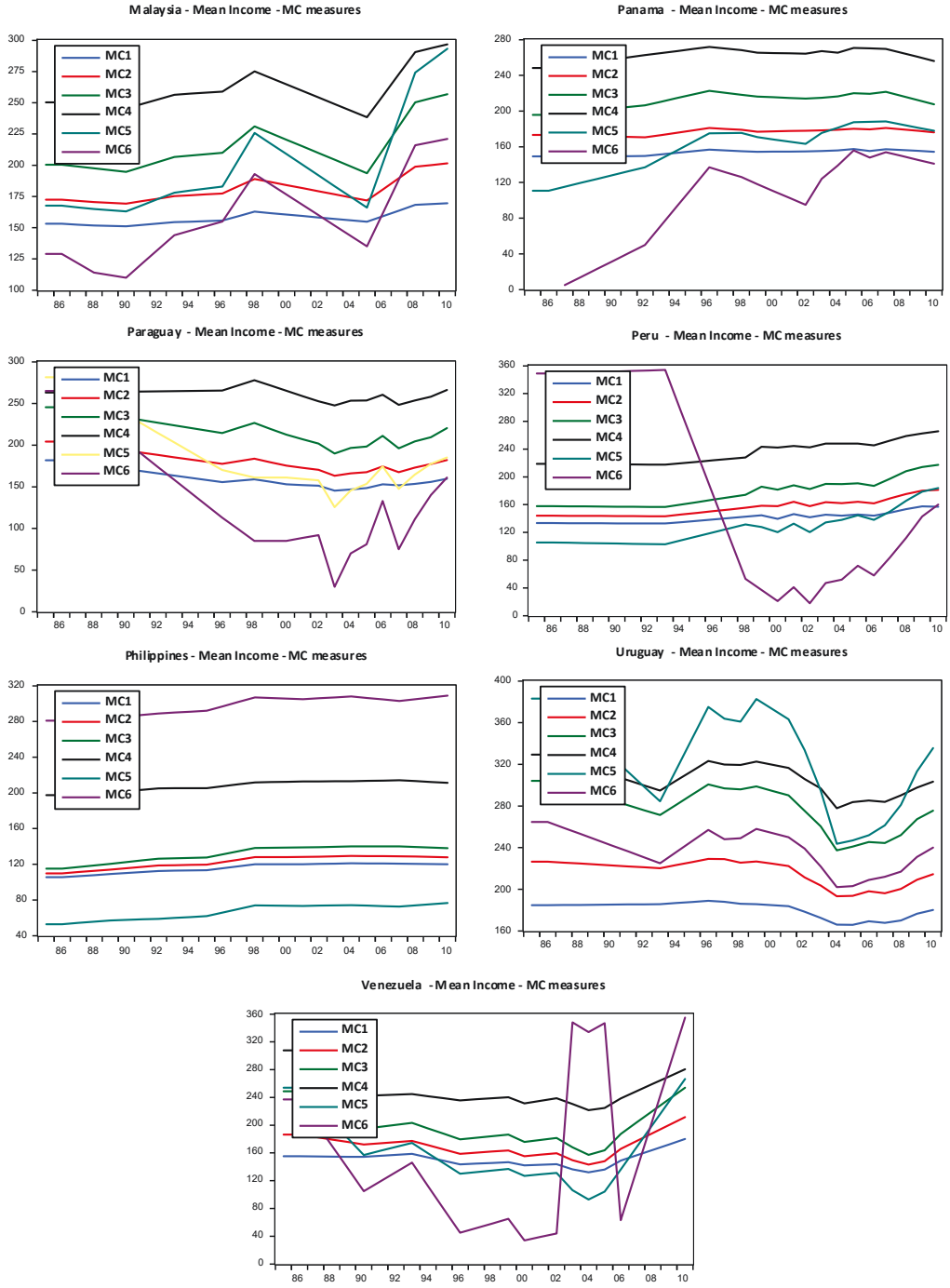




Source: World Bank -PovcalNet.

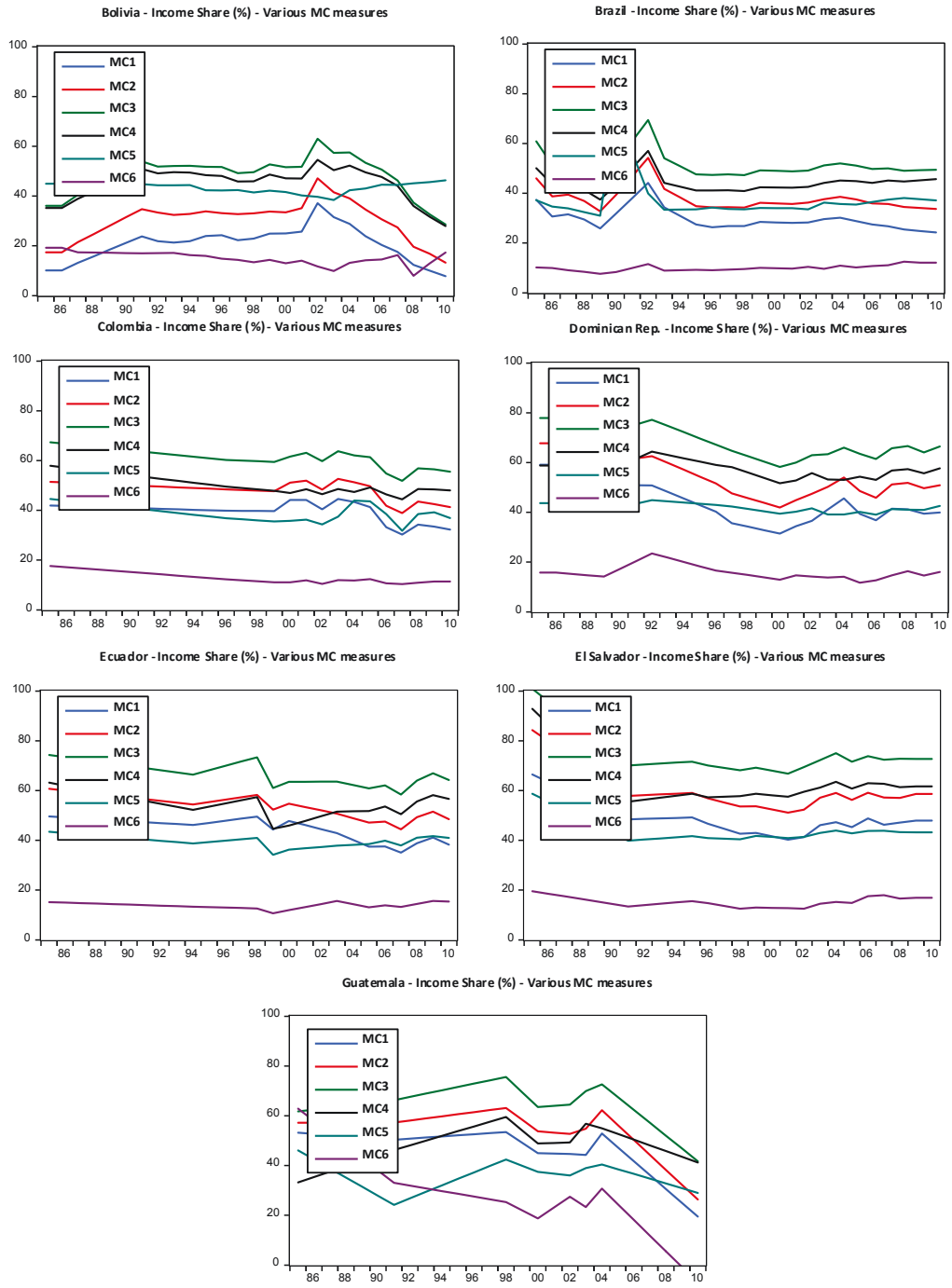
Figure 13: Middle-Income Trapped Countries - Mean Incomes (in 2005 PPP USD)

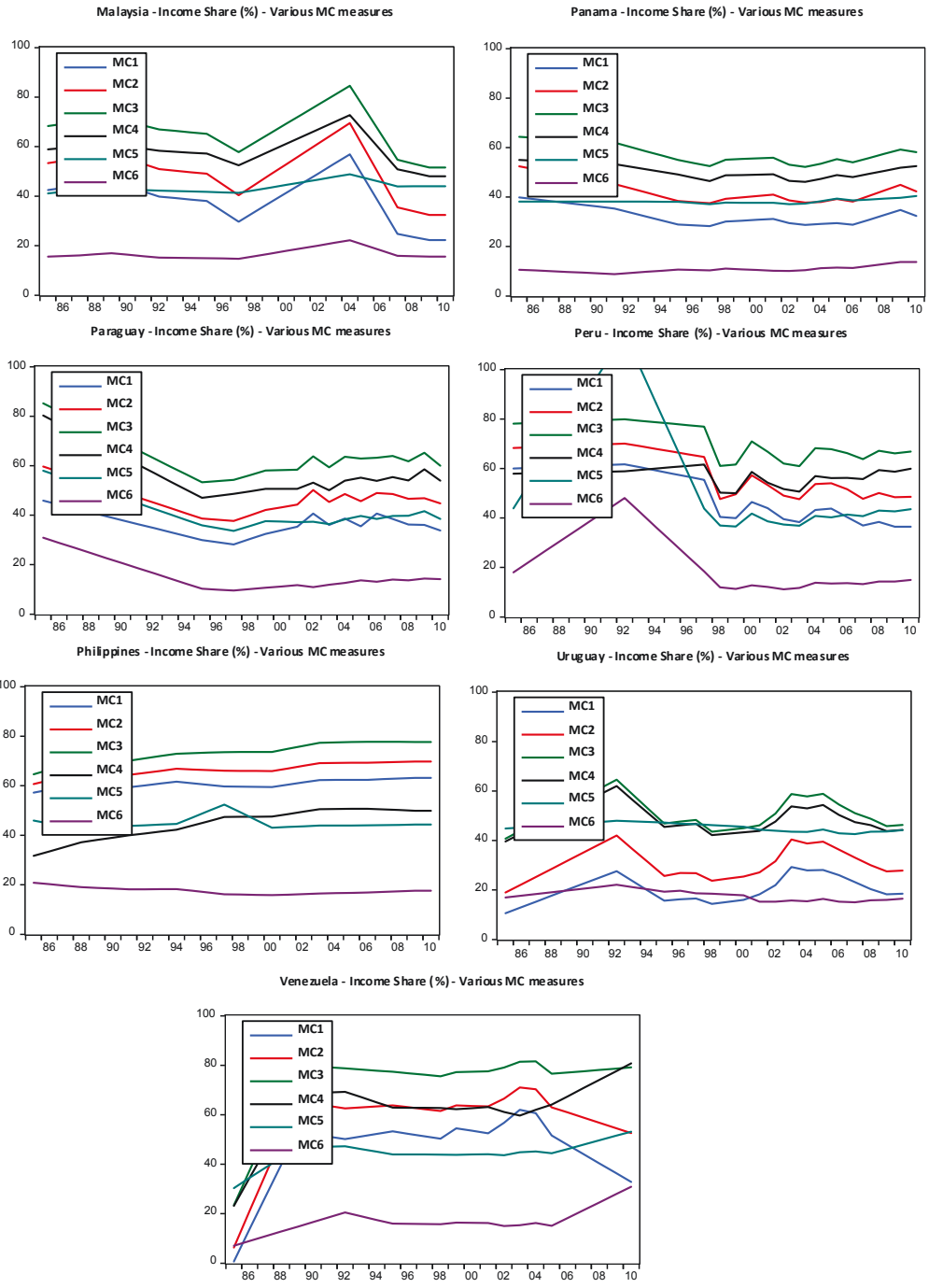




Source: World Bank -PovcalNet.

Figure 14: Middle-Income Trapped Countries - Income Shares (%)





Source: World Bank -PovcalNet.

Table 23: Middle-Class Income Thresholds: Relative Measures

	MC5 (Q2-Q4)				MC6 (75%-125%)			
	1985		2010		1985		2010	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Argentina	7.4	27.0	7.9	31.8	10.9	18.2	12.1	20.2
Bangladesh	0.8	1.7	2.2	2.2	0.8	1.3	1.0	1.7
Bolivia	2.1	7.7	1.6	9.4	3.0	5.0	3.2	5.3
Brazil	1.6	9.5	3.1	15.5	2.8	4.7	5.4	9.0
Chile	2.1	10.0	5.2	19.8	3.2	5.3	7.2	12.0
China	0.6	1.5	1.7	6.9	0.7	1.2	2.6	4.3
Colombia	2.4	10.3	2.4	11.8	3.6	6.0	3.9	6.5
Costa Rica	2.0	6.3	4.2	17.9	2.9	4.8	6.2	10.3
Dominican Rep.	1.5	6.4	2.9	11.3	2.4	4.0	4.2	7.0
Ecuador	1.8	8.5	2.9	11.6	3.1	5.2	4.3	7.2
El Salvador	1.7	8.3	2.3	9.1	3.1	5.2	3.5	5.9
Guatemala	0.5	2.8	1.6	8.1	0.9	1.5	2.8	4.7
Honduras	0.7	3.8	1.4	9.5	1.2	2.0	2.8	4.7
Indonesia	0.7	1.6	1.3	3.7	0.8	1.3	1.6	2.7
Kazakhstan	6.6	14.9	3.7	8.5	7.5	12.5	4.2	7.0
Kyrgyz Rep.	3.8	8.6	2.0	5.7	4.2	7.0	2.5	4.1
Lao PDR	0.8	1.8	1.0	2.6	0.9	1.5	1.2	2.0
Malaysia	2.6	10.4	4.3	18.6	3.9	6.5	6.8	11.3
Mexico	1.6	6.7	3.5	13.2	2.5	4.1	5.4	8.9
Nicaragua	1.0	5.2	1.5	5.6	2.1	3.5	2.1	3.5
Pakistan	0.7	1.6	1.2	2.7	0.8	1.3	1.3	2.2
Panama	1.0	9.7	2.7	12.8	2.9	4.8	4.5	7.5
Paraguay	4.0	13.7	2.7	12.2	5.2	8.7	4.5	7.6
Peru	1.7	6.4	2.7	12.2	2.4	4.2	4.5	7.5
Philippines	0.9	3.0	1.2	2.1	1.3	4.6	1.8	3.0
Sri Lanka	1.3	3.1	1.5	2.5	1.9	5.0	2.3	3.8
Thailand	1.4	4.6	1.8	3.0	3.2	9.8	4.0	6.7
Uruguay	5.4	18.9	7.8	13.0	5.3	21.2	7.9	13.1
Venezuela	2.6	14.6	4.6	7.6	2.6	10.1	4.0	6.6
Vietnam	0.6	1.7	0.8	1.3	1.4	3.8	1.7	2.8
Average	2.1	7.7	2.8	9.7	2.9	5.8	4.0	6.6

Source: World Bank -PovcalNet

Table 24: Growth in real GDP per capita (in 2005 PPP USD), 1985-2010

Growth in real GDP per capita (2005 PPP USD)						
Country	**1985-1990**	**1991-1995**	**1996-2000**	**2001-2005**	**2006-2010**	**Average**
Argentina	-1.3	5.4	1	-0.6	5.4	1.98
Bangladesh	0.6	2.3	2.7	3.1	5	2.74
Bolivia	-0.7	1.7	1.7	0.7	2.8	1.24
Brazil	1.7	-0.1	0.6	1.7	3.2	1.42
Chile	5.7	5.4	3.9	2.8	2.8	4.12
China	7.4	9.5	8	8.4	10.7	8.8
Colombia	2.5	2.3	-0.4	1.9	3.1	1.88
Costa Rica	2.6	2.9	2.8	1.2	3.2	2.54
Dominican Rep.	2.9	1.1	5.1	1.3	5.3	3.14
Ecuador	0.1	1	-0.7	2	2	0.88
El-Salvador	0.1	4.3	3	1.7	1.3	2.08
Guatemala	0.5	1.5	1.9	0.6	1.1	1.12
Honduras	0.9	0.1	0.4	2.5	2	1.18
Indonesia	4.6	6.2	0.2	3.1	4.3	3.68
Kazakhstan	-	0.4	0.5	10.3	5.4	4.15
Kyrgyz Rep.	-	-11.2	2	3.8	2.6	-0.7
Lao PDR	0.9	3.2	4.1	4.4	5.8	3.68
Malaysia	3.3	6.5	2.6	3.3	2.8	3.7
Mexico	-1.1	2.2	1.1	0.8	0.9	0.78
Nicaragua	-6	-1.8	3.4	1.7	1.5	-0.24
Pakistan	2.8	1.8	0.8	2.3	2.2	1.98
Panama	-4.6	4.6	2.3	1.4	5.9	1.92
Paraguay	3.4	1.3	0	-1	2.8	1.3
Peru	-2.8	0.9	1.8	2.2	5.7	1.56
Philippines	2.4	-0.5	1.4	2.4	3.1	1.76
Sri Lanka	1.2	4.3	3.6	3.5	5.3	3.58
Thailand	8.2	8	0.5	4	3.4	4.82
Uruguay	4.2	3.6	2.4	-1.6	6	2.92
Venezuela	-0.8	1.6	-1.1	-0.1	3.2	0.56
Vietnam	2.2	5.4	5.8	5.4	0.3	3.82
Average	1.5	2.5	2.0	2.4	3.6	2.4

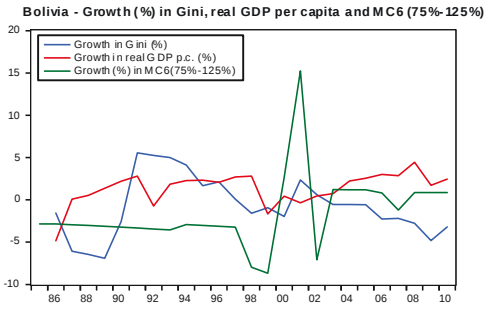
Growth in real GDP p.c. is the 5-years annual average. A "-" sign indicates an absence of data. Source: World Bank - WDI

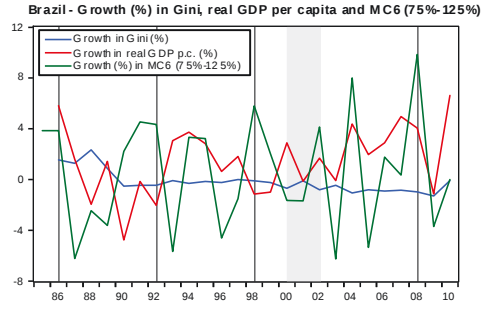
Table 25: Gini coefficient and Growth in the Size of MC6 (75%-125%), 1985-2010

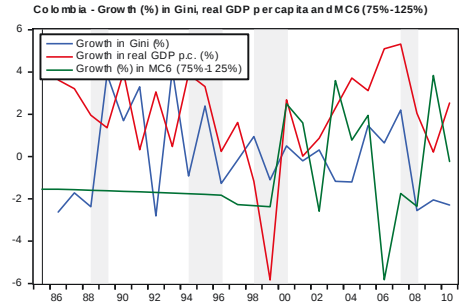
	Gini Coefficient							Growth (%) in the size of MC6 (75%-125%)					
Country	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**	**Δ (%) 1985-2010**	**1985-1990**	**1990-1995**	**1995-2000**	**2000-2005**	**2005-2010**	**Average**
Argentina	41.2	44.9	45.8	48	46.7	43.90	6.7	-0.8	-1.1	-3.1	1	2.6	-0.3
Bangladesh	36.5	37.7	41.2	41.7	45.9	45.2	23.9	-0.4	-3.4	0.9	0.3	0.1	-0.5
Bolivia	57.9	45.4	56	54.7	55.4	47.5	-17.9	-3.0	-3.3	-4.1	2.3	0.4	-1.5
Brazil	56.3	59.5	58.6	57.9	56.0	53.8	-4.6	-1.2	1.9	0	-0.2	1.7	0.4
Chile	53.73	54.5	53.5	54.2	52.0	50.7	-5.7	1.7	-0.5	0.9	0.9	0.7	0.7
China	29.9	35.4	40	43.6	49.8	50.1	67.5	-2.0	-1.4	-4.4	0.4	-2.8	-2.0
Colombia	51.2	50.6	53.6	53	52.6	50.5	-1.4	-1.6	-1.7	-1.3	1.1	-1.3	-0.9
Costa Rica	41.8	44.3	45.1	48.1	48.3	49.1	17.5	-3.9	0.8	-0.6	0.8	-1.4	-0.9
Dominican Rep.	48.1	49.3	47.6	49.4	49.7	46.7	-2.9	-0.3	1.2	-2.2	1.1	-0.2	-0.1
Ecuador	46.8	47.2	54.2	55.8	52.5	47.0	0.3	0	0.1	-0.6	0.9	1.6	0.4
El Salvador	44.0	45.3	49.4	52.0	45.8	43.3	-1.6	1.8	2.0	-2.8	2.0	2.2	1.0
Guatemala	55.0	54.4	53.2	52.8	50.9	51.0	-7.3	-2.2	1.8	3.3	-2.6	3.8	0.8
Honduras	54.1	52.9	52.7	53.7	56.7	52.8	-2.5	-1.6	3.3	-0.8	-2.6	0.1	-0.3
Indonesia	35.2	34.4	38.2	35.4	37.9	41.9	19.2	1.4	-0.5	1.1	-3.1	-1.8	-0.6
Kazakhstan	27.0	28.0	34.7	34.5	34.0	30.6	13.5	-3.2	-3.5	-1.6	5.0	1.4	-0.4
Kyrgyz Rep.	26.2	28.6	54.4	35.6	37.6	35.9	37.0	-9.4	-4.4	6.3	-3.6	3.6	-1.5
Lao PDR	32.2	32.2	36.2	37.3	37.6	39.4	22.4	-2.1	-2.3	-0.7	-0.6	-1.4	-1.4
Malaysia	47.9	46.5	46.7	49.0	43.5	44.6	-6.9	0.6	-1.1	1.8	1.2	-3.1	-0.1
Mexico	45.4	46.5	48.8	49.0	47.5	46.4	2.2	6.7	-6.0	0.1	0.6	1.3	0.5
Nicaragua	54.3	54.3	53.7	54.7	49.1	43.8	-19.3	2.7	2.4	1.6	0.4	0.3	1.5
Pakistan	36.1	34.3	32.9	33.6	37.0	39.8	10.3	0.7	2.9	-0.2	-1.0	3.2	1.1
Panama	49.4	53.7	54.2	54.2	52.7	50.3	1.8	7.0	0.9	0.3	1.3	2.5	2.4
Paraguay	39.9	39.9	53.1	54.0	51.2	49.8	24.8	-5.7	-8.0	1.7	5.7	-0.4	-1.3
Peru	55.7	53.9	52.9	54.7	50.3	50.0	-10.3	-0.3	3.7	-5.7	1.6	0.1	-0.1
Philippines	45.5	47.2	48.0	48.5	47.1	46.1	1.4	-1.2	-1.0	-1.3	0.5	0.6	-0.5
Sri Lanka	40.2	36.3	40.1	38.2	44.8	44.1	9.8	2.0	-2.6	-1.3	-0.7	1.7	-0.2
Thailand	48.2	47.6	46.5	44.8	44.8	42.6	-11.7	0.9	0.7	-0.3	-0.2	1.2	0.5
Uruguay	42.3	48.1	47.6	49.6	52.6	51.9	22.7	2.3	-1.2	-0.7	-1.0	0.8	0.1
Venezuela	50.1	41.7	44.0	45.4	44.6	40.3	-19.5	14.2	-1.7	0.5	-1.8	12.8	4.8
Vietnam	39.4	37.3	37.0	39.1	41.1	41.8	6.0	-0.1	-0.1	-0.8	-1.1	2.4	0.1
Average	44.4	44.4	47.3	47.4	47.2	45.7	5.8	0.1	-0.7	-0.5	0.3	1.1	0.1

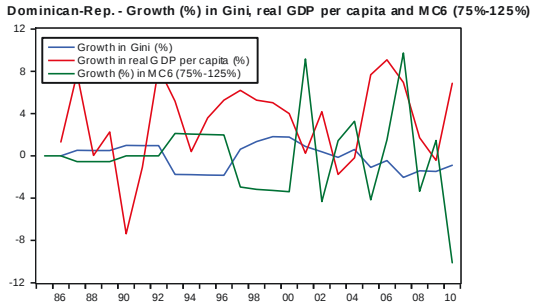
Growth in the size of the middle-class is measured as the average growth per 5-years periods. Average is the average growth per 5-year periods.Sources: Unu-Wider WIID and World Bank -PovcalNet

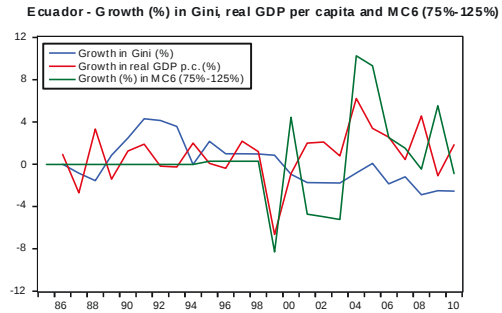
Figure 15: Middle-Income Trapped Countries - Growth (%) in Gini, real GDP per capita and MC6 (75%-125%)

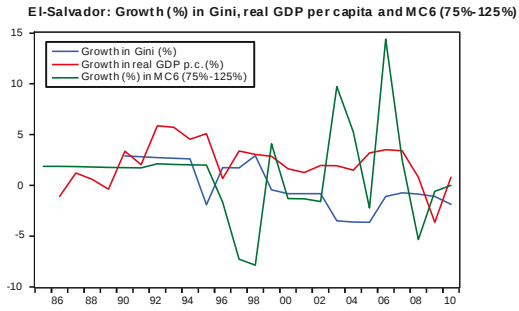


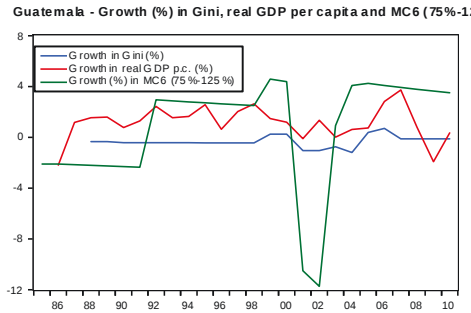












Shaded areas and vertical lines indicate stock market crashes, as identified by Reinhart and Rogoff (2010).
Sources: World Bank - WID, Unu-Wider - WIID and World-Bank PovcalNet

Table 26: Correlation Matrix - Middle-Class Measures and Selected Variables

	Growth in MC1 ($2-$10)	Growth in MC2 ($4-$20)	Growth in MC6 (75%-125%)
Human Capital Variables			
Life expectancy (total)	-0.319	-0.189	0.098
Log(fertility rate)	0.142	-0.050	-0.099
Working age population	-0.152	0.057	0.073
Political Variables			
Polity_II	-0.453	-0.363	0.139
Coups d'état	-0.141	-0.118	0.087
Gender Variables			
Differential in educational attainment	-0.112	-0.129	0.081
Differential in life expectancy	-0.176	-0.112	0.202
Number of seats held by women in parliaments	0.153	0.142	0.064
Macroeconomic Variables			
Gross savings	0.269	0.264	0.032
Urban ratio	-0.523	-0.471	0.118
Growth of the terms of trade	0.132	0.095	0.287

Correlations are measured over 5-years periods, with growth in the different middle-class measures measured as the average annual growth per 5-years periods, and with the other control variables measured at the beginning of each 5-years periods. Sources: World Bank - WID, The Center for Systemic Peace, and World Bank - PovcalNet

Table 27: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - MC1 ($2-$10)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.197**	0.073	30	0.012	115	OLS
	Whole sample	0.009	0.047	29	0.849	115	FE
	Whole sample	0.231	0.142	29	0.105	84	A&B
	Regional groups						
	LAC	0.135**	0.053	18	0.021	68	OLS
	LAC	0.143**	0.060	17	0.031	68	FE
	LAC	0.179	0.218	17	0.411	54	A&B
	Asia	0.195*	0.105	12	0.091	47	OLS
	Asia	-0.129	0.112	11	0.273	47	FE
	Asia	0.057	0.240	11	0.813	33	A&B
	Income groups						
	MIT	0.121*	0.059	14	0.061	56	OLS
	MIT	0.141**	0.050	13	0.014	56	FE
	MIT	0.101	0.141	13	0.472	42	A&B
	Non-MIT	0.186**	0.089	16	0.055	59	OLS
	Non-MIT	-0.035	0.068	15	0.613	59	FE
	Non-MIT	0.015	0.122	15	0.901	45	A&B
3-year periods	**Standard analysis**						
	Whole sample	0.104**	0.053	30	0.059	200	OLS
	Whole sample	-0.047	0.062	29	0.458	200	FE
	Whole sample	0.072	0.070	29	0.298	176	A&B
10-year periods	**Standard analysis**						
	Whole sample	0.365**	0.155	30	0.026	57	OLS
	Whole sample	0.175*	0.098	29	0.084	57	FE

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. Control variables are all included, but not detailed in the table. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. Income groups are defined following the MIT classification (see Table 9). *** p<0.01, ** p<0.05, * p<0.1.

Table 28: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - MC4 ($4-$20)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.097***	0.020	30	0.000	115	OLS
	Whole sample	-0.028	0.021	29	0.203	115	FE
	Whole sample	0.049	0.050	29	0.330	84	A&B
	Regional groups						
	LAC	0.065*	0.032	18	0.064	68	OLS
	LAC	0.069**	0.029	17	0.028	68	FE
	LAC	0.210**	0.100	17	0.036	54	A&B
	Asia	0.091***	0.025	12	0.004	47	OLS
	Asia	-0.069*	0.034	11	0.066	47	FE
	Asia	0.101	0.113	11	0.376	33	A&B
	Income groups						
	MIT	0.044	0.047	14	0.368	56	OLS
	MIT	0.034	0.037	13	0.380	56	FE
	MIT	0.064	0.047	13	0.176	42	A&B
	Non-MIT	0.091***	0.020	16	0.000	59	OLS
	Non-MIT	-0.037	0.026	15	0.178	59	FE
	Non-MIT	0.010	0.056	15	0.861	45	A&B
3-year periods	**Standard analysis**						
	Whole sample	0.064***	0.015	30	0.000	200	OLS
	Whole sample	-0.045	0.029	29	0.129	200	FE
	Whole sample	0.038	0.043	29	0.380	176	A&B
10-year periods	**Standard analysis**						
	Whole sample	0.250***	0.052	30	0.000	57	OLS
	Whole sample	0.124***	0.045	29	0.010	57	FE

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. Control variables are all included, but not detailed in the table. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. Income groups are defined following the MIT classification (see Table 9. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 29: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - MC6 (75%-125%)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.258**	0.122	30	0.043	115	OLS
	Whole sample	0.196**	0.072	29	0.011	115	FE
	Whole sample	1.184*	0.551	29	0.074	84	A&B
	Regional groups						
	LAC	0.153**	0.053	18	0.011	68	OLS
	LAC	0.139***	0.041	17	0.004	68	FE
	LAC	0.251	0.223	17	0.261	54	A&B
	Asia	0.524	0.305	12	0.113	47	OLS
	Asia	0.401*	0.201	11	0.071	47	FE
	Asia	-0.926	-0.926	11	0.159	33	A&B
	Income groups						
	MIT	0.161**	0.060	14	0.019	56	OLS
	MIT	0.127**	0.045	13	0.014	56	FE
	MIT	0.250***	0.081	13	0.002	42	A&B
	Non-MIT	0.369	0.251	16	0.165	59	OLS
	Non-MIT	0.296*	0.141	15	0.054	59	FE
	Non-MIT	-0.381*	0.219	15	0.082	45	A&B
3-year periods	**Standard analysis**						
	Whole sample	0.164*	0.094	30	0.092	200	OLS
	Whole sample	0.129**	0.057	29	0.032	200	FE
	Whole sample	-0.095	0.115	29	0.411	176	A&B
10-year periods	**Standard analysis**						
	Whole sample	0.145	0.169	30	0.398	57	OLS
	Whole sample	0.121	0.107	29	0.269	57	FE

Notes: Dependent variable is the 5-year average annual growth in real GDP per capita. Control variables are all included, but not detailed in the table. In the GMM specification, two lags are used, and the growth in middle-class variable is treated as endogenous, the initial income as predetermined, and the exogenous instruments include all the other control variables. Income groups are defined following the MIT classification (see Table 9). *** p<0.01, ** p<0.05, * p<0.1.

Table 30: Sensitivity Analysis: Middle-Class and Growth: Baseline Model - Alternative Model Specifications

	Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods	Sargan	AR(1)
Alternative lags specification								
Growth of MC1 ($2-$10)	0.180	0.851	30	0.833	53	GMM(3)		
Growth of MC4 ($4-$20)	0.340	0.522	30	0.514	53	GMM(3)		
Growth of MC6 (75%-125%)	0.166	0.764	30	0.828	53	GMM(3)		
Alternative variables specifications (1)								
Growth of MC1 ($2-$10)	0.200**	0.084	30	0.017	81	GMM(2)	0.323	0.580
Growth of MC4 ($4-$20)	0.094***	0.032	30	0.004	81	GMM(2)	0.296	0.099
Growth of MC6 (75%-125%)	0.233***	0.07	30	0.001	81	GMM(2)	0.429	0.176
Alternative variables specifications (2)								
Growth of MC1 ($2-$10)	0.148	0.082	30	0.072	81	GMM(2)	0.325	0.580
Growth of MC4 ($4-$20)	0.094	0.032	30	0.004	81	GMM(2)	0.296	0.099
Growth of MC6 (75%-125%)	0.237	0.352	30	0.502	81	GMM(2)	0.744	0.582

Notes: The model has the same specification as the baseline models, with the average growth in real GDP per capita as the dependent variable. GMM(2) is defined as in the other models, using two-lags and defining the inequality variable as endogenous, the initial income as predetermined and the other control variables as exogenous. On the other hand, GMM(3) is defined such that three-lags are used to instrument the endogenous variables; the inequality variable is still defined as endogenous, the initial income as predetermined and the other control variables as exogenous. In this case, the Sargan test and AB autoccorrelation test are not available, due to the low number of data (and the fact that some regressors are dropped due to the misidentification of the model). The first alternative variables specification treats the educational attainment levels of both male and female as endogenous, in addition to the middle-class variable. The initial income is still treated as a predetermined variable, and the other control variables as exogenous. In the second specification, I also include the price level of investment as an endogenous variable, and the other variables are treated similarly to the first specification. *** p<0.01, ** p<0.05, * p<0.1.

Table 31: Sensitivity Analysis: Middle-Class and Middle-Income Trap: Logit Model - MC1 ($2-$10)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.168***	0.053	30	0.002	116	MLE
	Whole sample	0.263*	0.141	13	0.062	52	FE
	Whole sample	0.168**	0.065	29	0.010	116	RE
	Human Capital Channel						
	Whole sample	0.161***	0.056	30	0.004	116	MLE
	Whole sample	0.283	0.172	13	0.100	52	FE
	Whole sample	0.161**	0.072	29	0.025	116	RE
	Political Channel						
	Whole sample	0.155***	0.058	30	0.007	115	MLE
	Whole sample	0.272**	0.132	13	0.040	52	FE
	Whole sample	0.155**	0.068	29	0.022	116	RE
	Gender In. Channel						
	Whole sample	0.211***	0.081	30	0.009	82	MLE
	Whole sample	0.983	0.712	10	0.168	30	FE
	Whole sample	0.211***	0.084	29	0.012	82	RE
	Macroeconomic Channel						
	Whole sample	0.175***	0.063	30	0.006	101	MLE
	Whole sample	0.177	0.125	13	0.156	52	FE
	Whole sample	0.175**	0.074	26	0.019	101	RE
3-year periods	**Standard analysis**						
	Whole sample	0.090***	0.029	30	0.002	201	MLE
	Whole sample	0.087	0.061	16	0.156	111	FE
	Whole sample	0.090**	0.043	29	0.039	201	RE
	Standard analysis						
	Whole sample	0.283**	0.135	30	0.036	58	MLE
	Whole sample	0.283**	0.129	29	0.028	58	RE

Notes: Dependent variable is a binary variable that takes a value of 1 if a given country has successfully transitioned to an upper-income category, in a 5-years period, and 0 otherwise. Control variables are all included, but not detailed in the table. Income groups are defined following the MIT classification (see Table 9). Coefficients are expressed as log-odds ratios. *** p<0.01, ** p<0.05, * p<0.1.

Table 32: Sensitivity Analysis: Middle-Class and Middle-Income Trap: Logit Model - MC4 ($4-$20)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.060**	0.029	30	0.040	116	MLE
	Whole sample	0.031	0.038	13	0.410	52	FE
	Whole sample	0.060**	0.030	29	0.046	116	RE
	Human Capital Channel						
	Whole sample	0.046	0.043	30	0.285	116	MLE
	Whole sample	0.034	0.044	13	0.445	52	FE
	Whole sample	0.046	0.033	29	0.170	116	RE
	Political Channel						
	Whole sample	0.048*	0.029	30	0.099	115	MLE
	Whole sample	0.036	0.038	13	0.346	52	FE
	Whole sample	0.048*	0.029	29	0.098	116	RE
	Gender In. Channel						
	Whole sample	0.052**	0.037	30	0.153	82	MLE
	Whole sample	0.275	0.178	10	0.123	30	FE
	Whole sample	0.052**	0.032	29	0.107	82	RE
	Macroeconomic Channel						
	Whole sample	0.053	0.034	30	0.116	101	MLE
	Whole sample	0.017	0.042	13	0.686	52	FE
	Whole sample	0.053*	0.031	26	0.084	101	RE
3-year periods	**Standard analysis**						
	Whole sample	0.031**	0.014	30	0.026	201	MLE
	Whole sample	0.007	0.024	16	0.754	101	FE
	Whole sample	0.031*	0.018	29	0.076	201	RE
10-year periods	**Standard analysis**						
	Whole sample	0.150**	0.067	30	0.024	58	MLE
	Whole sample	0.150**	0.068	29	0.028	58	RE

Notes: Dependent variable is a binary variable that takes a value of 1 if a given country has successfully transitioned to an upper-income category, in a 5-year period, and 0 otherwise. Control variables are all included, but not detailed in the table. Income groups are defined following the MIT classification (see Table 9). Coefficients are expressed as log-odds ratios. *** p<0.01, ** p<0.05, * p<0.1.

Table 33: Sensitivity Analysis: Middle-Class and Middle-Income Trap: Logit Model - MC6 (75%-125%)

		Coefficient on middle-class	Standard error	Countries	p-value	Observations	Estimation methods
5-year periods	**Standard analysis**						
	Whole sample	0.036	0.069	30	0.605	116	MLE
	Whole sample	0.116	0.141	13	0.414	52	FE
	Whole sample	0.060**	0.030	29	0.046	116	RE
	Human Capital Channel						
	Whole sample	0.071	0.084	30	0.399	116	MLE
	Whole sample	0.271	0.185	13	0.142	52	FE
	Whole sample	0.071	0.109	29	0.514	116	RE
	Political Channel						
	Whole sample	0.028	0.070	30	0.691	115	MLE
	Whole sample	0.114	0.166	13	0.493	52	FE
	Whole sample	0.028	0.093	29	0.766	116	RE
	Gender In. Channel						
	Whole sample	0.010	0.089	30	0.909	82	MLE
	Whole sample	-0.096	0.314	10	0.760	30	FE
	Whole sample	0.010	0.119	29	0.932	82	RE
	Macroeconomic Channel						
	Whole sample	0.005	0.063	30	0.935	101	MLE
	Whole sample	0.087	0.175	13	0.617	52	FE
	Whole sample	0.005	0.104	26	0.961	101	RE
3-year periods	**Standard analysis**						
	Whole sample	0.005	0.050	30	0.921	201	MLE
	Whole sample	0.058	0.096	16	0.549	111	FE
	Whole sample	0.005	0.068	29	0.942	201	RE
10-year periods	**Standard analysis**						
	Whole sample	0.071	0.149	30	0.636	58	MLE
	Whole sample	0.071	0.158	29	0.654	58	RE

Notes: Dependent variable is a binary variable that takes a value of 1 if a given country has successfully transitioned to an upper-income category, in a 5-year period, and 0 otherwise. Control variables are all included, but not detailed in the table. Income groups are defined following the MIT classification (see Table 9). Coefficients are expressed as log-odds ratios. *** p<0.01, ** p<0.05, * p<0.1.