

P A F T A D

PACIFIC TRADE AND DEVELOPMENT
WORKING PAPER SERIES

Paper No. YF37-10

*Escaping the Middle-Income Trap:
Trade, investment and innovation*

Shiro Armstrong and Tom Westland

DRAFT, NOT FOR CITATION WITHOUT AUTHOR CONSENT

AUTHOR AFFILIATION: Australian National University

PAFTAD International Secretariat
Crawford School of Public Policy
College of Asia and the Pacific
The Australian National University
Canberra ACT 0200 Australia

Escaping the Middle-Income Trap: Trade, investment and innovation

Shiro Armstrong and Tom Westland

East Asian Bureau of Economic Research

Crawford School of Public Policy, Australian National University

Abstract

The notion of a ‘middle income trap’ has gained currency in recent years and focused attention on the policy settings that facilitate economic growth in middle income countries. Openness to international trade and investment is widely recognised as a necessary if not sufficient condition for rapid catch-up growth in developing countries. Experience in Asia has shown that catch-up growth has been associated with second-best institutions that helped overcome the lack of well-developed markets. This article distinguishes between ‘catch-up’ and ‘innovative’ growth phases in development and demonstrates that a deeper kind of openness is necessary to facilitate the latter. As countries approach the global technology frontier, those institutions which were an asset in catch-up growth begin to hinder economic growth. A ‘deeper’ openness requires institutions that foster firm entry and exit, competitive domestic product and factor markets, as well as financial markets and institutions that allocate capital efficiently. Important sources of gains from trade in new trade theory models derive from allocative efficiency and trade-induced domestic productivity growth, both of which become more important closer to the technology frontier and require heterogeneous firms with entry and exit. The empirical analysis suggests that the impact of this kind of deeper openness, which we capture by financial market development and liberalisation, complements traditional trade and investment openness, and is especially important for growth rates in middle and high income countries.

Paper prepared for the 37th *Pacific Trade and Development Conference*, Institute of South East Asian Studies, National University of Singapore, Singapore, 2-5 June 2015

Introduction

The Asia Pacific region, especially East Asia, is home to a number of economies which have managed to graduate from middle income status to be classified into the high income group of economies. Starting with Japan's rapid rise from the ashes of World War II, South Korea, Taiwan and Singapore all successfully caught up to the technological frontier and their peoples enjoy high incomes. Only 13 of 101 countries globally have been able to move from middle income to high income since 1960 and catch up to the technological frontier. China and other countries in Southeast Asia have succeeded in emulating the rapid catch-up growth of Japan and the newly industrialized economies (NIEs) but have yet to make the transition to high income. Some middle income countries, such as Thailand and Malaysia, appear to be stuck in the middle income range — using the World Bank Atlas method of categorising economies, this means that they are countries with per capita gross national incomes of between US\$1,045 and US\$12,746 — and are having difficulty in reaching the technological frontier. Others like China are experiencing a slow-down in growth as they rapidly approach higher middle income levels and a major policy preoccupation is with maintaining growth momentum and avoiding getting stuck in a middle income trap.

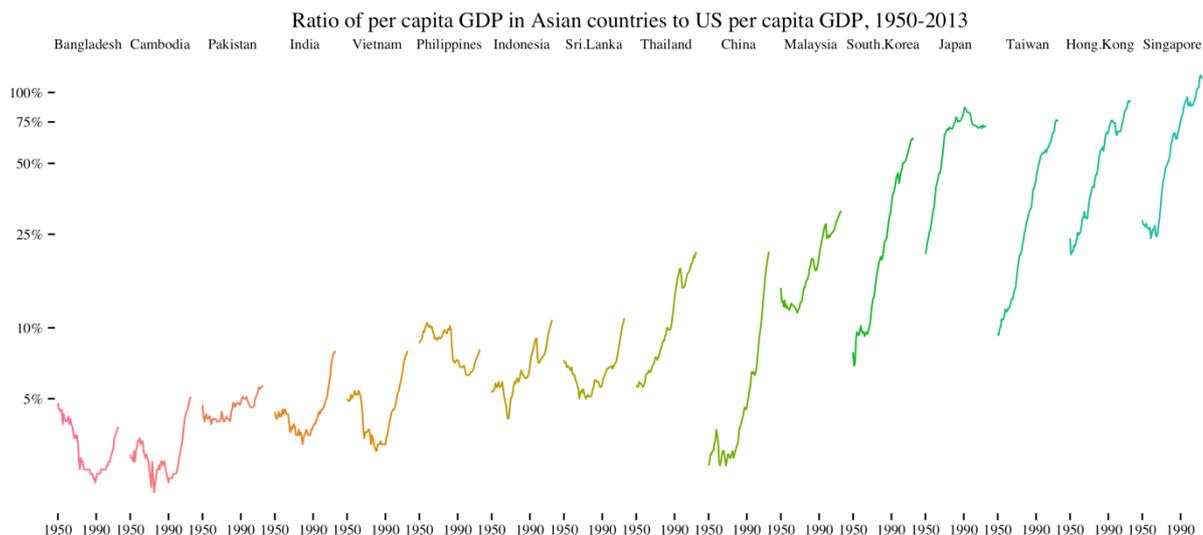
The 'middle income trap' is still rather nebulously defined in the literature. There is no strong agreement on the definition of the trap, its causes, or its potential remedies. Some authors consider that the trap is an absolute trap—that is to say, a phenomenon encountered by countries at a particular stage of their economic development (Felipe et al 2012). This might suggest structural pitfalls that are common to economies at different stages of development. Another interpretation suggests the middle income trap should be conceived in relative terms; that is, essentially, it describes a failure of some countries to converge to the income levels of the high-income countries, even though they may experience continual growth (Robertson and Ye 2013). Others—without necessarily using the phrase 'middle income trap'—examine 'growth slowdowns', as in Eichengreen

et al. (2013), Aiyar et al. (2013) and Summers and Pritchett (2014) in order to understand why rapidly-growing economies may slow down and not achieve potential.

Depending on which definition of the trap is used, some possible causes are relatively straightforward. Conceived as a relative slowdown, then the trap may be explained via simple convergence mechanisms like that suggested by the Solow model, whereby the accumulation of factors that exhibit diminishing marginal returns permits fast catch up growth when an economy is a long way from the frontier but leads to relatively slow economic growth closer to it. In this case, productivity growth becomes more important, suggesting that countries may need to invest in human capital or research and development in order to continue converging to the frontier. Other possible causes of the trap include a loss of competitiveness in export industries as countries reach the Lewis turning point and real wages begin to rise without countervailing increases in technology and human capital that would facilitate a move into high value-added industries (Cai 2012; Kharas and Kohli 2011) .

The East Asian growth model — that allowed some Asian economies to avoid or escape the middle income trap — has been studied extensively owing to the remarkable development record of the region over a short time. The policies that led to very fast growth of Japan early in the post war period, then by the newly industrialising economies of Taiwan, South Korea (Korea from here on in), Hong Kong and Singapore in the 1970s and 1980s, have been of immense interest in understanding the factors that facilitated or encouraged rapid growth but also the ability to reach high income levels and the global technology frontier. Figure 1 shows that the Asian economic experience has been extraordinarily diverse over the last sixty years: some countries have risen from very low levels of per capita income to converge closely to US per capita GDP; others, on the other hand, have stagnated at low or middle levels of income.

Figure 1: Ratio of real GDP per capita (PPP) in Asian countries to US, 1950-2013



Note: Per capita GDP is calculated on a PPP basis. Data is from Maddison Project.

<http://www.ggdc.net/maddison/maddison-project/home.htm>

The Asian growth story is strongly linked to openness in international trade. All the major economies that have transitioned from low through middle to high income in Asia were natural resource deficient economies which were dependent on efficient specialization in the international economy through exporting labour-intensive, then capital-intensive and technology-intensive products to make this transition. This story has been analysed and elaborated famously in this conference series (Garnaut, 1979). Policy makers in Asia and elsewhere recognize the importance of openness to trade and investment for economic development. They accept that rapid catch-up growth for low income countries and growth in reaching the technology frontier for middle income countries has required openness to trade and investment. Production networks and deep integration that now typify Asian economic interdependence are a result of openness to trade and investment.

This paper considers the middle income ‘trap’ as a product of the interaction between institutional and policy settings and developmental level. In particular, it looks at the importance of trade and foreign direct investment for catch-up growth and enquires into the nature of its importance for innovative growth. Openness to trade and investment appears a necessary but not sufficient condition for both phases of growth. But the kind of openness that facilitates fast growth in the catch-up and innovative growth phases is likely to be quite different. The traditional kind of openness— lower tariffs, openness to foreign capital — facilitates catch-up growth as well as innovative growth. But as

countries reach a certain stage of development, it can be hypothesized, a deeper kind of openness is required.

There are several well-known mechanisms that explain why openness is necessary for growth. To have access to frontier technology, for example, it is necessary to be open to trade in capital goods or in goods that embody the technology that is to be adopted. Just as importantly, international trade leads to fiercer competition for markets in the home country, which encourages domestic firms to raise their productivity. Openness also encourages economic specialisation in areas of comparative advantage, leading to higher allocative efficiency. Openness to international investment also promotes growth by facilitating the transfer of technology, increasing competition and encouraging efficiency gains.

The impact of this process of opening, however, may not be the same at all stages of development. Consider the case of tariffs. The deadweight loss of a tax is proportional to the square of the tax rate, so reductions in relatively low tariffs, although still positive for growth and efficiency, will not have the same impact as reductions in very high tariffs. But countries with relatively low tariffs often have other barriers to economic competition that, for example, impede firm entry and exit, or regulate financial markets in ways that may starve innovative, productivity-enhancing firms of the capital they require to expand.

The importance of trade and investment can therefore be considered in the context of two different growth stages: catch-up growth and growth closer to the global technology frontier. This paper is concerned with the experience of Asian economies in those two stages of development or growth, and those that may get stuck in-between the two.

Importance of trade and investment for growth

That trade and investment are important for economic growth and development is widely accepted — they are a necessary but not sufficient condition for growth (IMF, 2014). Opening up to trade allows specialization in production, realization of comparative advantage, and therefore a more efficient allocation of resources. East Asian economies are exemplars of the success of commitment to open trade and investment regimes for integrating into the global economy, rapid development and lifting incomes.

Openness to trade and investment would seem to be necessary for growth at all stages of economic development. Rapid catch-up growth for developing countries would not be possible without trade and investment. Even when growth slows as countries lose the advantage of backwardness and the ability to leapfrog early stages of development, the transition to more value-add growth continues to require adoption of technologies from abroad. And growth closer to the technology frontier would require maintaining that openness.

Table 1: The impact of ‘deep’ openness on average annual per capita GDP growth rates in Asia 1970-2010

	GDP per worker relative to the US			
	0-25%	25%-50%	50%-75%	75%-100%
Openness < 75	3.056%	6.04%	2.27%	2.14%
Openness > 75	n/a	6.212%	3.421%	4.575%

We illustrate this stylistically in Table 1, which uses the Konjunkturforschungsstelle (KOF) measure of economic globalisation that ranges from 0 to 100. The table presents average annual per capita growth rates in Asia for economies with KOF economic globalisation scores of less than (greater than) 75. For countries with labour productivity between a quarter and a half of US labour productivity, having very high openness is associated with a small additional positive impact on average growth rates. Countries between a half and three-quarters as productive as the US have a larger payoff to openness; however, the countries that see the largest impact of this ‘deep openness’ are those that are close to the US technological frontier.

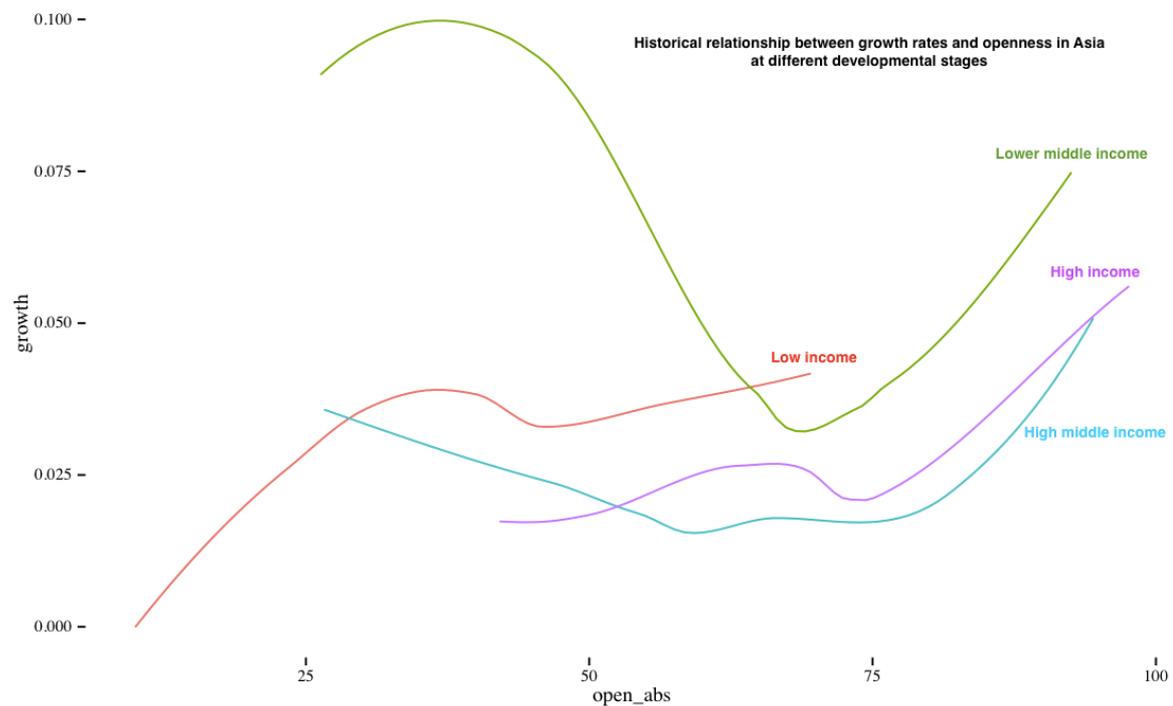
Technology upgrading and catching up to, or remaining at, the global technology frontier requires trade and FDI. FDI not only brings foreign capital but technology, knowledge, know-how and best-practice management; and is crucial to technological progress (Almeida and Fernandes, 2008). Trade embodies technology with significant spill-overs to the importing country. The global technology frontier is expanding with innovation wherever that may occur and requires openness for adoption and adaptation.

As middle income countries are defined by their distance from the global technology frontier, the ability to upgrade, catch up, and innovate is important to their closing that distance. To reach that technology frontier, countries need to be open to ideas and have institutions that allow for more complex interactions across the economy. That would seem to include good governance characterised by decentralised decision making and confidence in a well-functioning and flexible market system.

Figure 2 shows the correlation between openness and growth for Asian economies between 1965 and 2009 by income group. There is a strong positive relationship between an economy's growth rate and its level of openness across time and across income groups.

Low income countries that have below \$1,045 gross national income (GNI) as defined by the World Bank at any particular point in time show a strong relationship between growth and opening up from autarky. It would appear high middle income (with a GNI between \$4,125 and \$12,746) and high income countries (above \$12,746) require higher degrees of openness to grow significantly. Lower middle income countries (with a GNI between \$1,045 and \$4,125) exhibit a relationship between growth and openness that is unexpected with high rates of growth at both higher levels and relatively lower levels of openness, but not between.

Figure 2 Historical relationship between growth rates and openness in Asia at different stages of development, 1965-2009



Notes: The fits are local regression (loess) for each category. Openness is the KOF economic globalisation variable, growth rates are real per capita GDP growth rates (PPP) from the Penn World Tables for Asian countries.

Much of the literature — and Figure 2 illustrates this through simple correlation — is clear on the necessity of openness for growth. What is less clear in the literature is the empirical evidence of exact causal links, the magnitude of the effect of trade on growth and the channels by which trade and investment can accelerate growth.

The empirical evidence in traditional trade models, and some more recent literature, have generally found modest gains from trade (see, for example, Arkolakis et al. 2012). Those models typically measure gains from changes in aggregate trade following liberalization and aggregate elasticities. These models do not account for heterogeneous firms and therefore resource allocation within industries towards more productive firms. Ricardian trade models and others based on restrictive assumptions around homogenous firms, such

as that of Arkolakis et al. (2012), capture the gains of trade from moving from autarky, signs of which can be seen for low income countries in Figure 1.

In reconciling the difference in observed welfare gains and productivity growth from trade liberalization and the trade models, a new class of models has been developed in the last decade which demonstrate that gains from trade occur from increased varieties for consumers (Broda and Weinstein, 2006), allocative efficiency gains and trade-induced productivity gains (Melitz, 2003). The gains from trade are, in this class of model, largely driven by the increased competition from foreign firms and new entrant domestically, the ability of productive incumbent firms to expand and also inefficient firms to exit the market and free up resources (Melitz and Redding, 2013).

Increased competition — both from international and domestic entrants — and access to a larger market internationally is important for reducing mark-ups for firms, realising economies of scale and for higher aggregate productivity for firms and industries (Melitz and Ottaviano, 2008; Melitz and Redding, 2013). An important condition for realising these gains is free entry and exit of firms. The extent of barriers to entry for firms are an important indicator of well-functioning institutions (Djankov et al, 2002; Acemoglu et al, 2006) and high barriers to entry for new firms mean that innovation is impeded, incumbent firms are protected and do not have the incentive to innovate (Aghion et al., 2009). Barriers to exit, or poor bankruptcy laws, mean that inefficient firms cannot easily exit the market and hold up valuable resources that could be put to better use (Lee et al, 2011). Economies with high barriers to entry and exit are often characterised by inefficient firms with lost innovation potential and may need subsidies to survive.

The gains from trade are magnified when innovation and deeper specialization occurs in production chains. Melitz and Redding (2014) show domestic productivity growth due to specialization in the production networks that characterize trade and investment in global commerce today are in addition to the any dynamic gains from trade and technology spillovers. These effects can be expected to be particularly prominent in Asia where production networks are more extensive than anywhere else in the world (Baldwin and Lopez-Gonzalez, 2014). Those gains from trade and FDI due to technology diffusion and spillovers are often identified as necessary for escaping the middle income trap (Lee and Narjoko, 2015). The Melitz and Redding (2014) model shows fragmentation of

production across borders that induces reorganisation of production is a significant source of endogenous change in domestic productivity.

The experience of Asian and other economies beyond Asia show that catch-up growth requires openness to goods trade and liberalised FDI across key industrial sectors. An export-oriented growth strategy, which many in Asia have followed, requires policies and institutions that allow adoption of technology and favourable conditions for exporting to the global market.

The policy strategies and institutions that encourage export-oriented growth may not be suitable for more innovative growth that requires higher productivity services input, efficiency in production and more flexibility in resource allocation as well as a wider array of arms-length market interactions. That would seem to require a different kind of openness to goods and services trade, openness to international and domestic competition, and more foreign participation and linkages across more of the economy.

Catch-up growth and growth at the technology frontier

Institutions and policies suited to growth and development differ at different stages of development. There is a large body of literature that shows different institutions from those that are considered best practice may serve developing countries sufficiently well. Those second-best institutions are important in the context of developing countries that have specific market and government failures that cannot be remedied in the short run (Rodrik, 2008).

The experience of many Asian countries demonstrates that second-best institutions and policies have been a feature during rapid catch-up growth. Barriers to entry and rents may be an element in developing countries that stimulates entrepreneurship, investment and exports (Rodrik, 2008; Bailey and Lederman, 2006). Such second-best institutions are often then seen as a drag on growth once those economies develop to the point where the underlying market and government failures can be remedied. Rajan and Zingales (1999) suggest that the very institutions and practices which were responsible for Asia's growth success played a role in the Asian financial crisis as the countries failed to change their growth models and reform their institutions as they narrowed the distance to the technology frontier. The institutions that played an important role in Japan's rapid growth, such as the labour practices, a repressed capital market that directed the

allocation of capital to preferred sectors and industrial organisation arrangements, are now seen as a drag on growth since the economy reached the technology frontier and growth has slowed (Ozawa, 2005).

It is therefore important to recognise the different policy regimes and institutional settings that might be suited to different stages of growth in any analysis on the importance of trade and investment for moving from one stage of growth to another.

Acemoglu et al (2006) develop a model to show that catch-up growth, or as they characterise it, growth that depends on *adoption* of technologies from the global technological frontier, will be fostered by a different set of policies and institutional arrangements than is required for an economy closer to the frontier that requires innovation. The key difference between firms in catch-up economies and those that are closer to or at the technology frontier in Acemoglu et al (2006) is whether firms are protected from competition or not.

Investment and capital formation is important for an economy in the catch-up phase of growth that is adopting technology instead of innovating (Acemoglu et al 2006). Investment in this phase of development is commonly encouraged by non-competitive arrangements, including protection from competition, state intervention and long-term relationships between firms and banks (Gerschenkron, 1962). Without that protection, firms and managers may not have the incentive to invest but that protection becomes a hindrance to productivity-raising investment as an economy moves closer to the frontier.

Beyond catch-up growth through capital accumulation and the utilization of cheap labour, firms need to innovate and not just adopt or imitate technology to reach the global technology frontier. That requires selection of more efficient, productive and innovative managers, more highly skilled labour and more flexible firms. As a country approaches the global technology frontier in the Acemoglu et al (2006) model, in order to move to innovation-based growth those protections need to be removed to allow natural (better) selection of firms and managers. A country will get stuck in a non-convergence trap — trapped in the investment-based strategy and fail to transition to the innovation-based strategy — if they maintain those non-competitive arrangements. With more competition, international and domestic firms are less likely to retain unsuccessful workers and the

opportunity costs of subsidies to unsuccessful firms that fail to innovate become more costly.

Acemoglu et al (2006) do not refer to the middle income trap, and their model is solely concerned with domestic competition and does not include an external sector, but the model provides a useful framework for thinking about these two different growth strategies. In the Acemoglu et al framework, the difference between catch-up growth and growth closer to the frontier is simplified to the difference between high barriers to entry and low barriers to entry. Their empirical results suggest that barriers to entry are more harmful to growth as a country moves closer to the frontier.

Firm entry and exit is one of the main drivers of the gains from trade in the new trade theory models with heterogeneous firms as explained above (Melitz, 2003; Melitz and Redding, 2013; Levchenko and Zhang, 2014). Efficiency and productivity gains from low barriers to firm entry and exit are not able to be realized for economies in the catch-up phase of growth given the under-developed markets in developing countries. Other conditions that are required for innovative growth such as high levels of human capital, would also seem to be necessary to ensure flexibility and gains from low barriers entry. The allocative efficiency gains and the trade-induced productivity gains from trade liberalisation may be even more important when an economy is closer to the technology frontier. Protection of incumbents and barriers to firm entry mean that the industry does not realise the potential allocative efficiency gains and productivity gains through natural selection.

Market intervention in Asia and transition to innovation

Governments in Japan, Korea, Taiwan, and China countered market failure in factor markets with interventions to facilitate the establishment and growth of industrial sectors that were consistent with their comparative advantage (Amsden, 1989; Wade, 1990; Kwon, 1994). Export-promoting growth strategies were pursued through different interventions across these economies. Such second-best or third-best policies were embraced for political stability and to allow a gradual approach to marketization given the many vested interests and the circumstances of those countries (Perkins, 1994). Another reason that the Northeast Asian economic policies achieved a high degree of success was

that the interventionism typically worked by influencing rather than replacing private market decisions (Kuznets, 1988).

Market distortions in East Asia during the rapid catch-up growth periods have been mainly focused on government intervention in trying to fix or overcome underdeveloped markets (see Corden, 1974 and Myint, 1973 for earlier work). As Perkins (1994) and Saxonhouse (1985) argue, in Japan and East Asia, industrial policy and government intervention was often aimed at assisting particular industries to overcome the underdevelopment or suppression of factor markets. That was often done instead of addressing the more difficult underlying problem of an underdeveloped market — prominently seen in financial but also other markets.

There is another stream in this literature that shows trade liberalization requires well-functioning credit markets for convergence (Peters and Schnitzer, 2012). Well-functioning capital markets are important to realizing the gains from trade that come from a reallocation of resources within and between industries because the efficiency and productivity gains come from existing productive firms that are able to innovate and compete being able to expand production, and new entrants being able to raise capital to enter the industry. Suppressed capital markets do not intermediate savings to productive investments via market forces and do not encourage inefficient firms to exit the market and those resources to be reallocated to efficient incumbents or potential new entrants.

Developing East Asian economies were no different from other developing countries in having shallow, underdeveloped capital markets. Firms had a difficult time raising capital in such circumstances and many investment and growth opportunities go unrealized. But Northeast Asian economies in particular overcame some of those constraints via the nature of the capital market distortions that were put in place, whether from direct intervention in the capital market or by financial market repression, coupled with industrial policies that generally gave priority to exporters, and saw rapid exports and high investment rates that contributed greatly to rapid GDP growth.

During rapid catch-up growth in Japan, government intervention and government lending through strategic industrial policy overcame some of the drawbacks of a suppressed capital market (Patrick, 1972). Saxonhouse argues that ‘Japanese industrial policy has

been a substitute, and not an unfair complement, for the market allocation of capital’ (Saxonhouse, 1985).

The distortions in Chinese factor markets that repressed labour, capital, land and resource costs acted as a subsidy to producers and was important in increasing investment (Huang, 2010). The factor market repression combined with liberalisation of product markets and goods trade helped China achieve competitiveness in international markets. As the Chinese economy moves closer to the global technology frontier and innovation-based growth becomes more important, it will be need to reform those underlying market failures in its factor markets (Huang, 2010).

Those second best institutions are not congenial to factor augmenting, or innovative, growth. Countries can get stuck in a non-convergence trap if an economy does not switch out of the investment-based policies (Acemoglu et al 2006).

Capital market development, openness and creative destruction

In order to examine the hypothesis that a different and deeper kind of openness is necessary for countries to move from catch-up to innovative growth, this paper adapts the empirical strategy in Acemoglu et al (2006). In particular, we use two composite indices of openness: the de jure measures of economic globalisation in the KOF globalisation index, and a financial repression index.

The Acemoglu et al. empirical results suffer from a number of shortcomings. The results also have inconsistent specifications between regressions and the description of variables is inconsistent within the text. Their empirical exercise is used to motivate their paper rather than demonstrate empirical evidence for the theoretical model they develop. Most notably, their measure of high and low barriers — taken from Djankov et al. and measuring the number of procedures required to open a business — is time invariant. While it may be conceivable that, if the process of reform proceeds in a linear fashion, countries that were ‘high barrier’ countries in 2002 were also ‘high barrier’ countries in 1965, when the Acemoglu et al. panel began, it is unlikely that all countries with low barriers today also had low barriers in 1965.

In contrast, we use two variables that vary across time as well as across countries. This makes our results easier to interpret. We use a measure of capital market repression instead of a

measure of high or low barriers to entry to proxy for the different institutional and policy settings in the catch-up and innovative growth phases. As explained above, financial or capital market repression is characteristic of developing countries with high growth. And the lack of a well-functioning capital market acts as a barrier to entry for new firms and for expansion of all efficient or productive incumbents.

In order to investigate the notion that openness and financial market repression may have differing impacts at different levels of development, we investigate the relationship between three-yearly average growth rates and measures of openness and financial market repression in a diverse panel of 69 countries from 1973-2005. The model is estimated for a large set of countries to provide context for Asia's experience which is the focus of this study.

As our measure of openness, we use the *de jure* economic globalization measure that forms part of the Konjunkturforschungsstelle (KOF) globalization index, which measures legal restrictions on trade and investment. Financial market repression is measured by the financial metric found — with a more detailed explanation of its construction — in Abiad et al. (2010). It incorporates coded measures of reserve requirements, credit direction, subsidized credit, interest rate liberalization and financial sector entry and exit. Real GDP, population and employment figures are taken from the latest version of the Penn World Tables. Summary statistics for all variables are presented in the appendix.

We then construct two dummy variables, FAR and MIDDLE, as measures of a country's distance from the technological frontier. A country is 'far' from the frontier if its labour productivity at time t is less than 30% of US labour productivity at time t . A country is in the 'middle' of the technological spectrum if its labour productivity at time t is between 30% and 60% of US labour productivity at time t . Using dummies in this way allows us to capture non-linearities in the interaction between our variables of interest and the distance from the technological frontier. For example, a given increase in magnitude of financial openness may have a higher (or lower) impact on countries in the middle of the productivity range than it does those closer or further away from the technological frontier. This may be difficult to capture with a simple linear interaction term. Our basic equation therefore takes the following form:

$$growth = \beta_0 + \beta_1 open + \beta_2 finance + \beta_3 far + \beta_4 middle + \beta_5 far \cdot open + \beta_6 middle \cdot open + \beta_7 far \cdot finance + \beta_8 middle \cdot finance + \epsilon$$

(1)

We estimate this equation with time and country fixed effects, so, for example, the coefficient on the openness variable may be interpreted as the extent to which increasing or decreasing openness will cause a deviation from the country's average growth rate, taking into account also the average growth rate amongst all countries for that year.

As in Acemoğlu et al., we then include a human capital control in regression (2). In regression (3), we replace our measure of financial liberalization with the residuals from a regression of financial liberalization on real GDP per capita. This gives us a measure of the extent to which an economy has a liberalized financial sector for its level of development.

In all three specifications, openness has a positive impact on growth, although, interestingly, this impact is somewhat reduced at middle-distance to and far from the frontier. There is some evidence of convergence, with countries far from the frontier and at mid-distance from it growing faster. Financial reform has a significant impact on growth far from the frontier and at mid-distance from it, with the point estimate of the impact of financial reform higher for countries in at middle distance to the frontier than for countries that are far from it. The assumption underlying this result is that in general the countries at the technology frontier have developed and liberalized financial markets. (That said, we cannot exclude the possibility that the difference between the coefficients is zero, and therefore that the additional impact of financial reform on low- and middle-productivity countries is the same).

In regression (2), we can see a positive but insignificant impact of human capital on growth for countries close to the frontier, with this effect cancelled out for low and middle productivity countries. Including the human capital control increases the magnitude of the impact of openness and of financial reform on growth for middle and low productivity countries, although the sign on the main effect of financial reform turns negative though insignificant. In practice, this means that countries close to the frontier derive little, zero or negative benefit from additional financial openness. When we turn in regression (3) to consider the impact of *relative* financial liberalization — relative, that is, to the level that might be expected of a country at its level of per capita GDP — we see that there are even larger estimates of the positive impact of financial liberalization for low and middle

technology countries; although, the effect on countries close to the technological frontier is smaller, an effect which is statistically significant. This may be an indication of macroeconomic volatility in developed countries with very liberalized financial sectors.

Table 2: Regression results

	<i>Dependent variable:</i>		
	(1)	growth (2)	(3)
KOF de jure openness	0.156** (0.063)	0.167*** (0.064)	0.204*** (0.057)
Far from frontier	0.072* (0.039)	0.177*** (0.065)	0.246*** (0.063)
Mid-distance from frontier	0.070* (0.041)	0.145** (0.064)	0.215*** (0.065)
Financial liberalisation	0.010 (0.025)	-0.016 (0.028)	
Financial reform relative to GDP			-0.056** (0.026)
Human capital		0.010 (0.021)	0.011 (0.020)
KOF * far	-0.153** (0.068)	-0.140** (0.071)	-0.166*** (0.063)
KOF * mid-distance	-0.157** (0.069)	-0.178** (0.070)	-0.206*** (0.061)
Financial reform * far	0.058** (0.027)	0.089*** (0.031)	
Financial reform * mid-distance	0.067** (0.030)	0.092*** (0.034)	
Relative reform * far			0.129*** (0.032)
Relative reform * mid-distance			0.140*** (0.037)
Human capital * mid-distance		-0.028 (0.019)	-0.025 (0.017)
Human capital * far		-0.048** (0.024)	-0.047** (0.022)
Observations	728	695	695
R ²	0.041	0.050	0.057
Adjusted R ²	0.036	0.044	0.050
F Statistic	3.407*** (df = 8; 642)	2.943*** (df = 11; 609)	3.378*** (df = 11; 609)

Note:

*p<0.1; **p<0.05; ***p<0.01

Conclusion

This paper has demonstrated that openness to trade and investment is a necessary but not sufficient condition for escaping the middle income trap and reaching the technological frontier. In order to graduate from being a middle income country to a high income country that is close to the global technology frontier, there are a number of conditions that would seem necessary including a highly educated workforce, institutions that encourage innovation and efficiency, and confidence in a well-functioning market system. Rapid catch up growth also requires openness to trade and investment in order to acquire technology, know-how and the global markets for reallocating resources domestically to more productive uses and realization of comparative advantage. But to shift from catch-up growth to innovative growth at the frontier requires a deepening of liberalization and openness across the economy, including importantly openness to domestic as well as international competition.

To reach the global technology frontier, and to remain there, it is necessary to have low barriers to new firms entering the market, human capital and good institutions, including well-functioning markets, as well as openness to trade and investment. Those are necessary for productivity growth and better resource allocation. It is not only openness and exposure to competition, but openness to ideas and change. High barriers to competition domestically, represented in this study by the level of capital market suppression, becomes more costly the closer a country gets to the technology frontier, and financial market development and liberalization, as well as other regulatory reforms to reduce barriers to entry would appear to be important for escaping the middle income trap.

One interesting question is what leads to or obstructs this deeper openness. As an economy grows in its 'catch-up' phase, it will likely generate larger and larger economic rents, making reform more and more difficult if political pressure is exerted by firms and individuals who benefit from the rents. Governments can also derive significant implicit revenue from financially repressive or anti-competitive policies (Giovannini and De Melo 1991; Reinhart and Sbrancia 2011, Aloy et al 2013). However, the amount of implicit

revenue/debt relief that is obtainable by financial repression is limited by opening up to foreign trade and capital (Jinjarak 2013).

A democratic polity may be more or less conducive to reforms than other styles of government. Quinn (2000), for example, finds that financial reforms are more likely to occur under democratic rule. Giuliano et al (2013) find that democratic systems are broadly more likely to engage in reforms, including in the financial sector, the capital account, product markets, agricultural markets, trade, and the current account.

A model of the political economy of the middle income trap that endogenises changes in domestic regulation could therefore shed further light onto why some countries remain ‘trapped’ at middle income status and others do not.

References

- Abiad AG, Detragiache E, and Tressel T (2010). A new database of financial reforms. *IMF Staff Papers*, 57(2), 281-302.
- Acemoglu D, Aghion P and Zilibott F, *Journal of the European Economic Association*, 4(1) 37–74.
- Aghion P, Bloom N, Blundell R, Griffith R, and Howitt, P (2005). Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics*, 120(2): 701–728.
- Aiyar S, Duval R, Puy D, Wu Y, Zhang L (2013) Growth Slowdowns and the Middle Income Trap. IMF Working Paper, International Monetary Fund.
- Almeida R and Fernandes AM (2008) Openness and technological innovations in developing countries: evidence from firm-level surveys. *Journal of Development Studies*, 44(5).
- Aloy M, Dufrénot G, and Péguin-Feissolle A (2014). Is financial repression a solution to reduce fiscal vulnerability?. *Applied Economics*, 46(6), 629-637.

- Amsden, AH (1989) *Asia's Next Giant: South Korea and Late Industrialization*. Oxford University Press, Oxford.
- Arkolakis C, Costinot A and Rodriguez-Clare A (2012) New trade models, same old gains? *American Economic Review*, 102(1), 94-130.
- Baldwin R and Lopez- Gonzalez J (2014). Supply- chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *The World Economy*.
- Klinger B and Lederman, D (2006). Diversification, innovation, and imitation inside the Global Technological Frontier. World Bank policy research working paper 3872, World Bank.
- Broda C and Weinstein DE (2004) Variety growth and world welfare. *The American Economic Review*, 94(2) 139-144.
- Corden M (1974) *Trade Policy and Economic Welfare*. Clarendon Press, Oxford.
- Djankov S, La Porta R, Lopez-de-Silanes F, and Shleifer A (2002). The Regulation of Entry. *The Quarterly Journal of Economics*, 117(1), 1-37.
- Eichengreen B, Park D, Shin K (2013) Growth Slowdowns Redux: New Evidence on the Middle-Income Trap. Working Paper 18673, National Bureau of Economic Research.
- Cai F (2012) Is There a “Middle- income Trap”? Theories, Experiences and Relevance to China. *China & World Economy*, 20(1), 49-61.
- Felipe J, Abdon A and Kumar U. (2012) Tracking the middle-income trap: what is it, who is in it, and why? Levy Economics Institute Working Paper.
- Garnaut R (ed.) (1979), *ASEAN in the changing Pacific and World economy*, Australian National University Press, Canberra.
- Gerschenkron A (1962) *Economic backwardness in historical perspective*, Cambridge, Massachusetts: Belknap Press of Harvard University Press.
- Giovannini A and De Melo M (1991) ‘Government revenue from financial repression’. Working Paper 3604, National Bureau of Economic Research.
- Giuliano P, Mishra P and Spilimbergo, A (2013). Democracy and reforms: evidence from a new dataset. *American Economic Journal: Macroeconomics*, 5(4), 179-204.
- Huang Y (2010) Dissecting the China Puzzle: Asymmetric Liberalization and Cost Distortion. *Asian Economic Policy Review*, vol. 5, issue 2, pages 281-295.
- Kharas H and Kohli H (2011). What is the middle income trap, why do countries fall into it, and how can it be avoided?. *Global Journal of Emerging Market Economies*, 3(3), 281-289.
- Jinjarak, Y (2013) Economic integration and government revenue from financial repression. *Economic Systems*, 37(2), 271-283.

Levchenko AA and Zhang J (2014) Ricardian productivity differences and the gains from trade. *European Economic Review*, Elsevier, vol. 65(C), pages 45-65.

Melitz MJ (2003) The impact of trade on intra- industry reallocations and aggregate industry productivity. *Econometrica* 71(6) 1695-1725.

Melitz MJ and Redding SJ. Firm heterogeneity and aggregate welfare. CEPR Discussion Paper DP9405.

Melitz MJ and Ottaviano GI (2008). Market size, trade, and productivity. *The review of economic studies*, 75(1), 295-316.

Kuznets PW (1988) An East Asian Model of Economic Development: Japan, Taiwan, and South Korea. *Economic Development and Cultural Change*, S11-S43.

Lee C and Narjoko D (2015). Escaping the Middle- Income Trap in Southeast Asia: Micro Evidence on Innovation, Productivity, and Globalization. *Asian Economic Policy Review*, 10(1), 124-147.

Lee SH, Yamakawa Y, Peng MW and Barney JB (2011) How do bankruptcy laws affect entrepreneurship development around the world? *Journal of Business Venturing*, 26(5), 505-520.

Myint H (1973) *The Economics of the Developing Countries*, London: Hutchinson University Library.

Ozawa T (2005) *Institutions, Industrial Upgrading, and Economic Performance in Japan: The 'Flying Geese' Paradigm of Catch-up Growth*, Edwin Elgar, Massachusetts.

Patrick H (1972) *Finance, capital markets and economic growth in Japan*. New York University Press, New York 109-139.

Perkins D (1994) Completing China's move to the market. *The Journal of Economic Perspectives*, 23-46.

Peters F and Schnitzler M (2012) Trade liberalization and credit constraints: why opening up may fail to promote convergence. CEPR Discussion Paper DP8942.

Pritchett L, Summers LH. (2014) Asiaphoria meets regression to the mean. Working Paper 20573, National Bureau of Economic Research.

Quinn DP (2000). *Democracy and international financial liberalization*. McDonough School of Business, Georgetown University.

Rajan RG and Zingales L (2000) *The Great Reversals: The Politics of Financial Development in the 20th Century*. OECD Economics Department Working Papers 265, OECD Publishing.

Reinhart CM and Sbrancia MB (2011) *The liquidation of government debt*. Working Paper 16893. National Bureau of Economic Research.

Robertson P and Longfeng Y (2013) On the existence of a middle-income trap. University of Western Australia Discussion Paper.

Rodrik D (2008) Second-best institutions. Working Paper 14050. National Bureau of Economic Research.

Saxonhouse, GR (1983). What is all this about 'industrial targeting' in Japan? *The World Economy*, 6(3), 253-274.

Appendix: Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
year	740	1,989.099	9.481	1,974	2,004
pop	740	55.478	162.630	1.349	1,277.826
rgdpe	740	324,522.400	625,809.800	3,454.154	6,251,935.000
emp	738	23.818	80.000	0.408	748.048
hc	707	2.245	0.564	1.095	3.448
lp	738	23,346.950	20,499.210	626.504	82,243.450
rgdpc	740	9,681.731	9,641.766	308.662	41,385.140
frontier	740	67,571.820	11,033.860	54,869.580	88,039.630
frontier_ratio	738	0.345	0.288	0.009	0.946
growth	740	0.019	0.040	-0.154	0.180
ifs	740	384.091	227.341	112	939
directedcredit	740	1.511	1.157	0.000	3.000
creditceilings	399	0.602	0.474	0.000	1.000
creditcontrols	740	1.543	1.130	0.000	3.000
intratecontrols	740	1.755	1.292	0.000	3.000
entrybarriers	740	1.677	1.183	0.000	3.000
bankingsuperv	740	0.719	0.921	0.000	3.000
privatization	740	1.250	1.146	0.000	3.000
intlcapital	740	1.650	1.085	0.000	3.000
securitymarkets	740	1.464	1.111	0.000	3.000
finreform	740	10.056	6.381	0.000	21.000
finreform_n	740	0.479	0.304	0.000	1.000
large_reversal	739	0.006	0.055	0.000	1.000
reversal	739	0.043	0.120	0.000	0.667
reform	739	0.230	0.272	0.000	1.000
large_reform	739	0.048	0.135	0.000	1.000
status_quo	739	0.673	0.319	0.000	1.000
Advanced	740	0.312	0.464	0	1
Emerging_Asia	740	0.161	0.368	0	1
Latin_America	740	0.238	0.426	0	1
SSA	740	0.193	0.395	0	1
Transition	740	0.007	0.082	0	1
MENA	740	0.089	0.285	0	1
open	730	0.005	0.002	0.001	0.010
facto	730	0.478	0.205	0.038	0.983
jure	730	0.514	0.249	0.059	0.960
far	738	0.557	0.497	0	1
middle	738	0.178	0.382	0	1
uhat	740	-0.000	0.234	-0.572	0.566