

**COMPARATIVE ADVANTAGE DEFYING DEVELOPMENT
STRATEGY AND CROSS COUNTRY POVERTY INCIDENCE**

By

Abu Bakkar Siddique

THESIS

Submitted to

KDI School of Public Policy and Management

in partial fulfillment of the requirements

for the degree of

MASTER OF DEVELOPMENT POLICY

2014

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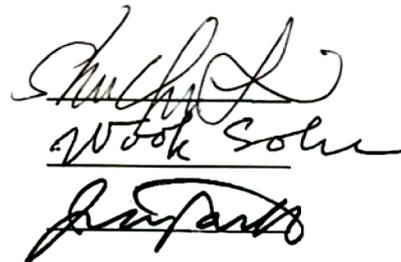
DEVELOPMENT POLICY Committee in

charge:

Professor Shu-Chin LIN, Supervisor

Professor Wook SOHN

Professor Jin PARK

The image shows three handwritten signatures in black ink. The top signature is for Professor Shu-Chin LIN, the middle one for Professor Wook SOHN, and the bottom one for Professor Jin PARK. Each signature is written in a cursive, flowing style.

Approval as of December, 2014

ABSTRACT

COMPARATIVE ADVANTAGE DEFYING DEVELOPMENT STRATEGY AND CROSS COUNTRY POVERTY INCIDENCE

By

Abu Bakkar Siddique

This paper argues that poverty in a country is endogenously determined by the country's long-term economic development strategy. It empirically examines the effects of adopting a Comparative Advantage-Defying (CAD) development strategy - which attempts to encourage economic actors to deviate from the economy's existing comparative advantages in their entry into an industry or choice of technology - on its level of poverty. This paper also examines how this effect of CAD differs with the level of financial development in an economy, which is the most important channel for the effects of CAD on poverty to manifest themselves. Data for the period of 1963 to 2000 for 113 countries are used in analysis. We find that the more aggressively a country adopts CAD development strategy, the higher the level of poverty incidence. But a high level of financial development reduces the poverty-increasing impact of adopting CAD. The policy recommendation by this paper is to adopt Comparative Advantage-Following (CAF) development strategy, which facilitates the actors' entry into an industry according to the economy's existing comparative advantages, by all the countries in order to reduce poverty incidence.

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Dedicated to My Parents

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I. INTRODUCTION

Poverty is the main social and economic problem in most developing countries. Most economists also agree that economic performance and level of poverty in a country are determined, to a large degree, by the quality of its institutions. A country's chosen development strategy matters in determining the quality of institutions and, hence, the level of poverty (Lin, 2009). Almost all the countries in the world have been striving to develop their economies and side by side alleviate poverty since the Second World War ended, either domestically or globally. But the dream of poverty-free nations has few successes, mostly in East Asia like Japan, South Korea and Taiwan. Thus, living standards in most of these countries have not improved substantially and particularly countries in the Sub-Saharan Africa have improved almost next to nothing. Now the most important question becomes what was wrong with the development policies in most developing countries and whether it is possible to avoid these mistakes.

Lin (2003) argues that a country's economic development strategy matters; and an economy's growth performance, trade structure, income distribution and poverty are endogenous to its choice of development strategy. He broadly divides a country's development strategy into two mutually exclusive groups - Comparative Advantage-Following (CAF) and Comparative Advantage-Defying (CAD) development strategies. Countries adopting a CAF strategy will be more open, achieve higher economic growth and create more job opportunities for low-income groups who rely mainly on physical labour for their livelihood. As a consequence, income distribution in these countries will be relatively even and poverty will be alleviated gradually. On the contrary, countries adopting CAD strategy to promote capital-intensive industries will inevitably see the

reverse happen. This is because investment in the priority sectors of a CAD strategy creates limited job opportunities, excluding poorest segments of the society from formal labour markets. Moreover, firms in the priority sectors are nonviable in open and competitive markets. The survival of such firms depends on government subsidies and protection from international competition, and as a result, the economy becomes closed. As investment in priority sectors requires large amounts of capital, thus only the rich and/or those people with strong connections with the government have the ability to invest. The burden of providing subsidies to these nonviable firms will ultimately be carried by the poor and the people having no power. It will certainly further distort the income distribution and will make the poverty alleviation process more difficult (Lin and Liu, 2006). Thus, the hypothesis that will be tested in this paper is that over an extended period a country adopting a CAD development strategy will have higher level of poverty.

The most important channel through which the CAD strategy can affect level of poverty is the channel of finance. Many governments of LDCs which carry out a CAD strategy subsidize the firms in priority sectors by distorting funds prices, foreign exchange rates and other inputs or input prices; and use administrative authorities to allocate price-distorted inputs to the firms. These priority sectors are mostly capital-intensive. A financial system that is ready to finance the prioritized investments facilitates the execution of CAD as it can manipulate financing more in an underdeveloped financial system than in a developed financial system. The functions of market will be suppressed and rent seeking will be widespread. Thus finance is one of the most important intermediary factors between CAD and poverty incidence. Therefore, it becomes necessary to examine if the financial system is well-developed, how the impact of CAD

differs. Our hypothesis is that a highly developed financial system can reduce the detrimental effect of CAD on poverty's incidence.

Recognizing the urgency of poverty issue, world leaders have made eradicating poverty a top priority as reflected in Millennium Development Goal 1. There is a continuous debate about how to achieve poverty reduction in developing countries, but not enough discussion of why some countries are highly poverty prone and others do not have poverty and what we mean by poverty reduction. It is often understood as short-hand for promoting economic growth that will permanently lift as many people as possible over a poverty line. Thus, many political leaders viewed the development of capital intensive and technologically advanced heavy industries that prevailed in the developed countries as the symbols of modernization and an easy way of reducing poverty. But the developing countries have mostly been capital-scarce economies and capital-intensive industries were not to their comparative advantages (we define this strategy as CAD strategy). Even many economic policymakers were not concerned whether this is really the correct policy measure to reduce poverty. Our motivation is to empirically explore the flawed policy statements taken by the most developing countries and suggest corrections in their development strategies.

The methodology this paper uses is the Ordinary Least Square (OLS) estimation. But because of endogenous problems it uses the instrumental variable (IV) approach as well. We have found IV for both of our interested endogenous variables - CAD and financial development. Nevertheless, our dependent variable poverty level contains lots of zeroes due to lack of data on poverty based on our headcount definition of poverty. So OLS may not be an ideal model to analyse the impact of CAD on the level of poverty incidence.

We find that the two-step Heckman model is more suitable than OLS. Therefore, we use the Heckman model for purposes of robustness. The paper finds that CAD has very significant positive impact on the cross country poverty level across different models even after controlling for a substantial number of variables in each regression.

The paper proceeds as follows: Section II discusses the notion of development strategy, particularly CAD and CAF development strategy, financial development and poverty incidence. Section III describes the data, methodology and the hypotheses that we will test. Section IV presents the empirical results of the effect of development strategies on the level of poverty incidence. Section V concludes.

II. LITERATURE REVIEW

A. Development strategy, income distribution and poverty

The analysis of Dollar and Kraay (2000) using data from 80 countries over about 40 years shows that ‘the income of the poor rises one-for-one with overall growth’. Likewise, if income disparity in an economy increases along with its per capita income, the problem of poverty will be deteriorated. Thus the combination of economic growth and improved income distribution is a basic and sustainable way for solving the problems of poverty. Therefore, it is imperative to find a mode of development that can promote economic growth and improve income distribution simultaneously.

The economic situation of low-income groups has to be improved in order to reduce poverty and distribute the income more equally. Unlike the wealthy people, low-income individuals have little of land, capital, higher education, personal relations or social networks that may help them generate income. The most important source of income for

the poor segments of the society is their physical labour that they can offer. Therefore, it is essential for creating employment opportunities and for increasing wages for them as much as possible in order to continuously increase the income of these individuals both absolutely and relatively. This is the only feasible and sustainable way to improve the economic situation of low-income individuals in LDCs. If CAF strategy is adopted and labour-intensive industries are developed, these poor people will have sufficient job opportunities. Moreover, the strategy will accelerate the accumulation of capital, which will in turn cause initially relatively abundant labour to become scarcer. In this process, industry and technology become increasingly capital intensive and the marginal productivity of labour increases, as do wages. With sufficient employment and an increase in wages, poverty can be eliminated. In the meantime, the return to capital will decline as capital becomes increasingly abundant. The relative gap will be narrowed in terms of income of people originally with an advantage in capital and those who could only depend on physical labour. Therefore, income will become more equally distributed. It is by adopting CAF strategy that efficiency and equity can be achieved simultaneously in LDCs.

On the contrary, if an LDC adopts a CAD strategy, and gives priority to capital-intensive industries, it will fail to create a large number of jobs particularly for the poor people who do not have education and technical knowledge. Most labourers will be dependent on the agricultural sector, where marginal productivity and their wages are low (Lin et al. 1996). Meanwhile, only the rich and the powerful people who have easy access to subsidized loans from banks will have the financial resources to invest in prioritized capital-intensive industries. However, firms in these capital-intensive industries will not be

viable. Their investment and survival depend on government protection and subsidies, which must ultimately come from the pockets of the poor and powerless. Therefore, inequality in income distribution will be exacerbated.

Lin, J. Y. and Liu, P. (2006) have found that the execution of CAD strategy will also reduce social transfers to the groups who are relatively in weak positions such as the poor, unemployed, disabled and elderly. These groups are universally acknowledged as the ones in need of social protection, either through social security networks or relief funds or through assistance from other family members. However, the resources that could be allocated to support these groups depend on overall economic growth. Under a CAD strategy, low economic performance reduces the total amount of resources that can be used to help these people. Sometimes, the government may even divert resources to subsidize prioritized sectors from the resources have been allocated to the social security system. This will lead to deterioration in the standard of living for disadvantaged people in the society.

B. CAD, Financial Development and Poverty

The poor people may benefit from financial development because of more money circulating in the economy compared to the barter system. A monetised system would reduce the large costs of finding trading partners and transporting agricultural goods. Money is easily divisible, easy on the pocket to transport, and an ever acceptable means of payment (Bollard, 1977). Murphy (2004) argues that increased money supply may also promote intercity trade and reduce transaction costs. Hence all the people including poor may benefit as increased money supply facilitates trade and efficiency. The poor may also benefit from financial development because of saving opportunities. McKinnon

(1973) states in his “conduit effect” theory, if the poor can save they can also earn rates of return and accumulate wealth. In fact credit is scarce in developing countries, so the poor need to save to make them able to invest. The financial institutions particularly banking system provide the poor the means to save. Thus financial development may help the poor to accumulate necessary funds by making savings opportunities in financial institutions more accessible.

However, after World War II, governments in the developing countries, whether socialist or capitalist or others, instituted a complicated set of regulations and distortions that suppressed the functions of competitive markets such as financial depression, trade controlling, rationing of capital and foreign exchange market, licensing for controlling investments, administrative monopoly and state possession. It has been recognized now by the economists (like Lin, 2007) that, no matter what might be their motivation, these policies often lead to poor economic performance, low living standards and also frequent crises in the developing countries. There are many competing hypotheses about the cause and effect of those regulations and distortions. However, none of them reveal convincingly the relationships between various policies in the complicated set of regulations and distortions (ibid).

Earlier research works on finance and poverty show different logics to show that the poor may benefit from financial development. Poor people may benefit from lower costs to access financial services. Because of financial market imperfections there may be high costs to take out loans in developing countries. But developed financial system may allow anyone with a profitable project to take out a loan. In a less developed financial system, because of information asymmetries and assumed high risk of borrowers turning

defaulters on the loans, banks ask the borrowers to put down collateral in order to offer loans. As the poor often do not have enough money or real assets for collateral, they are usually deprived of getting access to loans (Galor and Zeira, 1993). These encumber them to invest and insure themselves against the risks of unexpected negative economic shocks. In these markets, the rich have higher access to the financial services as they have more assets than the poor to put down as collateral. These kinds of capital market worsen poverty by promoting income inequality (Dercon, 2003). So the mode of financial development matters for poverty reduction.

Under the CAD, government wants to patronize the capital intensive industries and therefore tries to regulate the financial institutions. This helping hand regulation of the government (Pigou, 1938) distorts the financial institutions originally. Considering these adverse effects of government regulations and distortions in most of the developing countries, many economists have proposed an alternative ‘grabbing-hand’ view (Acemoglu, 2007; Grossman and Helpman, 1994; Shleifer and Vishny, 1994; Sokoloff and Engerman, 2000). They proposed that government interventions were pursued for the benefit of politicians and bureaucrats like favoring friendly firms and other influential people. Although Greenwood and Jovanovic (1990) argue that financial development initially hurts the poor in the poorest countries by promoting the ability of the rich to access credit markets while the poor are left out. Developed financial services may only reduce income inequality for countries with financial development above a certain threshold. Thus, earlier research works on finance and poverty under CAD or government regulations do not provide any one-way results; rather there are ambiguous opinions among the prominent researchers.

III. EMPIRICAL STRATEGY AND DATA

A. Model Specification and Data Description

To check the economic relationship between development strategy and the poverty level, we can write the following simple equation ignoring the issues of nonlinearities:

$$poverty_i = \alpha_1 + \beta_1 CAD_i + Z_i Y_0 + u_i \quad (1)$$

Where *poverty* is the level of poverty incidence in country *i*, is measured as the headcount ratio of poverty. CAD is a measure of development strategy in country *i*. Z_i is a vector of other controls. The coefficients β and α are the parameters of interest, and Y_0 is a vector capturing effects of the control variables in Z_i . If we add our second interested variable level of financial development into the equation (1) as independent variable as well as interacting with our first interested variable CAD, following extended economic relationship can be obtained:

$$poverty_i = \alpha_1 + \beta_1 CAD_i + \beta_2 FD_i + \beta_3 CAD_i x FD_i + Z_i Y_0 + u_i \quad (2)$$

In equation (2), in addition to equation (1), FD is representing the level of financial development and CADx FD representing the interaction term of the CAD and the level of financial development. The outcome variable we focus is the level of poverty incidence, measured as poverty headcount ratio at \$2 a day (PPP) (% of population). The poverty level is averaged over the period 1963-1999. To proxy for CAD or in broad sense development strategy, we use Technological Choice Index (TCI). We will explain TCI measure in subsection B below. The TCI for 113 countries is averaged over the period 1963-1999. Y_0 is a vector capturing effects of the control variables in Z_i , we include several control variables in the control vector which have the probability to affect the level of poverty incidence.

The trade dependence ratio of 108 countries has been taken from Dollar and Kraay (2003) to reflect the openness of a country. The openness index is calculated by the total volume of imports plus total volume of exports relative to the GDP. A more open country may have better scope for trade and industrialization leading to more employment opportunity and source earnings. This may reduce the poverty incidence level. Arce, et al. (2014) concluded in their literature review on trade liberalization and poverty that trade liberalization has positive effects on poverty reduction in the long-run; however, it should be accompanied by structural reforms and redistribution policies in order to minimize the probable negative effects in the short-run. On the contrary, if a country is landlocked it may not have good external trade competitiveness and thereby less job opportunities and sources of earnings. These may increase the probability to have higher level of poverty incidence. Arvis, J. F. et al. (2007) highlighted both theoretically and empirically that landlocked economies are affected more by the high degree of unpredictability in transportation time than by a high cost of freight services. Physical constraints are not only the main sources of costs but widespread rent activities and severe flaws in the implementation of the transit systems. These prevent the emergence of reliable logistics services. Cárcamo-Díaz, R. (2004) suggests a new possible reason of landlocked countries to have a low level of development which is the greater relative uncertainty due to which landlockedness may have a negative effect on investment incentives in the tradable sector of such countries. Landlocked is a dummy variable measuring as 1 if it is landlocked country and zero if otherwise.

To measure the level of government intervention in property rights institutions, we use the Index of Economic Freedom (IEF) and the expropriation risk. Their indexes range

from zero to ten. The higher value of the IEF represents the higher level of degrees of economic freedom. Economic intuition says that higher economic freedom is helpful to reduce level of poverty incidence. Hasan, Quibria and Kim (2003) explored the empirical relationship between poverty and economic freedoms and shown that important indicators of economic freedom such as openness to trade and small size of the government are robustly associated with poverty reduction. In doing so, they estimated the levels of absolute poverty for a panel of over forty developing countries and then employed fixed effects and GMM-IV estimators to derive this relationship. Our observations constituting the IEF from ninety-one countries are taken from Economic Freedom of the World (Fraser Institute, 2007), and are available from 1970 onwards adopted by Lin, J. Y. (2009). The expropriation risk is the risk of outright confiscation and forced nationalization of property. This variable ranges from zero to ten. A higher value means that a private enterprise has a lower probability of being expropriated by the government. In our sample, we have both developed and developing countries. The expropriation risk of 102 countries is adopted from the International Country Risk Guide (Political Risk Services, 2007). We are also interested to see how the level of poverty is different if the country is developing. If a country is developing by nature it is supposed to have higher level of poverty incidence. It is a binary variable, measured as 1 if it is developing country and zero otherwise. The variable developing is arranged based on World Bank (2014) classification. We also used Growth rate of per capita income as control variable which should reduce poverty level. Many cross-country studies have explained that the pace of economic growth is the main determinant of poverty reduction. Roemer and Gugerty (1997) provide strong support to the proposition that growth rate of

per capita GDP can be and typically is a powerful force in poverty reduction. The average annual growth rate of per capita GDP for 109 countries for the period 1962 to 1999 has been collected from Lin, J. Y. (2009) calculation.

Table 1: Descriptive Statistics											
	<i>Poverty</i>	<i>TCI</i>	<i>Growth of GDP per capita</i>	<i>Land lock</i>	<i>Openness</i>	<i>IEF</i>	<i>Expropriation risk</i>	<i>Developing</i>	<i>livapg</i> ¹	Liquid liability	Private credit ratio
Panel A: Summary Statistics											
<i>Mean</i>	26.3788	3.0846	2.0403	.16814	73.5365	6.1926	7.470	.6071	29.61	45.39	36.81
<i>Median</i>	10.72	1.936	2.1	0	60.795	6.2	7.32	1	26.90	38.485	28.36
<i>St. error</i>	2.9835	.26327	.17372	.03533	3.7794	.09247	.1636	.0463	1.721	3.151	2.899
<i>Maximum</i>	95	17.921	6.42	1	209.38	8.36	10	1	70.494	172.26	144.97
<i>Minimum</i>	0	.335	-3.91	0	15.51	4.36	2.98	0	2.530	4.52	.29
Panel B: Correlation Matrix											
<i>Poverty</i>	1.0000										
<i>TCI</i>	0.7102*	1.0000									
<i>Growth of GDP per capita</i>	-0.261*	-0.240*	1.0000								
<i>Land lock</i>	0.2143*	0.248*	-0.0548	1.0000							
<i>Openness</i>	-0.234*	-0.289*	0.1465	0.1534	1.0000						
<i>IEF</i>	-0.577*	-0.532*	0.333*	0.0761	0.285*	1.0000					
<i>Expropriation risk</i>	-0.637*	-0.477*	0.373*	0.0683	0.1242	0.664*	1.000				
<i>Developing</i>	0.6586*	0.515*	-0.259*	0.0713	-0.218*	-0.65*	-0.74*	1.000			
<i>livapg</i>	-0.563*	-0.458*	-0.332*	-0.0334	0.1400	0.1323	0.31*	-0.445*	1.000		
<i>Liquid liability</i>	-0.4633*	-0.411*	0.4169*	-0.0176	0.4375*	0.525*	0.511*	-0.532*	0.1435	1.000	
<i>Private credit ratio</i>	-0.5027*	-0.422*	0.4212*	-0.1078	0.1983*	0.626*	0.603*	-0.611*	0.1298	0.847*	1.000

Note: * indicates significance at the 5% level.

This paper uses two proxy variables as a representative of financial development. These variables are liquid liabilities to GDP and private credit by deposit money banks and other financial institutions to GDP. Liquid liabilities are also known as broad money or M3. Data for both the liquid liability and private credit ratio to the GDP are collected from International Financial Statistics, World Bank and International Monetary Fund (2014) averaged from 1963 to 2000. The dataset consists of 113 developed and developing countries (see Appendix A for details). Table 1 shows the summary statistics

¹ Initial added value of manufacturing industries of country *i* at time 1963

and correlation matrix of the variables. Poverty level and country openness are more volatile than the other variables.

B. Proxy for development strategy

In order to test the above hypotheses, a proxy for a country's development strategy is required. Lin and Liu (2004) propose a technology choice index (TCI) as a proxy for the development strategy implemented in a country. The definition of the TCI is as follows:

$$TCI = \frac{AVMi, t/LMi, t}{GDPi, t/Li, t}$$

Where $AVMi, t$ is the added value of manufacturing industries and $GDPi, t$ is the total added value of country i at time t . LMi, t is the labour in the manufacturing industry and Li, t is the total labour force of country i and time t . If a government adopts a CAD strategy to promote its capital-intensive industries, the TCI in this country is expected to be larger than it would otherwise be. This is because, if a country adopts a CAD strategy, in order to overcome the viability issue of the firms in the prioritized sectors of the manufacturing industries, the government might give the firms monopoly positions in the product markets – allowing them to charge higher output prices – and provide them with subsidized credits and inputs to lower their investment and operation costs. The above policy measures will result in a larger $AVMi, t$ than otherwise. Meanwhile, investment in the prioritized manufacturing industry will be more capital-intensive and absorb less labour, *ceteris paribus*. The numerator in equation will therefore be larger for a country that adopts a CAD strategy. As such, given the income level and other conditions, the magnitude of the TCI can be used as a proxy for the extent that a CAD strategy is pursued in a country.

C. Empirical Strategy

The simplest strategy is to estimate the model in equation (1) and (2) using OLS regression. But there are two distinct problems with this strategy. Firstly, both CAD development strategy (TCI) and financial development (liquid liability etc.) are endogenous, so we may be capturing reverse causality issue or the effect of some of the omitted variables (e.g., geographical characteristics, culture and so on). Secondly, both of our main interested variables are measured with error, therefore there may be a downward attenuation bias. Moreover, if development strategy and financial development are correlated, the effect of the TCI which is measured with greater error will load onto the other variable.

Both of these concerns imply that OLS regressions will give results that do not correspond to the causal effect of CAD and financial development on level of poverty incidence: upward or downward biases are possible. Our strategy is to estimate equation (1) and (2) using two-stage least squares (2SLS) with distinct and plausible instruments for CAD and financial development. These instruments should be correlated with the endogenous variables but orthogonal to any other omitted characteristics (i.e., uncorrelated with the outcomes of interest through any channel other than their effect via the endogenous variables). A successful instrumental variables approach would correct not only for the simultaneous and omitted variable biases but also for differential measurement error in the two endogenous variables as long as the measurement errors have the classical form (see Wooldridge 2002, chap. 5 for details) and thus, we can estimate the α and β parameters consistently.

Two first stages for instrumental variables strategy:

$$CAD_i = \delta_1 \cdot L_i + \eta_1 \cdot P_i + Z_i Y_1 + u_{1i}$$

$$FD_i = \delta_2 \cdot L_i + \eta_2 \cdot P_i + Z_i Y_2 + u_{2i}$$

Where, P_i represents the freedom of press or the initial added value in the manufacturing sectors; it conceptually corresponds to the instrument for TCI. The key exclusion restriction is that in the population $\text{Cov}(\hat{\epsilon}_i, P_i) = 0$ where $\hat{\epsilon}$ is the error term in the second-stage equation, (1) and (2). The role of the press as Fourth Estate and as a forum for public discussion and debate has been recognized since the 17th century. Today, the notion of the media as watchdog, guardian of the common interest and as a conduit between governors and the governed remains deeply ingrained, despite of its propensity for unpleasantness, sensationalism and superficiality. The governments need to care about media before making any policy decision. Thus, if the freedom of press is high in a country its development strategy is supposed to be pro-poor and in the case of low freedom of press, the government may have the chance to manipulate the development strategy to give priority to a particular group. So the freedom of press should be correlated with country's development strategy (we have also found significant positive correlation .37). We did not find any channel through which freedom of press can affect level of poverty directly. But the freedom of press can affect poverty incidence through policy agenda such as development strategy. Therefore, freedom of press can be a valid instrument. The index of freedom of press (Freedom House, 2014) provides analytical reports and numerical ratings for 197 countries and territories, conducted since 1980 by Freedom House. We have collected press freedom score for 113 sample countries. Countries are given a total press freedom score from 0 (best) to 100 (worst) on the basis

of a set of 23 methodology questions divided into three major subcategories, and are also specified a category designation of “Free,” “Partly Free,” or “Not Free.” Assigning numerical points allows for comparative analysis among the countries covered and facilitates an examination of trends over time. We have also tried one of the readymade candidates to be used as the instrument which is the initial value of the endogenous variable. We use one of the important factors used to calculate TCI is the added value of manufacturing industries of country i at time 1963. Using these two instruments separately is a good check on our results. We have checked for over identification problem doing Hansen test. The result has shown that there is no over identification problem (see table 3).

The term L_i is a dummy variable for English legal origin (or, equivalently, for whether or not the country was a British colony) and is the instrument for financial development. For legal origin to be a valid instrument the key exclusion restriction is also that in the population, where is the $Cov(\hat{\epsilon}_i, L) = 0$ where $\hat{\epsilon}_i$ is error term in the second-stage equation (2). This legal origin instrument was also used successfully by Beck, et al. (2004) and Acemoglu D. & Johnson S. (2005) in their regression analysis. The original idea in the line of research of La Porta et al. (1997, 1998) is that all the countries have their distinct “legal origins”, which matter for legal and financial performances. They draw the strong distinction between the two great legal traditions: “common-law” countries that were part of the British Empire and “civil-law” countries in which a French, German or Scandinavian legal system has prevailed. La Porta et al. (1997, 1998) show that English or common law legal systems provide greater protection of property rights than do civil law systems or communist based systems. Since consumer and investor’s protection

facilitates the development of financial institutions, the legal origin of countries is correlated with the level of financial development. The paper uses dummy variable for the instruments. English equals one for countries with English common law legal systems and zero otherwise. The legal origin of a country may be a matter of choice, but for former colonies there are good reasons to regard it as exogenous: the British imposed common-law systems on the countries they colonized, whereas other European powers imposed civil-law systems for their colonized countries. We use an instrument for the measures of financial development with legal origin in this work. Djankov et al. (2003) have shown using the whole world sample that legal origin explains about 40 percent of the difference in legal formalism. We have also tried with the initial value of liquid liabilities and private credit ratio which are the proxies for financial development. The data for these two variables are averaged from 1963 to 2000. Here the value of only 1963 has been taken as the instrument for both proxies. We have also checked here for over identification problem doing Hansen test. The result has shown that there is no over identification problem, thereby providing validity of the IV (see table 4).

We are also concerned with the non-linearity of the relationship between poverty and CAD as well as the sample selection bias. If we look at our dependent variable that is level of poverty is not normally distributed (see fig 1 in Appendix B). This is because we have a lot of zeroes in our dependent variable. Our total sample is 113 and among these 41 countries do not have any poverty, carrying value of zero. If we use OLS or 2SLS model to estimate the impact of CAD on the level of poverty, that may violate two important assumptions of linear OLS model that are linearity in parameters and random sampling. Besides, the country with no poverty is completely different from those

countries with high level of poverty in terms of economic institution, political culture, and other fundamentals issues that essentially outline the economic performance. To overcome these problems we have used Heckman two-step model (see Cameron & Trivedi 2005, chapter 16.5 for details). The estimated results based on these samples with extreme characteristics can lead to erroneous conclusions and poor policy suggestions. The Heckman correction, a two-step statistical approach, offers not only the solution for samples with extreme characteristics but also a means of correcting for non-randomly selected samples. Thus, Heckman's model suggests a two-stage estimation method to correct these biases. The execution of these corrections is easy and has a firm basis in statistical theory. Instead, Heckman's correction involves a normality assumption, provides a test for sample selection bias and a formula for bias corrected model. Heckman's two-step error correction model has two equations: First, whether the country has poverty or no (participation equation) and second, given that the answer to the first question is yes, how intensely to have poverty in the country or simply how high the level of poverty (intensity equation). This is precisely the motivation behind the hurdle model of error corrections. This specification has been labeled as "corner solution" model. A more general model that accommodates these objections is as follows:

1. Selection equation

$$y_i^* = Z_i' \alpha + \varepsilon_{1i}$$

2. Outcome equation:

$$y_i^* = X_i' \beta + \varepsilon_{2i}$$

Where y^* is the dependent variable poverty value = 1 if the country has poverty and value = 0 if the country does not have poverty. Z_i' and X_i' are the vectors of explanatory

variables. ε_{1i} and ε_{2i} are the error term. β and α are the coefficient estimators (see Greene W. H. 2012, Chapter 19 for details).

IV. EMPIRICAL RESULTS

A. CAD and cross country poverty incidence

Based on the theoretical background and measuring scale explained before we expect that TCI and level of poverty will be positively correlated. Figure 1 reports a scatter plot of the level of poverty incidence against the TCI. The correlation is positive, steady and statistically significant; 71 percent of the poverty incidence is associated with the development strategies subject to the measurement error.

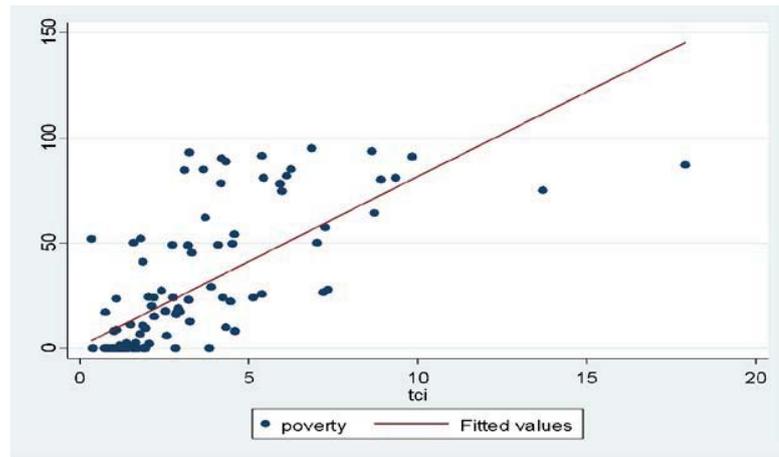


Figure 1: Scatter plot of poverty and TCI

A.1 Ordinary Least Square method

Table 2 reports the OLS estimated regression results with dependent variable poverty level. In this table, each cell corresponds to a separate regression. The model 1.1 represents the simple regression model with single independent variable TCI without controlling for other variables. The TCI is strongly correlated with poverty. Model 1.2

controls for the growth rate of GDP per capita and model 1.3 adds control for the trade openness with the rest of the world. The coefficient associated with TCI is lowered but still significant at the 1 percent level. Model 1.4 has the same explanatory variables with additional control variable whether the country is landlocked or not. Similarly each of the models 1.5, 1.6 and 1.7 add one more control variable such as index of economic freedom, whether the country is developing or no and expropriation risk. However, in the model 1.7 we exclude economic freedom index because of high multi-collinearity with expropriation risk. Our standard error is robust standard error to check for the heteroscedasticity. The reported coefficients are the effect of a marginal change in the corresponding regressor on the level of poverty.

Table 2: OLS Regression Estimates

	Poverty 1.1	Poverty 1.2	Poverty 1.3	Poverty 1.4	Poverty 1.5	Poverty 1.6	Poverty 1.7
Technological Choice Index	8.127*** (1.233)	7.787*** (1.243)	7.627*** (1.276)	7.421*** (1.295)	6.444*** (1.432)	5.341*** (1.348)	5.566*** (1.388)
Growth rate of GDP per capita		-1.731 (1.275)	-1.828 (1.402)	-1.819 (1.377)	-0.426 (1.709)	0.029 (1.527)	0.292 (1.328)
Openness			-0.021 (0.058)	-0.033 (0.059)	-0.045 (0.063)	-0.062 (0.059)	-0.019 (0.054)
Land lock				4.709 (6.890)	6.921 (7.433)	7.627 (6.982)	-0.038 (7.563)
Index of economic freedom					-11.574*** (3.034)	-6.113** (2.907)	
Developing						19.441*** (4.925)	11.883* (7.012)
Expropriation risk							-5.583** (2.459)
_cons	1.309 (3.538)	6.336 (4.926)	8.825 (7.305)	9.494 (7.269)	81.745*** (24.645)	38.983* (23.073)	44.401* (23.865)
R ²	0.50	0.51	0.51	0.51	0.54	0.59	0.62
N	113	109	107	107	85	85	90

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

Table 2 shows that CAD development strategy increases the level of poverty. This effect is statistically significant at the 1 percent level for each specification even with

controlling for many variables' impact on the level of poverty. We gradually increase the number of control variables to check whether the result is really persistent or no. The results displayed in table 2 imply that the TCI has the expected positive impact and this impact of implementing CAD strategy on the level of poverty incidence is economically sizeable. This finding supports our hypothesis that the more aggressive the CAD strategy pursued by a country the worse the poverty situation is in that country during the period 1963–99. The estimated coefficients of TCI have values ranging from 5.66 to 8.12. From the estimates, we can infer that a 1 standard deviation increase from the mean value of the TCI can result in approximately 5 to 8 percent increase in the country's average poverty level for the whole period 1963–99, whose per capita income is below \$2 a day based on purchasing power parity index.

The regression results also report that the index of economic freedom has the expected signs and highly significant effects on the poverty level in the regression model 1.5 and 1.6. The freedom of economic and financial institutions are important for their business performance in the economy and thereby creating job opportunities. Thus, higher index of economic freedom reduces the level of poverty incidence. Similarly, expropriation risk has significant effect at 5% level on poverty and is negatively correlated with poverty. The expropriation risk is the risk of outright confiscation and forced nationalization of property. A higher scale in the scale of zero to ten means that a private enterprise has a lower probability of being expropriated by the government as mentioned before. As the result shows, there is a negative relationship between the poverty and expropriation risk, which is consistent with the expectations meaning that 1 standard deviation increase from the mean value of the scale, decreases the poverty by roughly 5.5 percent. This result

demonstrates the evidence that nationalization does not help to reduce poverty. These two indexes of economic freedom and expropriation risk are representing the institutional quality. Thus, cross-country poverty incidence can be explained by the quality of the institutions.

Our data set confirms that higher level of poverty exists in a developing country, which is supposed to be. The regression result also shows that if a country is developing it will have higher level of poverty. This explanatory variable captures a lot of effects like level living standard, health, education etc, because we believe that developing countries have relatively lower living standard, education, health and so on which may affect the level of poverty. For example, if a person is well-educated he or she can get job and can get rid of poverty. Important to mention, even after controlling the developing country dummy variable our main interested variable TCI is still significant at 1 percent level but with more precise magnitude. Other explanatory variables like growth rate of GDP per capita, whether country is landlocked or not and country's index of trade openness are not significant even at 10% level. However, the impacts of these variables are jointly significant. To test whether we should include rate of GDP per capita, landlocked status and trade openness into the regression model, our null hypothesis have their joint coefficient equal to zero. However, we reject the null hypothesis at 5% level that these variables have no impact on poverty jointly. It permits that these variables should be included into our regression model.

A.2 Instrumental variable regression

While CAD may lead to higher poverty level, higher poverty level might also encourage a government to adopt CAD strategy. One possibility is that the government in a country

with higher poverty level wants to reduce poverty and improve living standards of the people that encourage them to emphasize industrial development with more capital intensive industry. That's why governments give privileges to that industry through subsidies or tax waivers. This may create problem of reverse causality. We are also suspecting the problem of measurement error as our main interested variable TCI is a proxy variable which may not be a true representative variable for CAD development strategy. There is also a chance of omitted variable bias in our OLS model. To control these endogeneity biases, we instrument our TCI variable with the index of freedom of press and initial industrial value added (% of GDP) for the first year of the sample period as mentioned earlier. The instrumental variable (IV) regression estimation results are reported in Table 3.

Table 3: IV regression result

	Poverty 2.1	Poverty 2.2	Poverty 2.3	Poverty 2.4	Poverty 2.5	Poverty 2.6	Poverty 2.7
TCI	13.564*** (2.308)	13.297*** (2.256)	13.604*** (2.299)	13.976*** (2.245)	18.855*** (5.785)	17.933** (7.509)	21.646** (10.123)
Growth rate of GDP per capita		0.597 (1.355)	0.490 (1.408)	0.450 (1.476)	1.985 (2.189)	1.839 (2.085)	1.984 (2.528)
Openness			0.104* (0.055)	0.131** (0.059)	0.149 (0.097)	0.135 (0.119)	0.160 (0.161)
Land lock				-10.933 (9.276)	-3.450 (10.669)	-2.705 (11.109)	-12.041 (15.974)
Index of economic freedom Developing					4.275 (6.514)	3.356 (5.624)	4.923 (7.595)
Expropriation risk						0.758 (12.506)	-11.323 (16.236)
							-1.874 (5.769)
_cons	-15.165*** (5.420)	-15.389** (6.647)	-23.604*** (8.373)	-24.767*** (8.386)	-69.470 (60.352)	-60.363 (54.091)	-59.385 (103.295)
R ²	0.26	0.28	0.26	0.25	.	0.05	0.00
Hansen J-test	0.5002	0.2961	0.2444	0.2011	0.4820	0.3387	0.8833
N	107	104	103	103	83	83	74

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

Model specification in table 3 is a replication of table 2 except the estimation methodology which here is IV regression. As with the first OLS result in table 2, the estimates for the TCI have the expected positive sign and are highly significant in all regressions result at 1% level except in model 2.6 and 2.7 where it is significant at 5% level. One of the possible reasons for reducing significance levels in the last two models is the increasing number of control variables that increase the standard error noticeably. This is a penalty for incorporating additional insignificant control variables. The finding is once again consistent with the prediction of our hypothesis that development strategy is one of the prime determinants of the poverty level of a country. However, here the magnitude of the coefficient is higher than the OLS, meaning that OLS regression has downward bias. But the standard error is higher in IV regression than that of the OLS results. The standard error is also robust for IV regression. We have lost significance of other explanatory variables except trade openness even which is not consistently significant. Although these explanatory variables are not significant individually, they are jointly significant to determine the level of poverty in a country (not reported). However, IV regression gives more reliable estimated results by controlling endogeneity problems. Important sensible issues are determining whether IV methods are necessary and, if necessary, determining whether the instruments are valid. Unfortunately the validity tests are limited. They require the assumption that in a just-identified model the instruments are valid and test only over-identifying restrictions. Our over-identifying Hansen J-test says that our instruments are valid. While IV estimators are consistent given valid instruments, IV estimators can be much less efficient than the OLS estimator.

A.3 Heckman two-step model:

The relationship between CAD and poverty may not be linear. Besides our data set consists of the countries with and without poverty incidence as mentioned earlier. Total 41 countries do not have poverty having value zero and other 71 countries have poverty value ranges from .043 to 95 percent. The countries that do not have poverty are fundamentally different from those that have high level of poverty. Therefore, simple OLS and IV regression may not give us very precise estimation. Because OLS and IV regression estimates show average value of the dependent variable which may not be representative for the countries whose poverty is zero and also those whose poverty is 95 percent. Considering the different categories of the countries we estimate here the Heckman two-step model which can solve this problem and at the same time it can remove the sample selection bias. We estimate participation equation and intensity equation as explained before. Table 4 reports the regression result estimated using Heckman's two-steps model. The result shows that the CAD has very high significant effect on both whether a country will have poverty or not as well as if the answer is yes. In the first regression it computes the economic magnitude of the effect of CAD on the level of poverty. Considering the participation equation or the probability of having poverty in a country, if the TCI increases 1 percentage point the probability of having poverty increases by roughly 1.5 to 1.8 percent. And in the case of intensity or level of poverty, 1 percentage increase in TCI, the level of poverty increases by approximately 0.63 to 1.9 percent. The magnitude of the coefficients in the Heckman estimation is quite reasonable and precise for both of these equations.

Table 4: Heckman two-step model

		1.1	1.2	1.3	1.4	1.5	1.6	
Level of poverty	Log of TCI	1.455*** (0.469)	1.454*** (0.390)	1.500*** (0.390)	1.959*** (0.448)	1.696*** (0.572)	0.632*** (0.233)	
	_cons	1.274 (0.818)	1.335** (0.642)	1.377* (0.745)	0.591 (0.866)	6.277 (5.602)	11.585*** (2.901)	
Probability of having poverty	Log of TCI	1.541*** (0.268)	1.688*** (0.306)	1.697*** (0.316)	1.736*** (0.330)	1.628*** (0.454)	1.871** (0.852)	
	_cons	-0.604*** (0.196)	-0.038 (0.265)	-0.173 (0.448)	-0.118 (0.455)	17.192*** (5.060)	42.202** (18.162)	
	Growth rate of GDP percapita		-0.036 (0.104)	-0.286*** (0.094)	-0.312*** (0.099)	-0.234* (0.128)	-0.027 (0.161)	
	Growth rate of GDP percapita		-0.263*** (0.089)	-0.048 (0.105)	-0.060 (0.121)	0.019 (0.194)	0.116 (0.091)	
	Openness			-0.002 (0.005)	0.001 (0.005)	0.007 (0.006)	0.006 (0.012)	
	Openness			0.003 (0.004)	-0.000 (0.006)	-0.003 (0.010)	0.003 (0.005)	
	Land lock				-0.445 (0.473)	1.304* (0.764)	3.561* (1.942)	
	Land lock				0.828 (0.538)	-0.444 (0.760)	-0.223 (0.374)	
	Log of index of economic freedom					-3.042 (3.385)	-10.638* (5.724)	
	Log of index of economic freedom					-9.608*** (2.743)	-2.383* (1.396)	
	Log of expropriation risk						-2.820*** (0.752)	
	Log of expropriation risk						-11.658** (5.438)	
	mills	lambda	0.479 (0.742)	0.621 (0.630)	0.811 (0.633)	1.593** (0.657)	2.063** (0.970)	0.033 (0.533)
	<i>N</i>		113	109	107	107	85	76

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

B. Role of Finance interacting with CAD on the cross country poverty incidence

Figure 2 reports the scatter plot of liquid liability and private credit ratio against poverty and shows that they are negatively correlated. 46 percent of the poverty incidence is associated with the liquid liability and 50 percent with the private credit ration (see table 1). It is consistent with the past literature on financial development and poverty level

(Green, et al. 2006, Kirkpatrick, C., 2000, Akhter & Daly, 2009, Beck, T., A. Demirgüç-Kunt, and R. Levine 2004). Countries with bigger amounts of private credit and higher liquid liability are supposed to be supportive to eradicate poverty through higher money supply and access to the financial services.

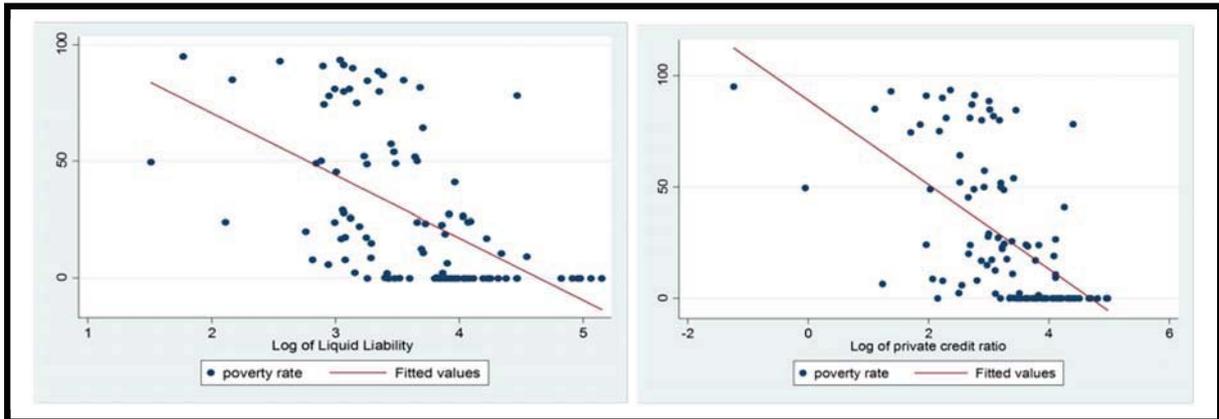


Figure 2: Scatter plot of poverty level and poverty level.

Some of the regression models in table 5 are used to investigate the direct effects of financial development on changes in poverty level. Other regression models are with interaction term of financial development and TCI. We would like to see how the effects of CAD strategy differ with the differences in financial development. It's important to mention that, from the correlation matrix in table 1 panel B, all of the financial development variables are highly correlated with each other. Therefore, we include one financial development variable at a time in each regression to avoid multicollinearity issue. This approach enables us to obtain more precise estimates of the impact of each of the financial development variables. Here we use ordinary least-squared regressions similar to Beck, Demirguc-Kunt, and Levine (2004). The dependent variables are the average poverty level over the long available time period from 1963 to 1999. The independent variables are the average values of financial development over that same

time period. Making average of the variables for longer time is in order to abstract out business cycles and smooth out volatility in the variables. This approach enables this work to examine the long run relationships between the variables. Because financial development may indirectly reduce poverty by promoting economic growth, we include some control variables like the growth of GDP per capita, index of economic freedom, dummy variable developing and landlocked status in the regressions.

We also use instrumental variable regressions to eliminate the endogenous biases in the OLS regressions. Even though countries with higher levels of financial development may have higher poverty alleviation, financial development may not be causing the changes in poverty. Both financial development and poverty alleviation may be derived by an omitted variable. It is also possible that lower level of poverty leads to higher financial development as more people demand financial services because of simultaneous relationship. Here we also use proxy for financial development which may have measurement error. IV regressions enable the work to determine whether financial development is causing poverty reduction and solve the endogenous problems. As mentioned before we use as instruments endogenous financial development variables with the instrument of legal origin and the initial value of liquid liabilities and private credit ratio. Instruments for the TCI are same as in table 3. Based on the Hansen J-test of over identifying restrictions, we conclude that these instruments are valid and satisfied the conditions of IV regression.

Table 4 presents the coefficients and robust standard errors from the headcount poverty level regression which is similar measure to the last regression model. Regressions (3.1),

(3.3), (3.5) and (3.7) are OLS, while regressions (3.2), (3.4), (3.6), and (3.8) are IV regressions.

Table 5: OLS and IV regression

	Poverty OLS 3.1	Poverty IV 3.2	Poverty OLS 3.3	Poverty IV 3.4	Poverty OLS 3.5	Poverty IV 3.6	Poverty OLS 3.7	Poverty IV 3.8
Log of TCI	17.024** (7.072)	93.622*** (36.270)	17.045** (7.061)	88.980*** (34.361)	44.431** (18.019)	189.593*** (64.576)	58.985*** (9.333)	141.565*** (39.449)
Log of IEF	-40.667** (19.875)	47.290 (66.570)	-38.275* (20.992)	39.375 (61.618)	-40.182** (19.540)	16.814 (32.869)	-37.514* (20.188)	-4.384 (29.974)
Openness	-0.063 (0.069)	0.325 (0.219)	-0.067 (0.069)	0.387 (0.244)	-0.082 (0.070)	0.044 (0.110)	-0.085 (0.066)	0.087 (0.094)
Growth rate of GDP per capita Developing	-0.005 (1.565)	-0.732 (3.258)	0.092 (1.557)	0.036 (2.996)	0.787 (1.595)	1.863 (2.747)	1.416 (1.691)	1.966 (2.649)
Land lock	16.849** (7.174)	-21.705 (17.023)	16.396** (7.087)	-23.056 (17.021)	18.705*** (6.975)	11.559 (13.015)	24.261*** (7.266)	20.903 (14.913)
Liquid liability	8.747 (7.008)	-11.510 (16.891)	8.654 (6.894)	-8.337 (14.900)	7.170 (6.970)	-9.912 (12.260)	5.251 (5.982)	-6.208 (9.671)
Private credit ratio			-0.038 (0.086)	0.210 (0.220)				
Log of liquid liability						47.883** (22.188)		
Log TCI * log of liquid liability					-8.510 (5.748)	-37.423** (17.972)		
Log of private credit ratio							9.740** (4.725)	34.991* (19.235)
Log TCI*log of private credit ratio							-14.482*** (3.337)	-30.323** (11.991)
_cons	79.031* (40.260)	-157.573 (154.858)	75.919* (41.050)	-134.298 (141.773)	73.723* (38.691)	-244.319** (121.331)	35.197 (35.878)	-147.041* (83.950)
R ²	0.58	.	0.58	.	0.59	.	0.62	0.22
Hansen J-test		0.6795		0.6990		0.2761		0.3633
N	82	80	82	80	82	78	82	78

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively.

Considering the OLS regressions without interaction terms, these are the first round analyses of the direct effect of CAD strategy and financial development on the poverty level. The coefficients of log of TCI in all the OLS regression have positive sign and significant at 5% level. Here we have found the same results suggesting that CAD increases the poverty level. However, the variables for the financial development like liquid liability and private credit ratio are not significant even at 10% meaning that these

two indicators do not have any direct impact on the poverty alleviation. These results show that financial development will not reduce poverty directly.

Considering the IV regression without interaction terms in table 5, these are also the first round analyses of the direct effect of CAD strategy and financial development on the poverty level but control for the endogenous problems in the OLS regressions. Once again the effect of CAD has been proved with higher economic impact and higher statistical significance and it has also been proved that financial development does not have any direct significant impact on reducing poverty. However, the endings are once again consistent with the prediction of the paper's hypothesis that CAD development strategy is one of the prime determinants of the long-run poverty level of a country. These results also indicate that only the rich and the powerful people in the society have access to subsidized loans from banks or simply financial services, and thus, only these people will have the financial resources to invest in prioritized capital-intensive industries. This type of financial development leads to higher inequality in the country and will not improve the poverty situation.

Finally considering both OLS and IV regressions with interaction terms reports very interesting results. Once the financial development interacts with the CAD strategy then it is significant and is negatively correlated with the country's poverty level. This means that if a country is following CAD development strategy it is supposed to have higher poverty level but higher financial development may mitigate the detrimental effects of CAD strategies on the level of poverty. In other words, financial development may reduce poverty incidence for a country even though it is following CAD strategies. Thus,

financial development is crucial to eradicate poverty although it does not have any direct impact on poverty.

V. CONCLUSION

Once again a reminder - the objective of this paper was to empirically examine the effects of adopting Comparative Advantage Defying (CAD) development strategy by a country, on its incidence of poverty. We also intended to check how this effect of CAD differs between countries according to different levels of financial development. We have found that the estimated coefficients of TCI, the development strategy's proxy, are economically positive and statistically highly significant for all the regression models. These results strongly support our hypothesis that the more aggressively a country pursues CAD strategy, the more severe the poverty level will be in that country. The empirical evidence presented in this paper strongly suggests that the development strategy is one of the most important determinants of a country's level of poverty incidence. Therefore, if the government in a developing country adopts a CAD strategy, it will suppress factor prices and prompt various institutional distortions to protect and subsidize the non-viable firms in the prioritized industries, which will in turn repress incentives and worsen resource allocation, resulting in higher level of poverty incidence. We also conclude that financial development does not necessarily reduce poverty directly but it helps minimize the negative effect of CAD on increasing poverty once it interacts with development strategy. In fact, our analysis of the interaction between CAD and financial development suggests that CAD matters the most when level of financial development is low and CAD is weak when the financial development is strong.

However, the obvious question is how generalizable these results are. We cannot fully rule out the possibility that this is precisely the situation in most of the developing countries. Moreover, our sample size is quite enough.

If we can generalize our result, then the question of how to address the deficiencies in development strategies takes on great policy relevance. Our analysis suggests that better financial management can possibly eliminate the negative effects of CAD strategy. However, better financial management is a treatment for the disease of CAD, not a preventive measure. We did not prove that which development strategy will serve the best. However, we argued at the beginning, for a country in which the government follows a CAF strategy, rather than CAD strategy, can reduce the level of poverty. Only future research will be able to prove it and tell how to remove the deficiencies of CAD. Thus, our policy suggestion from this empirical study is that the government in developing countries should create an environment that facilitates the growth and poverty reduction based on their comparative advantages (which have been suppressed in the past due to the government's pursuit of a CAD strategy).

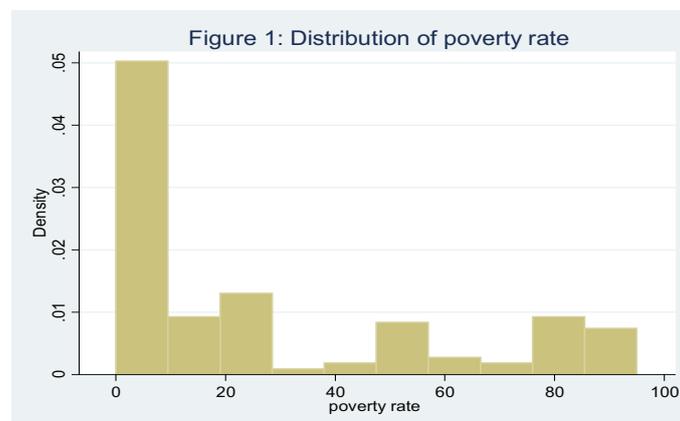
APPENDICES

Appendix A: Variable Description and sources of data

Variables	Descriptions	Sources
Technological Choice Index (TCI)	TCI is averaged for the year 1963 to 1999.	The data for calculating the TCI are taken from the World Bank's World Development Indicators (World Bank, 2002b) and the United Nations Industrial Development Organization's International Yearbook of Industrial Statistics (UNIDO, 2002)
Poverty	Level of poverty incidence is measured as poverty headcount ratio at \$2 a day (PPP) (% of population). It is averaged over the period 1963-1999.	World Bank (2014)
Openness	(exports + imports)/ GDP from 1960 to 1999	Dollar and Kraay (2003)
Growth of GDP per capita	The average annual growth rate of per capita GDP for 109 countries for the period 1962 to 1999.	Lin, J. Y.'s (2009) calculation
Land lock	Dummy variable value = 1 if it is land lock and 0 otherwise	Data for the variable land lock has been collected using Google map.
Expropriation risk	This variable ranges from zero to ten. A higher value means lower probability of being expropriated.	The expropriation risk of 102 countries is adopted from the International Country Risk Guide (Political Risk Services, 2007).
Index of Economic Freedom	Its value ranges from zero to ten. Higher value means higher freedom	The observations constituting the IEF from ninety-one countries are taken from Economic Freedom of the World (Fraser Institute, 2007), and are available from 1970 onwards adopted

			by Justin Yifu Lin (2009).
Developing	Dummy variable value = 1 if it is developing and 0 otherwise		World Bank (2014) classification.
Liquid liability ratio to GDP	liquid liabilities to GDP		World Bank (2014)
Private credit ratio	private credit by deposit money banks and other financial institutions to GDP		World Bank (2014)
Legal origin	Dummy variable value = 1 if it is English law and 0 otherwise		The legal origin data is collected from the CIA World Fact Book.
Freedom of press	Countries are given a total press freedom score from 0 (best) to 100 (worst) on the basis of a set of 23 methodology questions divided into three subcategories, and are also given a category designation of “Free,” “Partly Free,” or “Not Free.”		Freedom House, 2014

Appendix B: Distribution dependent variable poverty rate



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