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COMPARATIVE ADVANTAGE DEFYING DEVELOPMENT STRATEGY AND CROSS COUNTRY POVERTY INCIDENCE

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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 an economy's financial development, which is the most important channel for the effects of CAD on poverty to manifest themselves. Data for the period of 1963 to 1999 (cross-section average over this time period) and 1980 to 2000 (panel with 5 years interval) for 113 countries are used in the 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.

Keywords: Development Strategy, Comparative Advantage, Poverty, Financial Development, Technological Choice Index
JEL Classification: O2, P59, O15, G29, O33

1. 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 (Acemoglu, 2007;

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Acemoglu *et al*., 2004; Commander and Nikoloski, 2010). A country's chosen development strategy matters in determining the quality of institutions and, hence, the level of poverty (Lin, 2009). Since the end of the Second World War, developing and developed economies around the world have determinedly sought to alleviate, and even eradicate, poverty. With the exception of a few successes in East Asia including Japan, South Korea, Singapore and Taiwan, such efforts have largely failed. Thus, living standards in most developing countries have not improved substantially and particularly for countries in Sub-Saharan Africa, very little have changed (ibid). 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.

Nevertheless, the eradication of poverty remains a high priority for world leaders, 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 shorthand 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. We call this a Comparative Advantage Defying (CAD) strategy because the developing countries have mostly been capital-scarce economies and capital-intensive industries were not to their comparative advantages. 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. 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 a higher level of poverty.

The most important channel through which the CAD strategy can affect the level of poverty is the channel of finance. Many governments of least developed countries (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. For example, immediately after independence in 1949, the Chinese government adopted CAD strategy and made a big push for the nationalization movement by increasing the share in the industrial output of State Owned Enterprises (SOEs) from around 40% in 1952 to 90% in 1958. The government suppressed the price of agricultural products to support priority industry – price premium of agricultural products at informal markets relative to state procurement price went negative at 10 points in the 1950s (Lin *et al*., 2006). During this time, Chinese government failed to reduce poverty until stopping such deviant behavior in 1978 (Lin, 2009).

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 analyze 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 a 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.

This paper has marked an original contribution to the existing literature on development strategy and poverty reduction. Out of the existing literature on development strategy and poverty, our works have looked at the cross country cases rather than a single country experience. We have also tested whether the relationship between a CAD strategy and poverty is workable if a country's financial elements change. In terms of methodology, we have made a number of new attempts over existing literature: looked for reasonably valid instruments for our endogenous variables, robustness check with different representative variables and with different methodologies, and applying Heckman two-step model which allows treating samples with extreme characteristics and also correcting for non-randomly selected samples.

The paper proceeds as follows: Section 2 discusses the notion of development strategy, particularly CAD and CAF development strategy, financial development and poverty incidence. Section 3 describes the data and methodology. Section 4 presents the empirical results and section 5 concludes.

2. LITERATURE REVIEW

2.1. Literature on Development Strategy and Poverty

Many researchers (Yao, 2004; Dollar and Kraay, 2000; Aiyar, 2015; Montalvo and Ravallion, 2010; Smith and Webb, 2013) believe that 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. Many economists including Acemoglu *et al*. (2004) argue that LDCs have failed to reduce their poverty and catch up with the developed nations mostly because of bad institutions and a lack of effective constraints on power exercisers. However, when it comes to what forms of government development behavior help build such institutions and policies, economists rarely reach consensus. There are numerous theories explaining how government policy interventions silhouette the institution and thereby affect the level of poverty. They are broadly divided into two categories: 'helping-hand' (Pigou, 1938) versus 'grabbing-hands'. Considering the adverse effects of government regulations and

distortions in most developing countries, many economists have proposed this 'grabbing-hand' view (Acemoglu, 2007; Grossman and Helpman, 1994; Shleifer and Vishny, 1994; Sokoloff and Engerman, 2000). They argue that government interventions are for the benefits of politicians and bureaucrats like favoring friendly firms and other influential people. There are also other theories outside of this box of helping-hand versus grabbing-hands, which claim that the regulations and controls by the government over firms in LDCs may be rooted in poor taxation, limited administrative capacity and the high cost of collecting public funds (Gordon and Li, 2005a, b; Esfahani, 2000).

However, these theories are not helpful to understand the evolution of institutional composition under government interventions because the institutional structures in LDCs are shaped by the interventions is quite complicated. Even so, these theories can explain some of the characteristics of government behaviors in LDCs but are not sophisticated enough to explain all the intrinsic dimensions of it. Lin *et al*. (2006) challenged these helping-hand versus grabbing-hand taxonomy views and argued that these high regulations on the economy of LDCs are not solely due to the corruption of the politicians and the bureaucrats and also not due to the poor taxation and bureaucratic limited capacity as suggested by Esfahani (2000) and Gordon and Li (2005a, b), but due to the adoption of CAD strategy by the government. Lin *et al*. (2006) claimed that the fuzzy institutional arrangement in China and in many LDCs in the post-World War II can be largely elucidated by the government adopted inappropriate development policy strategies. During that time, most LDCs and many other socialist economies adopted a CAD strategy to accelerate the growth of capital-intensive industries and of prioritized sectors. Soon after, many firms supported by CAD became non-viable in open competitive markets as they violated the comparative advantage. Thus, a regulatory system needed to be established for continuing supports to the priority sectors. These have been summarized as a trinity system[1] including the macro policy environment, highly centralized planned resource allocation system and dependent micro management institution (Lin *et al*. 1996, 1999, and 2003; Lin, 2003). Lin *et al*. (2006) have statistically measured the evolution of CAD for China from the 1950s to 1980s and have shown that the CAD and the trinity system of government controls exist in tandem.

Lin *et al*. (1996, 1999, 2003, and 2009) have come up with a more convincing contribution with empirical results based on Chinese experience to these areas of the literature: government development strategy in shaping institutional structures and thereby effects on poverty and on the overall economy. Their findings support neo-liberal theorists (Lewis, 1955; Lucas, 1988) who suggest that there should not be any intervention so as not to defy comparative advantages. However, many economists

[1] Trinity system as explained by Lin *et al*. (2006): First, to execute CAD, government must either distort artificially the relative prices of factors of productions, or subsidize the heavy industries by collecting taxes from the light industries. Second, when the price of a product / factor is artificially set below its equilibrium price, the demand will be stimulated and the supply will be suppressed. Third, thus, the need of a central planning system to run these distorted markets with the missing competition, the profitability of an enterprise is not determined by its performance.

do not believe in their arguments particularly the structuralists (Chang, 2002, 2007; Keynes, 1935) who claim that government should provide supports and protections to the infant industries which may not necessarily correspond to the country's current endowment structures. Chang (2002, 2007) believe that the comparative advantage may be important sometimes but never more than the baseline and a country must defy its comparative advantage if it wishes to upgrade its industrial structures. Chang's works have added very new insights to the growing literature and criticized the neoliberal theories advocated by the World Bank, the International Monetary Fund (IMF) and the World Trade Organization (WTO). He covered an extensive range of development policies and a large number of country cases to produce his inductive historical method and shows that the now-developed countries (NDCs) developed a vast array of state interventionist measures, or protectionist policies, in their early stages of development. He has convincingly presented how and why the NDCs did not employ the so-called neoliberal approach when they climbed the ladder of economic success, yet they are prescribing such policies today through the structural adjustment programs taken care by the World Bank and the IMF. Chang aggressively concluded that the 'ugly policies' of government interventions and prioritized industry protection that most NDCs used effectively during their take off stages should be used by currently developing nations whether or not the available comparative advantages are defied.

However, his works have a number of serious methodological and theoretical shortcomings: did not have original theoretical grounds and did not seriously examine the channels and mechanisms through which the effects were translated into economic growth and poverty reduction. Moreover, presenting a simple correlation between the protectionist policies and economic growth is not adequate to prove that the adopted CAD or protectionist policies led to economic growth. His analysis would be more acceptable if he could put a counter-factual analysis to estimate the magnitude of paybacks and expenses of protectionist policies, otherwise, it hardly establishes a causal relationship between economic successes and adopted policies which defied comparative advantages. Nevertheless, Chang's attacks on the neo-liberal approach have opened an alternative way to analyze the pros and cons of development strategies.

Thus, there is no consensus within development literature that the development strategy should comply with the present comparative advantage of the country or direct the economy elsewhere. In this paper, we intend to advance the works of Lin and Liu (2006) by doing a cross-country analysis because their work was based exclusively on Chinese experience and cannot be generalized to the rest of the world. In addition, Lin and Liu (2006) did not demonstrate how CAD affects poverty.

2.2. Literature on Finance and Poverty

A substantial body of literature assesses whether financial development facilitates poverty reduction or not, and can broadly be divided into two categories: one effects poverty indirectly through the economic growth channel and the other effects directly

through the poor benefiting from the access to the financial services. Various analyses (e.g. Ravallion and Chen, 1997; Galor and Tsiddon, 1996; Perroti, 1993) show that economic growth has helped to alleviate poverty through job creation for the poor, reduction in wage differentials, capital accumulation and higher tax collection spent for social transfers. However, others disagree. For example, the Kuznets' (1955, 1963) inverted-U hypothesis argue that at the early stage of economic development economic growth may raise income inequality because the rich people who can have easy access to financial services or can self-finance would capture the early stage gains of industrialization and thus would leave the poor underprivileged.

There are also many studies that tried to establish a direct relationship between financial development and poverty reduction (e.g., Honohan, 2004; Beck *et al.*, 2007; Clarke *et al*., 2003; Galor and Zeira, 1993). They have presented a robust effect of financial development on the poverty incidence and say that the countries with developed financial intermediaries experience faster declines in poverty by disproportionately boosting the incomes. These positive effects are mostly because of direct and low-cost access to the financial services. However, there is also skepticism about whether financial development can ensure broad access to finance by the poor. Haber (2004) argues that only the rich and politically connected would receive benefits from enhancement in the financial services. Some views like Greenwood and Jovanovic (1990) support a nonlinear relationship between finance and income distribution, identical to the Kuznets' (1955, 1963) inverted-U hypothesis. Thus, we conclude that a developed financial system facilitates economic growth and economic growth is the approximate cause of poverty reduction. There is also evidence that financial development can directly reduce poverty by broadening the access to financial services for the poor.

We assume that the poor may benefit from lower cost access to financial services. However, the governments in the LDCs, while implementing CAD, frequently institute complicated regulations and distortions that suppress the functioning of competitive markets and financial systems. For instance, there may be high costs associated with taking out loans in developing countries along with collateral which only the rich can afford, while the poor struggle with such costs. If not, we assume a developed financial system would allow anyone with a profitable project to receive a loan. Thus, we set the following hypothesis: a highly developed financial system can reduce the detrimental effect of CAD on poverty's incidence.

3. EMPIRICAL STRATEGY AND DATA

3.1. 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:

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

In equation (2), in addition to equation (1), FD is representing the level of financial development and $CADxFD$ 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 the 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 3.2. 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 of affecting 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 of 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 fewer job opportunities and sources of earnings. These may increase the probability to have a higher level of poverty incidence. Arvis, *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 (2004) suggests a new possible reason of landlocked countries 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 economic freedom. Economic intuition says that higher economic freedom is helpful to reduce the level of poverty incidence. Hasan, Quibria and Kim (2003) explored the empirical relationship between poverty and economic freedoms and show 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 (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 located in a particular region. We created seven regional dummy variables which will control for time-invariant effects to the regression. 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 for 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 1963 to 1999 has been collected from Lin (2009) calculation.

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 1999. The dataset consists of 113 developed and developing countries (see Appendix for details). Table 1 shows the summary statistics and correlation matrix of the variables. Poverty level and country openness are more volatile than the other variables.

We also have a panel dataset over the time period of 1980 to 2000 with a five-year interval for the same 113 countries as in cross-section dataset (Table 2). The limitation of the panel dataset is many of the observations of control variables are not available for every year but the average value of this time period. However, it is quite rational to assume that they are fixed over time as most of the control variables are representing the

Table 2. Descriptive Statistics of Panel Data

	Poverty	TCI	Growth of GDP per capita	Landlock	Openness	IEF	Expropriation risk	Freedom of press	Iivapg	Liquid liability	Private credit ratio	Common law
Panel A: Summary Statistics												
Mean	26.26	3.030	3.290	.131	64.60	6.20	7.529	43.53	31.36	49.10	42.29	.29
Median	11.25	1.936	3.67	0	60.9	6.2	7.32	44	32.48	39.51	29.30	0
St. error	1.352	.129	.194	.017	1.846	.044	.083	.89	.619	1.75	1.695	.02
Maximum	97.81	17.9	23.87	1	209.38	8.36	10	84	70.49	299	222.34	1
Minimum	0	.36	-20.61	0	15.51	4.36	2.98	10	2.53	2.88	.39	0
Panel B: Correlation Matrix												
Poverty	1.00											
TCI	0.69*	1.00										
Growth of GDP per capita	0.05*	-0.01	1.00									
Land lock	0.20*	0.23*	0.01	1.00								
Openness	-0.22*	-0.28*	0.01	0.16*	1.00							
IEF	-0.56*	-0.51*	-0.00	0.07	0.28*	1.00						
Expropriation risk	-0.63*	-0.49*	0.04	0.06	0.12*	0.66*	1.00					
Freedom of press	0.45*	0.33*	0.09*	0.09*	-0.14*	-0.55*	-0.53*	1.00				
Iivapg	-0.51*	-0.42*	-0.15*	-0.05	0.04	0.19*	0.25*	-0.19*	1.00			
Liquid liability	-0.40*	-0.36*	0.12*	0.02	0.39*	0.51*	0.47*	-0.30*	0.12*	1.00		
Private credit ratio	-0.46*	-0.39*	0.13*	-0.10*	0.16*	0.61*	0.55*	-0.33*	0.15*	0.78*	1.00	
Common law	0.08*	-0.01	0.02	-0.12*	0.19*	0.09*	0.11*	-0.13*	0.12*	0.14*	0.11*	1.00

Note: * indicates significance at the 5% level. Sources of data are illustrated in Appendix as par variables.

quality of the institutions which do change very slowly (i.e. IEF and expropriation risk) and some of them are completely fixed over time (i.e. whether a country is landlocked or not). The motivation to use panel data is that the average value over a long period of time may not be able to extract the effects of variation within the country which panel data can do well. Therefore, we also tried to establish the relationship using panel data.

3.2. 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:

$$TCI = \frac{AVM_{i,t}/LM_{i,t}}{GDP_{i,t}/L_{i,t}},$$

where $AVM_{i,t}$ is the added value of manufacturing industries and $GDP_{i,t}$ is the total added value of country i at time t. $LM_{i,t}$ is the labour in the manufacturing industry and $L_{i,t}$ 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 $AVM_{i,t}$ than otherwise. Meanwhile, investment in the prioritized manufacturing industry will be more capital-intensive and absorb less labour, ceteris paribus. The numerator in the 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.

3.3. 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.) may be endogenous (Beck *et al*., 2007; Jeanneney and Kpodar, 2008), so we may be capturing reverse causality issues or the effect of some of the omitted variables (e.g., geographical characteristics, culture and so on). Secondly, both of our main interested variables may be measured with error as being proxy variable; therefore, there may be a downward attenuation bias (Wooldridge, 2002).

Both of these concerns imply that OLS regressions will give results that may not correspond to the causal effect of CAD and financial development on the 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 to produce more authentic results. These instruments should be correlated with the endogenous variables but orthogonal to any other omitted characteristics. 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 (Wooldridge 2002, chap. 5 for details) and thus, we can estimate the parameters consistently.

Two first stages for instrumental variables strategy:

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

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

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 or CAD. The key exclusion restriction is that in the population $cov(\varepsilon_i, P_i) = 0$ where ε is the error term in the second-stage equation (1) and (2). Thus, we need a source of exogenous variation in development strategy. We propose a theory of government development policy differences among countries and utilize this theory to derive a possible source of exogenous variation. Our theory rests on two premises: firstly, there are different levels of media independence which has different roles in government level decision process both directly and indirectly. By direct influence, at one extreme, media are not independent at all run under government instruction. These media cannot work to protect civil rights and cannot provide checks and balances against government expropriation and other actions. In fact, the main purpose of running this media is to work for the government and never against it. At the other extreme, the press is independent and always works as a watchdog of government actions. It works to protect civil rights and checks against government power. In an open political system, media helps to set the agenda of parliament and government. Parliament is to some extent more likely to track media than governments (Walgrave *et al.*, 2008). The media also use their indirect approach - publications and broadcasts to change the beliefs and policy preferences of mass people, which would presumably change subsequent policy decisions (Page, 1996). Secondly, media policy is influenced by the style of government. If the government is democratic it is more likely to allow freedom of press and if non-democratic more likely to exert control over media (Habermas, 2006).

Based on these two premises, we use the freedom of press in the country as an instrument for government development strategies. 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 which is mostly fixed over time. We have collected press freedom scores 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. As Fair (1970) has shown that the problems associated with the simultaneous equation can be solved using lagged endogenous variables, 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 problems with the 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 $cov(\varepsilon_i, L) = 0$ where ε_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 and Johnson (2005) in their regression analysis. The original idea in the line of research of 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. 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% 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 1999. 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 3).

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 Figure A1 in Appendix). 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 a 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 institutions, political culture, and other fundamental issues that essentially outline the economic performance. To overcome these problems we have used Heckman two-step model (see Cameron and 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 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 intense or high is 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:

Selection equation: $y_i^* = Z_i'\alpha + \varepsilon_{1i}$,

Outcome equation: $y_i^* = X_i'\beta + \varepsilon_{2i}$,

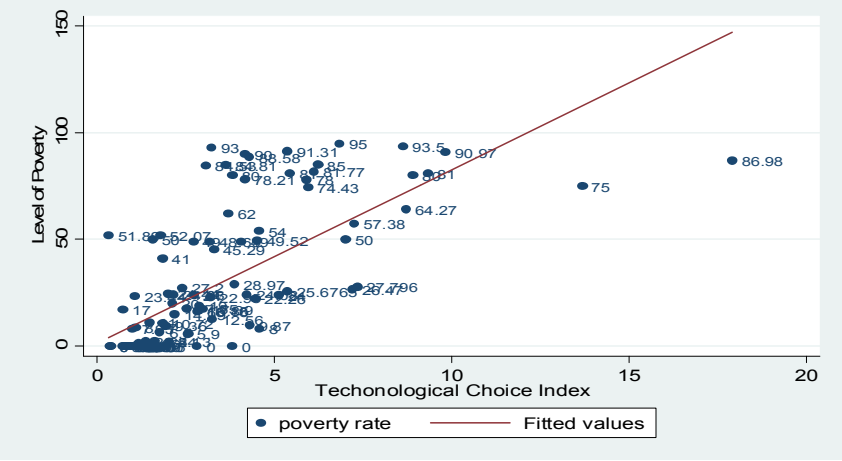
where y^* is the dependent variable $poverty\ value = 1$ if the country has $poverty$ and $value = 0$ if the country does not have poverty. Z_i' and X_i' are the vectors of explanatory variables. ε_{1i} and ε_{2i} are the error term. β and α are the coefficient estimators (Greene, 2012 chapter 19 for details).

For panel data, we also take several strategies to avoid endogeneity issue including random/fixed effect, system GMM, IV regression using the same instruments we use for cross-section data and Heckman two-step model. The system GMM allows not only to take into account the reverse causality problem but also to treat the issues of measurement error and omitted variables biases (Blundel and Bond, 1998).

4. EMPIRICAL RESULTS

4.1. 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% of the poverty incidence is associated with the development strategies subject to the measurement error.



Notes: Poverty is defined as \$2 a day (PPP) (% of the population). The TCI is defined as $(AVM_{i,t}/LM_{i,t})/(GDP_{i,t}/L_{i,t})$. Sources of the data are illustrated in Appendix as par variables.

Figure 1. Relationship between the Technological Choice Index (TCI) and the Level of Poverty

4.1.1. Ordinary Least Square Method

Table 3 reports the OLS estimated regression results with dependent variable poverty level. The model 1.1 represents the simple regression model with single independent variable TCI without any control variable. Model 1.2 and all other subsequent models gradually add more and more control variables including the growth rate of GDP per capita, trade openness with the rest of the world, whether the country is landlocked or not, index of economic freedom, expropriation risk and location of the country. The reported coefficients are the effect of a marginal change in the corresponding regressors on the level of poverty.

Table 3. OLS Regression Estimates

	Poverty 1.1	Poverty 1.2	Poverty 1.3	Poverty 1.4	Poverty 1.5	Poverty 1.6	Poverty 1.7
Log of TCI	29.65***	28.528***	29.079***	28.225***	22.096***	13.597**	8.122***
	(3.246)	(3.240)	(3.687)	(3.844)	(6.348)	(6.333)	(2.835)
Growth rate of GDP per capita		-2.413**	-2.505*	-2.456*	-0.716	0.860	0.752
		(1.204)	(1.342)	(1.317)	(1.646)	(1.520)	(0.875)
Openness			0.040	0.024	-0.012	-0.047	-0.028
			(0.060)	(0.063)	(0.065)	(0.061)	(0.041)
Landlock				6.216	7.196	8.850	6.302*
				(5.957)	(6.993)	(8.166)	(3.584)
Log of IEF					-65.783***	-37.186*	-16.899
					(23.259)	(20.902)	(21.950)
Log of expropriatio & risk						-57.926***	-50.691***
						(12.639)	(8.962)
South Asia							38.497***
							(9.632)
Middle-East & North Africa							-12.142*
							(6.327)
East Asia & Pacific							8.750
							(6.065)
Sub-Sahara & Africa							31.505***
							(6.541)
Latin America & Caribbean							-9.837**
							(4.615)
Europe & Central Asia							-5.214
							(5.101)
Constant	2.375	8.751*	5.654	6.378	128.897**	197.967***	146.817***
	(3.192)	(4.589)	(7.942)	(7.939)	(50.043)	(48.347)	(33.585)
R^2	0.53	0.55	0.55	0.55	0.54	0.62	0.87
N	113	109	107	107	85	76	76

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively. The reference point for the regional dummy variable is North America. Sources of data are illustrated in Appendix as par variables.

Table 3 shows that CAD strategy increases the level of poverty. This effect is statistically highly significant even after controlling a substantial number of variables which shows that the estimated impact of TCI on poverty is consistent. This result supports our hypothesis that more aggressively a country persuaded CAD strategy the worse the poverty situation is in that country during the period 1963–99. This effect of adopting CAD strategy is economically sizeable - the size of the coefficients of log TCI ranges from 8.12 to 29.67. From this estimates, we can infer that a 10% increase in the value of TCI can result in approximately 0.8% to 2.9% increase in the country's average poverty level during 1963–99, whose per capita income is below $2 a day based on purchasing power parity index. This result has a significant economic sense as TCI reflects both how much preference for developing capital-intensive industries as well as how much the economy is distorted by the government (Lin *et al*. 2006).

The regression results also report that the index of economic freedom has the expected signs and significant effects on the poverty level in the regression model 1.5 and 1.6. The freedom of economic and financial institutions is 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 a highly significant effect 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. This result demonstrates the evidence that nationalization does not help to reduce poverty. Both of these two indexes - economic freedom and expropriation risk represent the qualities of institutions and can explain the cross-country poverty differences.

The growth rate of GDP per capita is significant but does not consistently prove that a high rate of GDP growth benefits the poor. The regional dummy variables explain a significant part of differences in poverty which shows that South Asia and Sub-Saharan African countries are the most poverty-prone regions. Other controls like landlocked and trade openness are not significant; however, a joint significant test shows that they are jointly significant.

4.1.2. Instrumental Variable Regression

With regards to the possible endogenous biases - while CAD may lead to the higher poverty level, higher poverty level might also encourage a government to adopt CAD strategy. Suspecting the problem of measurement error and a chance of omitted variable bias in the OLS estimation, 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 4.

The model specification in table 4 is a replication of table 3 except the estimation methodology which here is IV regression. As with the OLS results in table 3, the

estimates for the TCI have the expected positive sign and are highly statistically significant across all the specifications. 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. The magnitude of the IV regression is higher than the OLS, meaning that OLS regression has a downward bias. However, we have lost the significance of other explanatory variables. Although these explanatory variables are not significant individually, they are jointly significant to determine the level of poverty in a country (not reported). Compare to OLS estimation, IV regression gives more reliable estimated results by controlling endogenous problems, however, is less efficient. 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.

4.1.3. 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 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%. The countries that do not have poverty are fundamentally different from those that have a high level of poverty. Therefore, simple OLS and IV regression may not give us very precise estimation. Because OLS and IV regression estimates show the average value of the dependent variable, they may not be representative for the countries whose poverty is zero or those whose poverty is 95%. Considering the different categories of the countries we estimate here, the Heckman two-step model 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 5 reports the regression result estimated using Heckman's two-steps model. The result shows that the CAD has a very high significant effect on both whether a country will have poverty or not as well as the magnitude when 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 by 10% the probability of having poverty increases by roughly 0.15% to 0.2%. And in the case of intensity or level of poverty, a 10% increase in TCI will increase the level of poverty by approximately 0.063% to 0.2%. The magnitude of the coefficients in the Heckman estimation is quite reasonable and precise for both of these equations.

Table 4. IV Regression Result

	Poverty 2.1	Poverty 2.2	Poverty 2.3	Poverty 2.4	Poverty 2.5	Poverty 2.6
Log of TCI	47.073***	47.362***	48.659***	49.735***	69.559***	33.701**
	(5.266)	(5.414)	(5.659)	(6.246)	(19.240)	(14.465)
Growth rate of GDP per capita		-0.539	-0.913	-0.924	1.129	-0.919
		(1.503)	(1.508)	(1.535)	(2.621)	(1.250)
Openness			0.175**	0.192**	0.264	0.121
			(0.077)	(0.085)	(0.159)	(0.103)
Landlock				-5.475	-3.119	-4.263
				(7.706)	(11.911)	(7.600)
Log of IEF					58.711	
					(59.603)	
Log of expropriation risk						-26.628
						(17.556)
South Asia						32.133*
						(17.756)
Middle-East & North Africa						-2.820
						(14.786)
East Asia & Pacific						2.752
						(15.208)
Sub-Saharan Africa						20.394
						(18.178)
Latin America & Caribbean						-16.146
						(15.221)
Europe & Central Asia						3.217
						(13.245)
Constant	-11.872**	-10.754	-23.763**	-24.959**	-156.282	43.521
	(5.081)	(6.820)	(10.290)	(10.884)	(128.158)	(48.536)
R^2	0.38	0.38	0.39	0.37	.	0.74
Hansen J-test	0.5002	0.2961	0.2444	0.2011	0.4820	0.8833
N	107	104	103	103	83	88

Notes: The standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively. The reference point for the regional dummy variable is North America. Sources of data are illustrated in Appendix as par variables.

Table 5. Heckman Two-step Model

		Poverty 3.1	Poverty 3.2	Poverty 3.3	Poverty 3.4	Poverty 3.5	Poverty 3.6
Level of poverty	Log of TCI	1.455***	1.454***	1.500***	1.959***	1.696***	0.632***
		(0.469)	(0.390)	(0.390)	(0.448)	(0.572)	(0.233)
	Constant	1.274	1.335**	1.377*	0.591	6.277	11.585***
		(0.818)	(0.642)	(0.745)	(0.866)	(5.602)	(2.901)
Probability of having poverty	Log of TCI	1.541***	1.688***	1.697***	1.736***	1.628***	1.871**
		(0.268)	(0.306)	(0.316)	(0.330)	(0.454)	(0.852)
	Constant	-0.604***	-0.038	-0.173	-0.118	17.192***	42.202**
		(0.196)	(0.265)	(0.448)	(0.455)	(5.060)	(18.162)
	Growth rate of GDP per capita		-0.036	-0.286***	-0.312***	-0.234*	-0.027
			(0.104)	(0.094)	(0.099)	(0.128)	(0.161)
	Growth rate of GDP per capita		-0.263***	-0.048	-0.060	0.019	0.116
			(0.089)	(0.105)	(0.121)	(0.194)	(0.091)
	Openness			-0.002	0.001	0.007	0.006
				(0.005)	(0.005)	(0.006)	(0.012)
	Openness			0.003	-0.000	-0.003	0.003
				(0.004)	(0.006)	(0.010)	(0.005)
	Landlock				-0.445	1.304*	3.561*
					(0.473)	(0.764)	(1.942)
	Landlock				0.828	-0.444	-0.223
					(0.538)	(0.760)	(0.374)
	Log of IEF					-3.042	-10.638*
						(3.385)	(5.724)
	Log of IEF					-9.608***	-2.383*
						(2.743)	(1.396)
	Log of expropriation risk						-2.820***
							(0.752)
	Log of expropriation risk						-11.658**
							(5.438)
mills	lambda	0.479	0.621	0.811	1.593**	2.063**	0.033
		(0.742)	(0.630)	(0.633)	(0.657)	(0.970)	(0.533)
N		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. Sources of data are illustrated in Appendix as par variables.

Table 6. Results of Panel Data Regression

	Poverty GLS 4.1	Poverty GLS 4.2	Poverty GLS 4.3	Poverty GMM 4.4	Poverty GMM 4.5	Poverty IV 4.6	Poverty IV 4.7
Log of TCI	14.583***	9.475***	11.125***	6.230***	7.354***	44.846***	35.338**
	(1.356)	(1.914)	(1.617)	(1.909)	(2.833)	(6.424)	(16.849)
Growth rate of GDP per capita		-0.043	-0.067		-0.143		-0.092
		(0.086)	(0.071)		(0.108)		(0.088)
Openness		-0.011	-0.022		0.029		0.135
		(0.049)	(0.039)		(0.102)		(0.123)
Landlock		5.665	3.496		0.000		-2.626
		(4.487)	(4.304)		(0.000)		(7.339)
Log of IEF		-20.615					
		(15.912)					
Log of expropriation risk		-46.260***	-47.459***		-8.100		-29.461*
		(9.322)	(8.287)		(9.238)		(17.684)
South Asia		39.006***	45.260***		0.000		34.192*
		(12.343)	(11.690)		(0.000)		(18.004)
Middle-East & North Africa		-11.999	-4.986		0.000		-1.715
		(11.600)	(10.513)		(0.000)		(15.204)
East Asia & Pacific		11.010	12.560		21.141		1.421
		(10.500)	(10.219)		(30.666)		(16.231)
Sub-Saharan Africa		28.036**	36.198**		0.000		12.785
		(11.492)	*		(0.000)		(21.730)
			(10.532)				
Latin America & Caribbean		-10.600	-5.839		0.000		-16.212
		(10.654)	(10.185)		(0.000)		(15.915)
Europe & Central Asia		-4.455	0.985		22.511		6.663
		(9.959)	(9.543)		(19.178)		(13.899)
L.poverty rate				0.804***	0.971***		
				(0.061)	(0.171)		
Regression types	Random-effects GLS	Random-effects GLS	Random-effects GLS	System dynamic	System dynamic	G2SLS random effects	G2SLS random effects
Constant	14.494***	144.494***	104.031***	-0.423	0.000	-10.066	45.346
	(2.345)	(33.714)	(21.051)	(1.734)	(0.000)	(6.244)	(51.754)
N	565	380	450	452	360	535	440

Notes: The standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively. The reference point for the regional dummy variable is North America. Sources of data are illustrated in Appendix as par variables

Table 7. Results of Heckman two steps model

		Poverty 3.1	Poverty 3.2	Poverty 3.3	Poverty 3.4
Level of poverty	Log of TCI	0.525*	1.334***	1.461***	0.779***
		(0.297)	(0.212)	(0.184)	(0.204)
	Constant	2.953***	1.437***	0.955	5.495**
		(0.591)	(0.438)	(1.811)	(2.364)
Probability of having poverty	Log of TCI	1.533***	1.570***	1.896***	1.742***
		(0.130)	(0.137)	(0.250)	(0.383)
	Constant	-0.690***	-0.689***	13.607***	23.993***
		(0.183)	(0.186)	(1.865)	(3.539)
	Growth rate of GDP per capita	-0.025	-0.029*	-0.014	0.006
		(0.017)	(0.017)	(0.022)	(0.029)
	Growth rate of GDP per capita	0.052***	0.051***	-0.014	0.006
		(0.020)	(0.016)	(0.022)	(0.029)
	Openness	0.000	0.001	0.010***	0.008**
		(0.003)	(0.002)	(0.003)	(0.004)
	Openness	0.003	0.004	0.010***	0.008**
		(0.002)	(0.002)	(0.003)	(0.004)
	Landlock		-0.754***	1.300***	2.367***
			(0.194)	(0.325)	(0.502)
	Landlock		0.808***	-0.973***	2.367***
			(0.233)	(0.252)	(0.502)
	Log of IEF			0.112	-7.087***
				(1.094)	(1.530)
	Log of IEF			-8.201***	-0.299
				(1.013)	(1.117)
	Log of expropriation risk				-1.562**
					(0.627)
	Log of expropriation risk				-6.071***
					(1.239)
mills	lambda	-1.797***	-0.469	-0.443	-1.575***
		(0.483)	(0.363)	(0.382)	(0.390)
N		539	539	425	380

Notes: The robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% level respectively. Sources of data are illustrated in Appendix as par variables.

4.1.4. Panel Data Regression

Panel data for the same set of countries produces identical results, demonstrating that the implementation of CAD strategy increases the level of poverty. We have checked this relationship using panel random effects, system dynamic GMM (Generalized Method of Moment) (Table 6) and instrumental variable random effect estimations

(Table 7). We determined by the country's development strategies. The impact is significant at 1% level except for IV multiple regression. The size of the magnitude in GLS and GMM is quite precise and reasonable. It predicts that 10% deviation to the higher from the mean value of TCI is responsible for 0.62% to 1.5% increase in poverty approximately. Panel data for Heckman two steps model provides very identical results to what we have found in Heckman estimation for cross-section data.

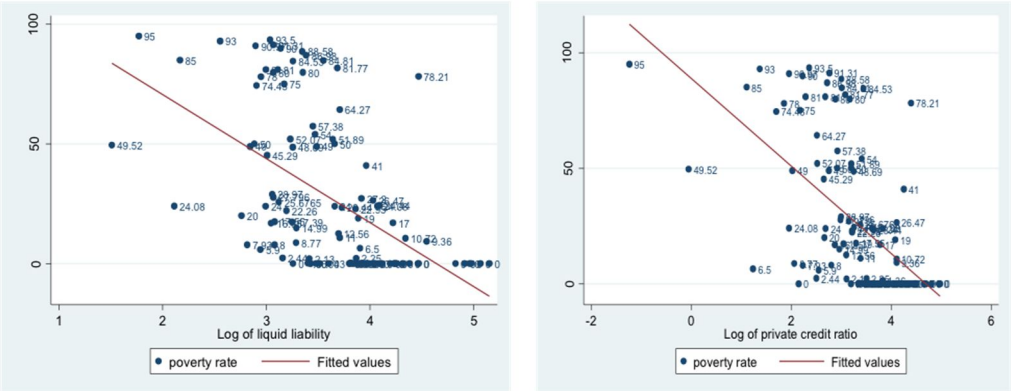
If we compare our finding based on the above estimations with the earlier works we see that we are confirming the arguments of neo-liberal theorists and more particularly the arguments of Lin and Liu (2006) who concluded based on Chinese provincial data that the development strategy employed in a province has a significant impact on rural poverty in that province. They said that the higher the deviation from a CAF strategy in a province, the higher the level of rural poverty in that province will be. Our result is identical with Lin and Liu (2006), however, based on cross-country data from 113 countries including both developed and developing countries. We conclude that higher deviation from CAF or more close to CAD is one of the drivers of increasing poverty in countries which adopted it.

4.2. 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 the level of poverty and shows that they are negatively correlated. 46% of the poverty is associated with the liquid liability and 50% 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, 2000, Akhter and Daly, 2009, Beck, Demirgüç-Kunt, and Levine 2004). Countries with bigger amounts of private credit and higher liquid liability are more successful in eradicating poverty through higher money supply and access to the financial services.

The regression models in table 8 are used to investigate both the direct effects of financial development on poverty as well as with an interaction term of financial development and TCI on poverty. We would like to see how the effects of CAD strategy differ with the differences in financial development. We use OLS regression similar to Beck, Demirguc-Kunt, and Levine (2004) and also IV regression. The dependent variable is same the as before: the average poverty level over the time period from 1963 to 1999. The independent variables are the average values of financial development over that same time period. Making an average of the variables for a longer time is in order to abstract out business cycles and smooth out volatility in the variables. This approach enables this work to some extent to examine the long-run relationships where we control for the same variable as before like the growth of GDP per capita, index of economic freedom, regional dummy variables and landlocked status in the regressions.

We also use IV regressions to eliminate the endogenous biases in the OLS regressions. Even though countries with higher levels of financial development may



Notes: Poverty is defined as $2 a day (PPP) (% of the population). The private credit ratio and the liquid liability are the proxies of financial development. Sources of the data are illustrated in Appendix as par variables.

Figure 2. Relationship Between the Level of Financial Development and the Level of Poverty

have higher poverty alleviation, financial development may not be causing the changes in poverty. Both financial development and poverty alleviation may be derived from an omitted variable. It is also possible that lower level of poverty leads to higher financial development as more people demand financial services which may lead to a simultaneous relationship. IV regressions enable the work to determine whether financial development is causing poverty reduction and solve the endogenous problems. As mentioned before, we use legal origin and the initial value of liquid liabilities and private credit ratio as our instruments for the endogenous financial development variables. Instruments for the TCI are same as in table 4. Based on the Hansen J-test of over-identifying restrictions, we conclude that these instruments are valid.

Table 8 presents the coefficients and robust standard errors from the headcount poverty level regression where regressions (5.1), (5.3), (5.5) and (5.7) are OLS, while (5.2), (5.4), (5.6) and (5.8) are IV regressions. Considering both the OLS and IV regressions, the coefficients of the log of TCI is significant with a positive sign across all the model specifications which suggest the same result - employment of CAD degrade the poverty situation. However, the financial development variables like liquid liability and private credit ratio are not significant consistently which indicate that these two indicators do not have any direct significant impact on the poverty alleviation. Thus, this result nullifies the position made by a group of researchers (e.g., Honohan 2004a; Beck, Demirgüç-Kunt and Levine 2004; Clarke *et al*., 2003; Galor and Zeira 1993) who have established a direct relationship between finance and poverty reduction.

However, some of them are statistically significant as in regression model 5.6 to 5.8 and with a positive sign meaning financial development increases poverty which is identical with the arguments of Greenwood and Jovanovic (1990) who claimed 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. It is also identical with Haber (2004) who argued that only the rich and politically connected would receive benefits from enhancement in the financial services. Therefore, we can infer that financial development may not have a direct impact on poverty situation; in addition, sometimes it may increase poverty and will not categorically reduce poverty directly. We can also hypothetically 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. However, in order to firmly decide on this issue, we need more evidence (e.g. redefine the finance variables and use other non-linear econometric models) and different hypothesis which are not the main interests of this paper. We have also checked these relationships using the panel data and found very identical results that's they are not reported here.

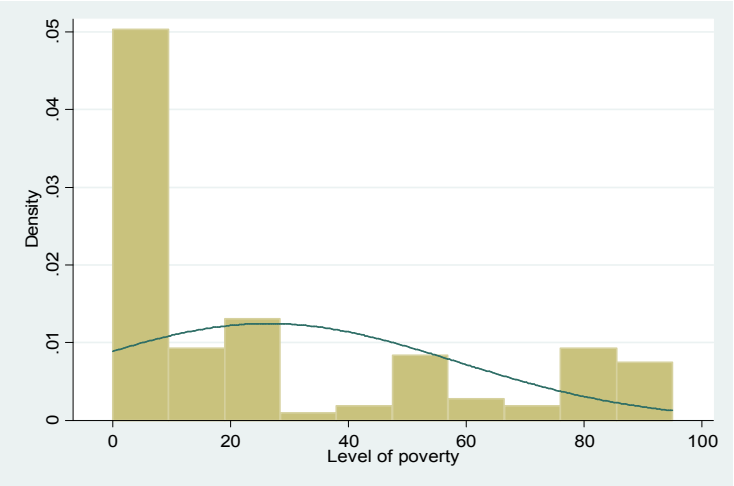
Now considering both OLS and IV regressions with interaction terms reports very interesting results. Once the financial development variables interact with the CAD strategy then it is significant and is negatively correlated with the country's poverty level. This means that if a country is following 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. This result confirms the position of Dollar and Kraay (2002), Ravallion (2004) and Perroti (1993) who claimed that finance is indirectly related with the poverty incidence.

We are interested in this result as it indicates that the governments who deployed CAD strategy to promote capital-intensive industry were required to distort or manipulate the financial system because the effectiveness of CAD depends on, to some extent, the country's financial system. It does confirm the Lin *et al.*'s (2006) trinity system which describes how in order to maximize available resources for capital intensive industries, requires a planned system. The trinity of intervention policies characterizes the CAD strategy as a macro policy environment where interest and exchange rate are depressed to favor heavy industry, by implementing a planned resource allocation system which guarantees resources went to heavy industries and by depriving the autonomy of the micro management institution in order to avoid the investment arbitrage and the erosion of profits and state assets. Thus, financial development plays a crucial role in eradicating poverty although it does not have any direct impact on poverty.

APPENDICES

Table A1. Variable Description and Sources of Data

Variables	Descriptions	Sources
Technological Choice Index (TCI)	TCI is averaged for the year 1963 to 1999. TCI for panel is from 1980 to 2000	The data for calculating the TCI are taken from the World Bank's World Development Indicators (2002b) and the United Nations Industrial Development Organization's International Yearbook of Industrial Statistics (UNIDO, 2002), calculated by Lin (2009). Panel data has been calculated using the World Development Indicators (2014) and International Yearbook of Industrial Statistics (UNIDO, 2002).
Poverty	The level of poverty incidence is measured as poverty headcount ratio at $2 a day (PPP) (% of the population). It is averaged over the period 1963-1999. Poverty for the panel data is from 1980 to 2000 at same headcount ratio.	Both cross section and panel data are from World Bank (2014)
Openness	(exports + imports)/ GDP from 1960 to 1999	For cross-section data, we used Dollar and Kraay (2003) and for panel data, collected from World Development Indicators (2014)
Growth of GDP per capita	The average annual growth rate of per capita GDP for 109 countries for the period 1963 to 1999.	For cross-section, Lin (2009) calculation and for panel data, World Development Indicators (2014)
Landlocked	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 a lower probability of being expropriated.	The expropriation risk of 102 countries is adopted from the International Country Risk Guide (Political Risk Services, 2007) for both panel and cross-section.



Notes: Poverty is defined as $2 a day (PPP) (% of the population). Sources of the data are illustrated in Appendix as par variables.

Figure A1. Distribution Dependent Variable Poverty Rate

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