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Modeling Causality between Financial Deepening and Poverty Reduction in Egypt

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Abstract
This study deals with the linkages between financial development and poverty reduction in Egypt using data for the period of 1975Q1-2011Q4. The stationarity properties of the variables are tested by applying Zivot-Andrews structural break unit root test. The structural break autoregressive distributed lag-bounds testing approach to cointegration is used to examine long run relationship between the variables. Our results show evidence of cointegration which confirms the presence of long run relationship between financial deepening, economic growth and poverty reduction. The results indicate that financial development reduces poverty when domestic credit to the private sector is used as proxy for financial development. The direct channel that financial sector development can lead to enabling the poor to access or broaden their access to financial services, such as credit and insurance-risk services, is therefore confirmed in case of Egypt. Furthermore, the indirect channel where financial sector development contributes to poverty reduction through economic growth is also confirmed for Egypt. This is only found when M2 is used as a proxy for financial development and infant mortality per capita as proxy for poverty.

While our results show that the causal relationship between financial development and poverty reduction in Egypt is sensitive to the proxy used to measure these variables, the results show that the poverty-reduction programs are desirable in Egypt, not only because they reduce poverty but also because they possibly lead to further development of financial sector in long run. Furthermore, our results show that appropriate reforms aimed at developing a financial sector in Egypt that is well-organized and spread throughout the country can help reduce poverty by availing more domestic credit to the poor.

Keywords: Financial Deepening, Poverty, Growth

1. INTRODUCTION

The role of financial development in driving economic growth has been the subject of extensive discussion and debate for decades. Theory suggests that financial development forms a potentially important mechanism for achieving long lasting growth (Hanohan, 2004; Levine, 2004; Beck et al. 2004). The literature establishes that an efficient financial system can ameliorate risk, mobilize savings, encourages productive investment, promote specialization and reduce transaction and information costs, and so forth. Such theoretical views received considerable empirical support from numerous studies and for a large group of countries [e.g. Levine and Zervos (1998), Darrat (1999), Khan and Senhadji (2000)]. In contrast to the outpouring of research on the impact of financial development on economic growth, empirical work on the relation of financial development and poverty reduction has been relatively limited. In comparison, few studies have examined the nexus between financial development and poverty reduction. Besides, such studies seem to produce unclear and inconsistent results from the empirical front as to whether financial development actually leads to poverty reduction in developing countries. Furthermore, most previous studies that have attempted to examine such linkage have concentrated mainly on Latin American and Asian countries while African countries received little attention. It is worth noting that the majority of such studies, up until recently, were based mainly on a bivariate causality analysis which may suffer from bias associated with the omission of variables.

Egypt, a country with an estimated population reaching 85,294,388 (July 2013 est.) [CIA-The-world-fact book], is the most populous country in the Middle Eastern and African region, with an economy that depends primarily on agriculture, tourism, media, and petroleum and natural

gas exports. In addition, an estimated 2.7 million Egyptians who live abroad contribute actively to the development of their country's economy through remittances which are estimated to have reached US$ 7.8 billion in 2009. Market reforms were implemented by Egypt in early 1990 and, while they are improving economic growth, they have not been successful in improving the living standards in Egypt which are low by international standards, and have even declined consistently since 1990 for the average Egyptian. A government survey that was conducted recently has shown that an increasing number of Egyptians are struggling to feed and clothe themselves. The report by the Egyptian Food Observatory found that of the 1680 households surveyed in September 2012, 86% said their income was insufficient to cover their monthly food, clothes and shelter bills. There is no question that corruption, poverty, unemployment and an unbalanced distribution of wealth in Egypt were among the main reasons that fed into the frustration that ultimately led to the revolution in January 25, 2011. Whether the new political parties, including the Muslim brotherhood, would be able to establish and follow a stable macroeconomic base that would result in improving the living standards of Egyptians in the long run remains to be seen.

The country's economic situation, however, is not likely to improve in the near future as the economic conditions are forecasted to deteriorate further against a strained political situation (As of March, 2013). According to the Oxford Analytica Country Profiles (Mar 8, 2013), growth was expected to reach just 2.6% in the 2012-13 fiscal year, compared to 5.5% prior to the 2011 uprising. Egypt's economic outlook has become increasingly fragile since those uprisings, with the country's foreign exchange reserves falling below the level that covers three months of imports and with the pound declining against the dollar. All these factors make it harder to

control rising inflation, the rising budget deficit, and to implement the longstanding subsidy reform, tax increases and other reforms agreed as part of the IMF loan. The implications for the average Egyptian do not seem to be promising at least in the near future. It is against this background that our study attempts to investigate the dynamic linkage between financial development and poverty reduction in Egypt by incorporating growth of GDP as an intermittent variable – thereby creating a simple trivariate setting.

The remainder of the paper is organized as follows: Section-2 will survey the relevant literature; Section-3 presents the estimation techniques and empirical analysis. Section-4 concludes the study and provides policy implications.

2. Financial Sector Development and Poverty Reduction: A Literature Review

This section reviews the theoretical and empirical literature on the role of financial sector development in reducing poverty. There are [convincing theoretical points of view] that financial sector development plays a critical role in facilitating economic growth and poverty reduction. These views tend to substantiate that a well-developed, efficient financial system tends to facilitate the process of capital accumulation which increases the level of economic growth [and in turn assists] in reducing poverty. Zhuang et al. (2009) argued that financial sector development can impact poverty through two channels, indirect and direct. The first is a major channel where financial sector development contributes to poverty reduction through economic growth. This is what is referred to in the literature as trickledown theory where economic growth is seen to trickle down to the poor through job creation and other economic opportunities. Furthermore, economic growth also is seen to create the required conditions for the broader

distribution of the benefits of growth (Todaro, 1997). This has been supported by a number of studies such as Ravallion and Datt (2002), Mellor (1999), Dollar and Kraay (2002), and Fan et al. (2005) among others. Here, the impact is seen in various areas as follows. First, economic growth could possibly create jobs for the poor. Second, a higher rate of economic growth would benefit the poor because it could result in the reduction of the wage differentials between skilled and unskilled labor (Galor and Tsiddon, 1996). Third, higher tax revenues resulting from growth could lead to an increase in government social spending (health, education, and social protection) which benefit the poor who as a result can invest more in human capital (Perroti, 1993). Fourth, more funds would become available to the poor for investment purposes, with the resulting increase in capital accumulation, which would increase their income (Aghion and Bolton, 1997).

The second channel relates to the argument that financial sector development can lead to enabling the poor to access or broaden their access to financial services such as credit and insurance-risk services. This reinforces the productive assets of the poor, augmenting their productivity and boosting their economic potential (World Bank, 2001; Jalilian and Kirkpatrick, 2002). In this regard, credit constraints produced by informational asymmetries are seen as compulsory on the poor, who are unable to finance their own projects or use collateral to obtain bank credit (Aghion and Bolton 1997, Galor and Zeira 1993).

A large body of empirical literature has examined whether financial sector development leads to poverty reduction directly or indirectly. Such studies include Uddin et al. (2012), Fowowe and Abidoye, (2012), Kar et al. (2011), Ho and Odhiambo, (2011), Perez-Moreno, (2012), Ellahi, (2011), and Shahbaz, (2009) among others. Uddin et al. (2012), investigated the relationship

using data over the period 1976-2010 for Bangladesh using the ARDL bounds testing approach to cointegration and the VECM Granger causality. They reported cointegration between the variables and found a feedback effect between financial development and poverty reduction. Fowowe and Abidoye, (2012) investigated the impact of financial development, inflation and trade openness on poverty reduction in a sample of African countries. Their results showed that financial development does not reduce poverty but they found that poverty is reduced by trade openness and low inflation. Kar et al. (2011) to detect the direction of causal relationship between financial development, economic growth and poverty reduction applied the VECM Granger causality approach for the Turkish economy. Their empirical work found that poverty reduction is Granger caused by economic growth (unidirectional) but they also reported weak causality running from financial development to poverty in a short span of time.

Odhiambo, (2009) examined the causal relationship between financial development, economic growth and poverty reduction using South African data. The author demonstrated that poverty reduction is Granger cause of financial development and economic growth and that the demand-side hypothesis is validated by finding causality that is running from economic growth to financial development. For the Indian economy, Pradhan (2010) explored the relationship between financial development, economic growth and poverty reduction using time series data over the period of 1951-2008. The author found that in short run, the feedback effect is found between economic growth and poverty reduction and that poverty reduction is Granger cause of financial development. Odhiambo, (2010a) investigated the relationship between financial development and poverty reduction in Kenya. He found the unidirectional causality running from financial development to poverty reduction and the feedback effect exists between domestic

savings and poverty reduction. Odhiambo, (2010a) further noted that the relationship between financial development and poverty reduction is sensitive in relation to the proxy used to measure financial development. For example, the author reported that poverty reduction Granger causes financial development when the latter is measured by (M2/GDP) but when domestic credit to private sector is used as measure of financial development then poverty reduction is Granger cause of financial development. Ho and Odhiambo, (2011) using Chinese data, explored the relationship over the period of 1978-2008. They reported that in the long run, poverty reduction Granger causes financial development. Furthermore, they reported a feedback effect between financial development and poverty reduction in the short run. Perez-Moreno, (2012) analyzed the relationship using data of 35 developing economies. He found unidirectional causality running from financial development to poverty reduction but not the other way around.

In the case of Pakistan, Shahbaz, (2009) studied the impact of financial development and financial instability on poverty reduction by applying the autoregressive distributed lag model (ARDL) for long run relationship between the variables by controlling for economic growth, inflation, agricultural growth, manufacturing and trade openness. He reported results showing the variables are cointegrated for the long run relationship over the period of 1973-2005. Furthermore, his results found that financial development is negatively related with poverty while financial instability increases poverty. Agricultural growth, manufacturing and trade openness seem to reduce poverty while inflation increases it. Ellahi (2011) investigated the relationship between financial development and poverty reduction in Pakistan by incorporating economic growth as a potential variable affecting both financial development and poverty. Ellahi reported cointegration between the variables. Financial development, investment and

poverty reduction were found to Granger cause economic growth. Odhiambo (2013) applied the bounds testing to examine the relationship between financial development and reduction in poverty for Tanzanian economy. Odhiambo found that poverty is reduced by financial development. Dhrifi and Maktouf (2013) applied GMM method to investigate the relationship between financial liberalization and poverty reduction. They found that financial liberalization leads to financial development which, in turn, reduces poverty after a threshold level of financial development.

Rehman and Shahbaz (2014) explored the causal relationship between financial deepening, economic growth and poverty reduction by applying the ARDL bounds testing approach to cointegration. They found that cointegration exists between the variables and causality results are sensitive with the use of proxy for poverty reduction as well as the methodology to be applied. Uddin et al. (2014) examined the relationship between financial development and poverty reduction in the Bangladesh economy. They found cointegration between the variables and noted that poverty reduction is a cause of financial development. Shahbaz et al. (2015) reported that financial development improves income distribution which, in turn, reduces poverty in Iran.

In addition to the above, many other studies that have attempted to examine the relationship between financial development and poverty reduction such as Jalilian and Kirkpatrick, (2002, 2005); Kirkpatrick, (2000); Beck et al. (2007); Jeanneney and Kpodar, (2008), Honohan, (2004), Geda et al. (2006), and Quartey (2005) among others. This large body of literature which has investigated the extent to which economic growth leads to poverty reduction has reported inconclusive conclusions. However, one can observe that while there were conflicting views on

the growth–poverty reduction nexus in the earlier literature, a consensus view has been evolving lately that support the view that financial development leads to poverty reduction.

3. Estimation Techniques and Empirical Analysis

The basic objective of present study is to investigate the causality between financial development, economic growth and poverty reduction in case of Egypt using quarter frequency data over the period of 1975Q1-2011Q4. In doing so, we have applied series of unit root tests. The long run relationship among the variables is investigated by applying the ARDL bounds testing to cointegration in the presence of structural breaks. The direction of causality is tested by using the VECM Granger causality approach.

Historically, in order to test the stationary properties of the variables, unit root tests like ADF by Dickey and Fuller (1979), P-P by Philips and Perron (1988), KPSS by Kwiatkowski et al. (1992), DF-GLS by Elliott et al. (1996) and Ng-Perron by Ng-Perron (2001) have been used extensively. However, due to lack of information on structural breaks stemming in the series, these tests produce unreliable results. To remove this anomaly, Zivot and Adndrews (1992) suggested another model that allows accommodating a single structural break point in the variables at level form, in slope of trend component and in intercept and trending function. Using the Zivot-Andrews (1992) model, the structural break in the series can be tested as:

$$\Delta x_t = a + ax_{t-1} + bt + cDU_t + \sum_{j=1}^{k} d_j \Delta x_{t-j} + \mu_t \quad (1)$$

$$\Delta x_t = b + bx_{t-1} + ct + bDT_t + \sum_{j=1}^{k} d_j \Delta x_{t-j} + \mu_t \quad (2)$$

$$\Delta x_t = c + cx_{t-1} + ct + dDU_t + dDT_t + \sum_{j=1}^{k} d_j \Delta x_{t-j} + \mu_t \quad (3)$$

Where DU_t denotes dummy variable and gives the mean shift incurred at each point while DT_t [1] denotes trend shift variable.

$$DU_t = \begin{cases} 1 \ldots if \quad t > TB \\ 0 \ldots if \quad t < TB \end{cases} \text{ and } DU_t = \begin{cases} t - TB \ldots if \quad t > TB \\ 0 \ldots if \quad t < TB \end{cases}$$

The null hypothesis of unit root break date is $c = 0$, which indicates that the series is not stationary with a drift not having information about structural break stemming in the series while the $c < 0$ hypothesis implies that the variable is found to be trend-stationary with one unknown time break. The Zivot-Andrews unit root test fixes all points as potential for possible time break and does estimation through regression for all possible structural breaks successively. Then, this unit root test selects that time break which decreases one-sided t-statistic to test $\hat{c}(= c - 1) = 1$. Zivot-Andrews indicated that in the presence of end points, asymptotic distribution of the statistics is diverged to infinity point. It is necessary to choose a region where end points of the sample period are excluded.

Because traditional approaches to cointegration have certain shortcomings, we have used the structural break autoregressive distributed lag model or the ARDL bounds testing approach to cointegration in the presence of structural break stemming in the series. The ARDL bounds

[1]We used model-4 for empirical estimations following Sen (2003)

testing approach to cointegration has certain merits, such as its flexibility regarding integrating order of the variables and whether they are found to be stationary at I(1) or I(0) or I(1) / I(0). In addition, Monte Carlo investigation confirms that this approach is better suited for small sample size (Pesaran and Shin, 1999). Moreover, a dynamic unrestricted error correction model (UECM) can be derived from the ARDL bounds testing through a simple linear transformation. The UECM integrates the short run dynamics with the long run equilibrium without losing any information for the long-run. The empirical formulation of the ARDL bounds testing approach to cointegration is given below:

$$\Delta \ln P_t = \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \ln P_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta \ln F_{t-j} + \sum_{k=0}^{r} \alpha_k \Delta \ln Y_{t-k} + \mu_t \quad (4)$$

$$\Delta \ln F_t = \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta \ln F_{t-i} + \sum_{j=0}^{q} \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^{r} \beta_k \Delta \ln Y_{t-k} + \mu_t \quad (5)$$

$$\Delta \ln Y_t = \alpha_1 + \alpha_T T + \alpha_{DUM} DUM + \alpha_P \ln P_{t-1} + \alpha_F \ln F_{t-1} + \alpha_Y \ln Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta \ln Y_{t-i} + \sum_{j=0}^{q} \beta_j \Delta \ln P_{t-j} + \sum_{k=0}^{r} \beta_k \Delta \ln F_{t-k} + \mu_t \quad (6)$$

Where $\ln P_t$, $\ln F_t$ and $\ln Y_t$ indicate the natural log of poverty (we have used two indicators of poverty reduction. Head-count ratio is denoted by PH_t and infant mortality rate by PI_t), natural log of financial development (proxies by domestic credit to private sector per capita (F_t and real liquid liabilities (M_t) per capita) and real income per capita. Δ is for difference operator, μ_s denotes residual terms, and DUM denotes dummy variable to capture the structural breaks arising in the series[2]. F-statistics are computed to compare with upper and lower critical bounds generated by Pesaran et al. (2001) to test for existence of cointegration. The null hypothesis to examine the existence of long run relationship between the variables is $H_0 : \alpha_P = \alpha_F = \alpha_Y = 0$ against alternate hypothesis ($H_a : \alpha_P \neq \alpha_F \neq \alpha_Y \neq 0$) of cointegration for equation-4. Using Pesaran et al. (2001) critical bounds, if computed F-statistic is more than upper critical bound (UCB), then there is cointegration between the variables. If computed F-statistic does not exceed lower critical bound (LCB), then the variables are not cointegrated for long run relationship. If the computed F-statistic falls between lower and upper critical bounds, then the decision regarding cointegration among the variables is uncertain. However, because our sample size is large (160 observations) and critical bounds generated by Pesaran et al. (2001) may be suitable. Therefore, we use lower and upper critical bounds developed by Pesaran et al. (2001) rather than Narayan (2005). Once long run relationship is confirmed between the variables then next step is examine the direction of causality as below:

[2] The structural breaks are based on Zivot-Andrews (1992)

$$(1-L)\begin{bmatrix}\ln P_t\\ \ln F_t\\ \ln Y_t\end{bmatrix}=\begin{bmatrix}a_1\\ a_2\\ a_3\end{bmatrix}+\sum_{i=1}^{p}(1-L)\begin{bmatrix}b_{11i}b_{12i}b_{13i}\\ b_{21i}b_{22i}b_{23i}\\ b_{31i}b_{32i}b_{33i}\end{bmatrix}\times\begin{bmatrix}\ln P_{t-1}\\ \ln F_{t-1}\\ \ln Y_{t-1}\end{bmatrix}+\begin{bmatrix}\alpha\\ \beta\\ \delta\end{bmatrix}ECT_{t-1}+\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\\ \varepsilon_{3t}\end{bmatrix} \quad (7)$$

Where $(1-L)$ denotes the difference operator and ECT_{t-1} denotes the lagged residual term generated from long run relationship, $\varepsilon_{1t}, \varepsilon_{2t}$ and ε_{3t} are error terms which are assumed to be normally distributed with mean zero and finite covariance matrix. The long run causality is indicated by the significance of t-statistic connecting to the coefficient of error correction term (ECT_{t-1}) and statistical significance of F-statistic in first differences of the variables shows the evidence of short run causality between variables of interest. Additionally, joint long-and-short runs causal relationship can be estimated by joint significance of both ECT_{t-1} and the estimate of lagged independent variables. For instance, $b_{12,i} \neq 0 \forall_i$ shows that financial development Granger-causes poverty reduction and causality is running from poverty reduction to financial development indicated by $b_{21,i} \neq 0 \forall_i$. The same hypothesis can be drawn for other variables.

The data of all the variables is taken from world development indicators (CD-ROM, 2013). We use two proxies for poverty, i.e. head count ratio and infant mortality rate (see Gassebner and Luechinger, 2011). Financial development is measured by two indicators: real domestic credit to private sector per capita and real M_2 (liquid liabilities) per capita. Real GDP per capita is used to measure economic growth. The study covers data period of 1975-2011. We have converted the annual frequency data into quarter frequency data using interpolation method following Romero (2005).

Table-1 below reports the descriptive statistics where we find that all the series are normally distributed as confirmed by Jarque-Bera test statistics. We have applied Ng-Perron (2001) unit root test to test the stationary properties of the variables. This unit root test is superior to traditional unit root tests such as ADF, PP, DF-GLS and KPSS etc. The Ng-Perron unit root test would not over-accept the null hypothesis when it is false, unlike the ADF unit root test. The results are reported in Table-2, which reveal that all the variables have unit root problem at level with intercept and trend. This implies that the order of integration of the variables is I(1), as all the variables are found to be stationary at 1st difference.

Table-1: Descriptive Statistics

Variables	$\ln PH_t$	$\ln PI_t$	$\ln Y_t$	$\ln F_t$	$\ln M_t$
Mean	6.0532	2.6037	6.4032	5.2413	6.0872
Median	6.0707	2.6652	6.3902	5.1402	6.1680
Maximum	6.5320	3.5627	6.9380	6.0508	6.6710
Minimum	5.4552	1.4228	5.6627	3.9002	4.8452
Std. Dev.	0.2669	0.6259	0.3065	0.65749	0.4930
Skewness	-0.3640	-0.1981	-0.2595	-0.3665	-1.0653
Kurtosis	2.5705	1.8457	2.4253	2.0341	3.3770
Jarque-Bera	4.4056	3.1852	3.6978	4.0671	2.8733
Probability	0.1104	0.1711	0.1574	0.1272	0.2010

Table-2: Unit Root Analysis

Ng-Perron Unit Root Test

Variables	MZa	MZt	MSB	MPT
$\ln PH_t$	-2.3391 (2)	-1.0783	0.4610	38.8155
$\ln PI_t$	-8.4419 (4)	-1.8519	0.2193	11.4705
$\ln Y_t$	-1.0867 (3)	-0.6900	0.6350	75.2707
$\ln F_t$	-0.5305 (3)	-0.2207	0.4159	43.2945
$\ln M_t$	-1.5616 (5)	-0.7165	0.4588	43.2992
$\Delta \ln PH_t$	-49.9699 (3)*	-4.9953	0.0999	1.8395
$\Delta \ln PI_t$	-40.4821 (3)*	-4.4615	0.1102	2.4524
$\Delta \ln Y_t$	-19.3997 (0)**	-3.0940	0.1594	4.8241
$\Delta \ln F_t$	-28.5305 (4)*	-3.7694	0.1321	3.2386
$\Delta \ln M_t$	-24.0352 (2)*	-3.4599	0.1439	3.8321
Note: * and ** indicate significant at 1% and 5% levels respectively. Optimal lag order of the variables is shown in small parentheses.				

Because the structural breaks stemming in the series are not reflected on these unit root tests, such tests tend to provide unreliable and biased results. In such an environment, application of these tests becomes questionable. To deal with this problem, we decided to apply the Zivot-Andrews (Zivot and Andrews, 1992) structural break unit root test, which allows for having information about an unknown structural break point stemming in the time series. The results, reported in Table-3 below, indicate that the variables do have unit root problem at level with a structural break both in intercept and trend. Both variables are found to be stationary at 1st difference. This implies that the variables are integrated at I(1). The unique integrating properties

of both series lead us to implement the ARDL bounds testing approach to cointegration examining the long run relationship between financial development, economic growth and poverty reduction over the study period of 1975Q1-2011Q4 in the case of Egypt. An appropriate lag order of the variables is needed to apply the ARDL bounds testing. Various lag length criteria are available as indicated in Table-4. We followed Akaike information criteria to select appropriate lag length. It is pointed out by Lütkepohl (2006) that AIC has superior power properties for small sample data compared to any lag length criterion. Our decision about lag length is based on the minimum value of AIC. The results are reported in Table-4, as we found that we cannot take a lag of more than 6 in such sample data.

Table-3: Zivot-Andrews Structural Break Unit Root Test

Variable	**At Level**		**At 1st Difference**	
	T-statistic	Time Break	T-statistic	Time Break
$\ln PH_t$	-4.376 (2)	2002Q1	-10.122 (3)*	1980Q3
$\ln PI_t$	-2.576 (2)	1987Q3	-6.014 (2)*	1985Q3
$\ln Y_t$	-4.153 (2)	1990Q3	-8.099 (3)*	1985Q3
$\ln F_t$	-2.936 (1)	1997Q3	-10.110 (3)*	1993Q3
$\ln M_t$	-5.021 (2)	1979Q3	-7.187 (3)*	1983Q3
Note: * represents significant at 1% level. Critical T-values are -5.57 and -5.08 at 1% and 5% levels respectively. Lag order is shown in parenthesis.				

The next step is to estimate the ARDL F-statistic to examine the existence of cointegration between financial development, economic growth and poverty reduction over the study period of

1975Q1-2011Q4 in case of Egypt. The results of the ARDL F-statistic are reported in Table-4, which indicates that our computed F-statistics are more than upper critical bounds as we treated poverty reduction (indicated by head-count ratio) and economic growth as dependent variables. This relationship is statistically significant at 1% and 5% respectively. This shows that there are two cointegrating vectors. The results are a little bit different when we use infant mortality rate as an indicator of poverty reduction but we find the cointegration among the variables. This confirms that there is a long run relationship among the variables over the period of $1975Q_I$-$2011Q_{IV}$ in case of Egypt.

Table-4: The Results of ARDL Cointegration Test

The Bounds Testing to Cointegration			
Estimated Models	Optimal lag length	F-statistics	Structural Break
$F_{P_H}(P_H / Y, F)$	6, 5, 5	4.133**	2002Q1
$F_Y(Y / P_H, F)$	5, 6, 5	5.185*	1990Q3
$F_F(F /, P_H, Y)$	6, 6, 6	2.41	1997Q3
$F_{P_H}(P_H / Y, M)$	6, 6, 6	8.285*	2002Q1
$F_Y(Y / P_H, M)$	6, 6, 6	4.143**	1990Q3
$F_M(M /, P_H, Y)$	6, 6, 6	4.572	1979Q3
$F_{P_I}(P_I / Y, F)$	6, 6, 5	6.015*	1987Q3
$F_Y(Y / P_I, F)$	6, 6, 5	3.787**	1990Q3
$F_F(F / P_I, Y)$	6, 6, 6	1.407	1997Q3
$F_{P_I}(P_I / Y, M)$	6, 6, 6	3.195	1987Q3

$F_Y(Y/P_I, M)$	6, 5, 5	3.984**	1990Q3
$F_M(M/P_I, Y)$	6, 6, 6	8.852*	1979Q3
Significant level	Critical values (T= 148)[#]		
	Lower bounds $I(0)$	Upper bounds $I(1)$	
1 per cent level	3.15	4.43	
5 per cent level	2.45	3.61	
10 per cent level	2.12	3.23	

The presence of cointegration among the variables implies that causality relation must exist among the variables at least from one side. The directional relationship between financial development, economic growth and poverty reduction will provide help in articulating comprehensive economic policy to reduce poverty and sustain economic growth for long span of time. We applied Granger causality test within the VECM framework to detect the causality among the variables. Table-5 reports the results of the VECM Granger causality analysis (when we use head-count ratio as poverty reduction indicator). The long run causality is captured by a significant t-test on a negative coefficient of the lagged error-correction term ECM_{t-1}. The jointly significant LR test on the lagged explanatory variables shows short-run causality.

The long run causality results show that the feedback effect is found between poverty reduction and economic growth. Financial development, as indicated by real domestic credit to private sector per capita or by real liquid liabilities per capita, Granger causes poverty and economic growth, (see Table-5). In the short run, Table-5 reveals that the relationship between poverty reduction and economic growth is bidirectional. The feedback effect exists between financial

development and economic growth. Financial development (real domestic credit to private sector per capita) does not Granger cause poverty and the same is true from the opposite side. The bidirectional causality is found between financial development (real liquid liabilities per capita) and poverty reduction. The neutral effect is found between financial development (real liquid liabilities per capita) and economic growth.

Table-5: The VECM Granger Causality Analysis

Dependent Variable	Direction of Causality						
	Short Run			Long Run	Joint Long-and-Short Run Causality		
	$\Delta \ln PH_{t-1}$	$\Delta \ln Y_{t-1}$	$\Delta \ln F_{t-1}$	ECT_{t-1}	$\Delta \ln PH_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$
$\Delta \ln PH_t$	….	18.4750* [0.0000]	0.2657 [0.7670]	-0.1092* [-4.9843]	….	20.3469* [0.0000]	8.8957* [0.0000]
$\Delta \ln Y_t$	19.2216* [0.0000]	….	12.6076 [0.0000]	-0.0416* [-2.8141]	13.0913* [0.0000]	….	11.0819* [0.0000]
$\Delta \ln F_t$	0.9733 [0.3804]	12.7576* [0.0000]	….	….	….	….	….
Variables	$\Delta \ln PH_{t-1}$	$\Delta \ln Y_{t-1}$	$\Delta \ln M_{t-1}$	ECT_{t-1}	$\Delta \ln PH_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$	$\Delta \ln M_{t-1}, ECT_{t-1}$
$\Delta \ln PH_t$	….	15.9473* [0.0000]	4.8222* [0.0094]	-0.0710* [-3.5382]	….	15.3198* [0.0000]	9.4335* [0.0001]
$\Delta \ln Y_t$	15.3942* [0.0000]	….	0.4990 [0.6082]	-0.0244*** [-1.8018]	10.2914* [0.0000]	….	7.2186* [0.0012]
$\Delta \ln M_t$	8.9780* [0.0002]	2.8884 [0.1052]	….	-0.0138*** [-1.8598]	7.1901 [0.0002]	3.7488** [0.0125]	….
Note: *, ** and *** show significance at 1, 5 and 10 per cent levels respectively.							

Table-6: The VECM Granger Causality Analysis

Dependent Variable	Direction of Causality						
	Short Run			Long Run	Joint Long-and-Short Run Causality		
	$\Delta \ln PI_{t-1}$	$\Delta \ln Y_{t-1}$	$\Delta \ln F_{t-1}$	ECT_{t-1}	$\Delta \ln PI_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$
$\Delta \ln PI_t$	….	6.1080* [0.0029]	19.9074* [0.0000]	-0.0011*** [-1.7252]	….	2.8661** [0.0391]	10.0163* [0.000]
$\Delta \ln Y_t$	5.6417* [0.0044]	….	17.7054* [0.0000]	-0.0249* [-3.1829]	7.5519* [0.0001]	….	18.6881* [0.0000]
$\Delta \ln F_t$	18.8951* [0.0000]	20.5114* [0.0000]	….	-0.0234*** [-1.8363]	13.2951* [0.0000]	….	15.3026* [0.0000]
Variables	$\Delta \ln PI_{t-1}$	$\Delta \ln Y_{t-1}$	$\Delta \ln M_{t-1}$	ECT_{t-1}	$\Delta \ln PI_{t-1}, ECT_{t-1}$	$\Delta \ln Y_{t-1}, ECT_{t-1}$	$\Delta \ln M_{t-1}, ECT_{t-1}$
$\Delta \ln PI_t$	….	3.0631** [0.0504]	9.0622 [0.0002]	….	….	….	….
$\Delta \ln Y_t$	3.2594*** [0.0908]	….	3.2723** [0.0409]	-0.0375** [-2.7694]	2.4671*** [0.0654]	….	5.7640* [0.0010]
$\Delta \ln M_t$	9.5573* [0.0001]	6.1749* [0.0027]	….	-0.0218** [-2.4656]	8.0889* [0.0001]	7.7854* [0.0001]	….
Note: *, ** and *** show significance at 1, 5 and 10 per cent levels respectively.							

Table-6 reveals the results of causality once we used infant mortality rate as measure of poverty. In long run, we find that the relationship between economic growth and poverty reduction (infant mortality rate) is bidirectional (in Granger sense). Financial development and infant mortality (poverty) are complementary as bidirectional Granger causality is confirmed between both variables. The unidirectional running from financial development to economic growth supporting supply-side hypothesis and demand-side hypothesis is also true as economic growth Granger causes financial development. The results vary when we used real liquid liabilities (M) per capita s measure of financial development. The feedback effect is found between financial development and economic growth. Economic growth and financial development Granger cause poverty reduction.

In the short run, we find the bidirectional causality between financial development (measured by real domestic credit to private sector per capita) and poverty reduction (indicated by infant mortality rate). The relationship between economic growth and poverty reduction is bidirectional and feedback hypothesis is validated between financial development and economic growth. Furthermore, poverty reduction is Granger cause of economic growth and financial development (proxies by real liquid liabilities per capita). A complementary relationship is found between economic growth and financial development, i.e. bidirectional.

4. Summary and policy implications

This study dealt with the association between financial development and poverty reduction in the case of Egypt using data for the period of $1975Q_I$-$2011Q_{IV}$. Unlike the majority of the previous studies, we have estimated a trivariate causality model that includes real GDP per capita as an

intermittent variable. The stationary properties of the variables are tested by applying the Zivot-Andrews structural break unit root test. The structural break autoregressive distributed lag-bounds testing approach to cointegration is used to examine long run relationship between the variables. The estimated results confirmed the existence of long run equilibrium relationship between financial development, economic growth and poverty reduction in Egypt. Our results show that financial sector development plays a vital role in facilitating economic growth in Egypt. A sound financial system supports economic growth through mobilizing and pooling savings, which contributes to poverty reduction through a major channel that is through economic growth.

Furthermore, our results show that financial sector development in Egypt also directly supports poverty reduction by broadening the access to financial resources of the poor. Financial development enables poor households to accumulate assets and therefore enables them to increase their future level of income. This suggests that financial development in Egypt, like other countries, seems to lessen poverty beyond its effect on growth or what is referred to in the literature as trickledown theory. The study, therefore, concludes that financial development in Egypt seems to be pro-poor.

The above results help us provide two significant policy implications as follows. First, the government of Egypt should pay more attention to the dominant types of economic activities in the country, and to the country's legal environment as it designs and implements policies aiming at increasing the level of financial development in the country. Making a desirable legal environment that stimulates most wanted growth in dominant activities that also reduce poverty

should be a priority. In this regard, changes in the role played by small local banks in the country's financial system are worth examining further. This is important as small, local banks tend to have more information about small, local firms and consumers and therefore will be in a better position than large banks to facilitate lending to new small local entrepreneurs. This is significant for a country such as Egypt, which, like many developing countries, needs more small banks and microfinance to meet many of basic financial needs of the poor. There is evidence that small domestic banks tend to have more small clients as larger banks "cream-skim" the large good borrowers. Second, we suggest that the Egyptian government, in considering development assistance to its financial sector, should focus on achieving financial deepening involving microcredit programs to SMEs businesses. This will contribute to poverty reduction by broadening the access to, and reducing the cost of finance for SMEs, as development assistance involving microcredit programs has been found to contribute to poverty reduction by broadening the access to, and reducing the cost of, finance for SMEs. This is important given that SME credit programs and microfinance have shown to advance poor households' economic and social wellbeing and reduce poverty in many countries.

Finally, it should be noted that a future direction for research concerning our paper's topic should focus on innovative practices that can provide more financial services and finances for the poor. Engaging, individually and collectively, nongovernmental businesses and government in a broad range of strategies that improve financial access to the poor is very crucial. Research within the micro aspects of such practices would also have substantial real world value to economic planners in most countries.

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