Devaluation and Income Inequality: Evidence from Pakistan

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Abstract

The paper examines the impact of nominal devaluation on income distribution in Pakistan. In the empirical model we include economic growth, measured per capita; trade-openness; foreign direct investment (FDI); unemployment and inflation rates which appear well justified in the particular context of the economy of Pakistan. The Auto Regressive Distributed Lag (ARDL) bounds testing approach to cointegration has been employed for the long run relation; and the Vector Error Correction Model (VECM) for the short run dynamics. We also test the Kuznets inverted-U relation between income inequality and economic growth. We find long run relationship among the series; and that nominal devaluation worsens income inequality. Though economic growth appears to deteriorate income distribution, the non-linear link between the variables depicts Kuznets' (1955) type inverted-U relationship. This is reassuring for Pakistan in the long run. We also find FDI and trade-openness worsens income distribution. Inflation lowers income inequality but unemployment aggravates it in Pakistan.

Key Words: Devaluation, Income Inequality, EKC, ARDL
JEL Classifications: F41, O15, C22

Introduction

Devaluation is one of the most widely used tools to correct chronic balance of payments problems, and to promote economic growth. Despite its policy implications, the impact of devaluations on income inequality has drawn little academic scrutiny. A sizeable research shows that as per capita income rises, income inequality worsens at the initial stage but improves later producing an inverted-U curve. This is known in the literature as the Kuznets (1955) curve. Ahluwalia (1974); Berry (1974); Fields (1980); Papanek and Kyn (1986) conclude that economic growth worsens income inequality but the link between the two is not robust. Mohtadi (1988) points out that the outcome might be different if the relation is properly specified. He shows that the inclusion of capacity utilization in economic growth improves income distribution. Because of the absence of adequate longitudinal data on income distribution, studies use cross-country data (Bourguignon, 1994; Milanovic, 1995; Jha, 1996; Doyle, 1996; Ram, 1997; Barro, 2000; Forbes, 2000; Wan, 2002; and Stephen, 2003). These studies apply a variety of methodologies including panel data to examine the relationship between economic growth and income inequality [Frank, 2002; Furquim and Garcia, 2002; Nahum, 2005; Heyse, 2006; Bahmani-Oskooee and Gelan, 2007; and Malinen, 2008].

Alexander (1952) in his study on the effect of devaluation points out that due to the potential for wages to lag much behind prices, profit earners may gain at the expense of wage earners. Rising prices transfer income from fixed income groups. This process of income transfers from wage earners who have high marginal propensity to absorb, to profit makers who have low marginal propensity to absorb[1]; favors the rich. Diaz-Alejandro (1965) demonstrates that devaluation can cause income inequality, particularly in the short run. He argues that devaluation lowers real wages and raises unemployment rate in the country, which hurts poor disproportionately. Same line of reasoning has also been advanced by Towmey (1983).

[1] Also supported by Krugman and Taylor (1978)

Lindert (1986) argues that the effects of devaluation works through inflation and varies by stakeholder groups in the short run. He points out that devaluation affects groups who receive income from selling non-traded goods and services. For them, devaluation raises the cost of living without corresponding increases in income. An increase in the relative price of traded goods however, favors those who are closely related to the production of traded goods [for more, see Edwards (1989); Benabou (1996)] Using cross-sectional data from 24 countries, Bahmani-Oskooee (1997) finds unequalizing effect of devaluation on income distribution; but Sarel (1999) reports equalizing effect in low income countries. Haughton and Kinh (2003) apply income per capita and expenditure approaches to household data to investigate the impact of devaluation on income distribution in Vietnam. They find that devaluation benefits the poor and the rich, but hurts those in the middle. Using time series data, Bahmani-Oskooee and Gelan (2008) document that currency devaluation increases income inequality in the U.S. Bahmani-Oskooee and Hajilee (2010) examined effect of currency devaluation on wages of unskilled and skilled workers, assuming that the poor unskilled workers have high marginal propensity to consume (MPC), and skilled workers who are rich have low MPC. They found that devaluation raises the wages more for the skilled workers compared to the unskilled workers, and thus worsens income inequality.

The objective of the paper is to empirically explore a long run equilibrium relation between nominal devaluation and income distribution in Pakistan. Pakistan has gone through several bouts with exchange rate regimes without much success. Given that devaluation is contractionary in Pakistan (Shahbaz et al. 2012); it plausible that poverty may also have been aggravated. An appreciation of the postulated relation between exchange rate and income inequality is important in an increasingly globalized world where trade has become more relevant as a growth strategy. The findings of the paper should help policymakers better understand the interaction between the variables. The authors are unaware of any such study on Pakistan. Being the first of its kind, this research fills in a gap in the literature.

The rest of the paper is organized as follows. Section 2 describes data sources and the empirical strategy. Results are reported in section 3. Conclusions and discussion on policy implications based on the paper are provided in section 4.

2. The Empirical Strategy and Data

Annual data used in the paper covers the period from 1973 to 2006. Data on GDP per capita, foreign direct investment (FDI) as share of GDP, inflation rate, trade as share of GDP has been taken from the World Development Indicators (WDI, 2007) CD-ROM. The unemployment rate and nominal effective exchange rate (proxy for nominal devaluation) series have been collected from the Economic Survey of Pakistan (2007) and the International Financial Statistics (IFS, 2007), respectively. Time series data on Gini, the commonly used measure for income inequality, is not available. However, Jamal (2006) constructed a series from 1973-2003. We extrapolated the series for the requisite years.

To investigate the impact of nominal devaluation on income distribution in Pakistan, we include theoretically justified variables to avoid potential problem of misspecification in the empirical model. These variables are trade-openness, foreign direct investment (FDI), rates of unemployment, and inflation. The justification for inclusion of these variables in the analytical framework is clear. Pakistan receives sizeable FDI which, as part of capital inflow, can affect balance of payments. The nation has had frequent bouts with double digit inflation. Inflation affects real exchange rate i.e., the terms of trade, and thus trade balance. Trade liberalization and easing of trade barriers have boosted imports and exports which are components of trade balance. Chronic unemployment affects economic growth. These series thus appear highly relevant for Pakistan. The model is specified as:

$$Gini = \alpha_1 + \alpha_2 GDPC + \alpha_3 DEV + \alpha_4 FDI + \alpha_5 TR + \alpha_6 INF + \alpha_7 UNP + \eta_t \ldots\ldots \quad (1)$$

Based on the findings of the effect of nominal devaluation on income distribution, we expect $\alpha_3 > 0$. FDI mostly finds its home in service sectors where the educated are

employed, who generally comes from the well-off families. Thus FDI tends to deteriorate income distribution. Another view is that due to competition, unskilled workers learn the needed job skills. Also competition can lower rent-seeking behavior and help reduce inequality. Therefore, $\alpha_4 > 0$, or $\alpha_4 < 0$.

We expect $\alpha_5 > 0$. Recent literature shows that trade openness deteriorates income distribution in the developing economies. Bensidoun et al. (2005) argue that trade openness worsens income inequality because most exporting firms use workers who are better educated. The poor who lack education often are not the beneficiaries of trade[2]. Bhagwati and Srinisvasan (2002) in a seminal article wrote, "While freer trade, or "openness" in trade, is now widely regarded as economically benign, in the sense that it increases the size of the pie, the recent anti-globalization critics have suggested that it is socially malign on several dimensions, among them the question of poverty. Their contention is that trade accentuates not ameliorates, deepens not diminishes, poverty in both the rich and the poor countries. The theoretical and empirical analysis of the impact of freer trade on poverty in the rich and in the poor countries is not symmetric, of course." (p. 7). Several other economists echo the concern of Bhagwati [Agenor, 2003; David and Scott, 2005; Osmani, 2005; Shahbaz et al. 2007a, Shahbaz and Aamir 2008 and Shahbaz 2008]. Shahbaz et al., (2007b) had found that a 1% rise in trade openness increases income inequality by 0.091% in Pakistan.

Inflation erodes the real value of non-indexed public transfers like unemployment benefits and pensions and thus may aggravate income inequality. Inflation worsens income distribution in the unequal societies (Aparicio and Araujo, 2011). In the context of debtor-creditor relation, poor belong to the former and thus may benefit from inflation (Shahbaz et al. 2010). Whether or not $\alpha_6 > 0$, $\alpha_6 < 0$[3], is left to empirical determination. Rise in unemployment worsens income inequality. In the long term, unemployment hurts the poor more due to their vulnerability. A priori, we expect $\alpha_7 > 0$.

[2] They also found that international trade leads to increased inequality both in rich and poor countries while improve income distribution in middle-income countries.
[3] Shahbaz et al. (2010) found that inflation declines income inequality.

To test the Kuznet's (1955) hypothesis, we specify inequality (Gini) as a function of growth in income per capita and its square term, devaluation, trade openness, unemployment and inflation:

$$Gini = \gamma_1 + \gamma_2 GDPC + \gamma_3 GDPC^2 + \gamma_4 DEV + \gamma_5 TR + \gamma_6 INF + \gamma_7 UNP + \mu_t \quad \ldots\ldots (2)$$

The inequality-widening hypothesis predicts $\gamma_2 > 0$ and $\gamma_3 = 0$, and the inverted-U or Kuznets hypothesis predicts $\gamma_2 > 0$ and $\gamma_3 < 0$. The inequality-narrowing hypothesis predicts $\gamma_2 < 0$ and $\gamma_3 = 0$, if $\gamma_2 < 0$ and $\gamma_3 > 0$ we have a U-shaped relation.

2.1 ADF Unit Root Test

We apply the Augmented Dickey Fuller (ADF) test to check for stationarity. The critical values of the distribution for the test statistics are from Dickey and Fuller (1979).

2.2 ARDL Approach for Co-integration

The impact of nominal devaluation on income distribution is based on the traditional view that devaluation transfers income from wage earners (high marginal propensity to absorb) to profiteers (low marginal propensity to absorb). In terms of our model, the Gini coefficient is a function of economic growth per capita (GDPC), devaluation (DEV), foreign direct investment (FDI), trade openness (TR), inflation, (INF) and unemployment rate (UNP). We apply the ARDL bounds testing approach to cointegration to examine a long run relation between x_t and y_t, where the vector $x_t = \{DEV, FDI, TR, INF, UNP\}$, and $y_t = Gini$. The unrestricted vector autoregression is represented as follows:

$$z_t = \mu + \sum_{j-1}^{q} \delta_j z_t + \varepsilon_t \qquad (3)$$

Where, $z_t = [y_t, x_t]'$; μ, a vector of constants, $\mu = [\mu_y, \mu_x]'$ and δ is a matrix of vector autoregressive (VAR) parameters of lag *j*. According to Pesaran, Shin and Smith (2001)

(PSS), the time series y_t is integrated at I(1), and x_t can have different orders of integration e.g., I(1) or I(0). Equation-3 can be rewritten as follows:

$$\Delta y_t = \beta_\circ + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \sum_{j=1}^{q-1} \beta y,_j \Delta y_{t-j} + \sum_{j=1}^{q-1} \beta x,_j \Delta y_{t-j} + \varphi \Delta x_t + \mu_t \qquad (4)$$

Where, $\beta_\circ = \mu_y - \omega' \mu_x; \beta_1 = \lambda_{yy}; \beta_2 = \lambda_{yx} - \omega' \lambda_{xx}; \beta_{y,j} = \lambda_{yy,j} - \omega' \lambda_{xy,j}$ and $\beta_{x,j} = \lambda_{yxj} - \omega' \lambda_{xxj}$. The coefficients in equation-4 can be estimated by ordinary least squares. Absence of a long run relation between the series, implied by the null hypothesis $\beta_1 = \beta_2 = 0$, is tested using the F-statistic. The alternate hypothesis $\beta_1 \neq \beta_2 \neq 0$ confirms long run relationship.

For stability of the ARDL model, we conducted sensitivity analysis. The stability test is performed using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squared recursive residuals (CUSUMsq).

3. Results

Table-1 reports the descriptive statistics for each of the series.

Table-1 Descriptive Statistics

Variables	GINI	GDPC	FDI	INF	TR	UNP	DEV
Mean	3.5993	9.4833	-1.0094	2.0233	3.4993	1.4033	3.0424
Median	3.6125	9.4962	-0.7936	2.0131	3.5300	1.3346	2.9565
Maximum	3.7581	10.175	0.6787	3.2831	3.6612	2.1126	4.1259
Minimum	3.4134	8.9508	-4.6636	1.0681	2.9923	0.5306	1.5606
Std. Dev.	0.1055	0.3390	1.1330	0.5462	0.1259	0.4822	0.7314
Skewness	-0.2671	0.2927	-1.1194	0.3101	-1.8850	-0.2264	0.0778
Kurtosis	1.8387	2.3395	4.3790	2.6941	8.3488	2.0526	1.7794

We implement the Augmented Dickey Fuller (ADF) unit root test to insure that none of the series is I(2) or higher (see Ouattara, 2004). The test results, reported in Table-2, show that inflation(INF) is *I(0);* while Gini (GINI), economic growth per capita (GDPC), devaluation (DEV), foreign direct investment (FDI), trade-openness (TR) and unemployment rate (UNP) are *I(1)*. This dissimilarity in the order of integration of the series sets the stage for implementing the ARDL bounds testing approach to cointegration for a long run relationship among the series.

Table-2 Unit-Root Estimation

Variables	Level		First Difference	
	Intercept and trend	Prob-value	Intercept and trend	Prob-value
GINI	0.2370	0.9974	-5.6126	0.0003
GDPC	-1.2375	0.8851	-5.2319	0.0009
DEV	-2.7414	0.2275	-3.9850	0.0192
FDI	-3.0734	0.1286	-3.2000	0.1024
INF	-3.7788	0.0303	-5.1420	0.0011
TR	-2.8503	0.1904	-4.1673	0.0126
UNP	-2.7370	0.2291	-4.5166	0.0054

Table-3 Lag length Selection

Order of lags	Akaike Information Criteria	Schwartz Bayesian Criteria	F-test Statistics
1	-15.3753	-12.8613	1.9259
2	-15.8616	-11.1478	10.9650
Diagnostic Test-Statistics Serial Correlation LM, F = 1.3580 (0.2740) ARCH Test = 0.5741 (0.5692) Normality J-B Value = 1.1129 (0.5732) Heteroscedesticity Test, F = 1.9108 (0.0906)			

Now we turn to the two-step ARDL co-integration (See Pesaran et al. 2001) procedure. In the first stage, we determine the lag length to estimate the conditional error correction version of the ARDL model for equation-4 from the unrestricted vector autoregression (VAR). We chose lag 2 using the minimum value of Akaike Information Criterion (AIC) as shown in Table-3. The computed F-statistic 10.965[4] exceeds the upper critical bounds (UCB) of 7.607 and is significant at the 1 percent level[5]. This affirms cointegration. The long-run elasticities estimated by OLS are presented in Table-4.

[4] As can be seen from Table 3, although the results of the *F-test* change significantly at lag order 2, support for cointegration. F-test statistic is highly sensitive to the lag order

[5] The lower critical bound is 6.140. See Narayan (2005)

Table-4 OLS Long Run Relationship

Dependent Variable: GINI				
Variable	**Coefficient**	**T-Statistic**	**Coefficient**	**T-Statistic**
Constant	2.2860	10.8969 [a]	-3.9130	-1.8267 [c]
GDPC	0.0626	2.4801 [b]	1.3508	2.9799 [a]
GDPC^2	….	….	-0.0659	-2.7818 [a]
FDI	0.0119	2.5301 [b]	….	….
DEV	0.0637	4.6268 [a]	0.0636	5.3617 [a]
TR	0.1463	3.8690 [a]	0.1088	3.6330 [a]
INF	-0.0156	-2.4456 [b]	-0.0024	-0.3325
UNP	0.0405	2.9666 [a]	0.0484	3.4546 [a]
R-Squared = 0.9837 Adj-R-Squared = 0.9801 Akaike Info Criterion = -5.4703 Schwarz Criterion = -5.1592 F-Statistic = 281.4011 Prob(F-Statistic) = 0.0000 Durbin-Watson = 1.4495			R-Squared = 0.9817 Adj-R-Squared = 0.9779 Akaike Info Criterion = -5.3025 Schwarz Criterion = -4.9946 F-Statistic = 260.1752 Prob(F-Statistic) = 0.0000 Durbin-Watson = 1.5169	

Note: a, b (c) indicate significance at 1%, 5% (10%)

The results show that trade, economic growth and FDI contribute to worsening income inequality in Pakistan, instead of improving it. This can happen if FDI inflows target service sectors like telecommunications, banking, etc., where skilled labor is needed. A 1 percent increase in nominal devaluation worsens income inequality by 0.06 percent, on average, all else same. Our finding that trade-openness increases income inequality is in line with Bhagwati (2004). If trade benefits the elite rather than the poor[6] such outcome is not surprising. We find that inflation benefits the poor. This may be due to the higher number of the poor who are indebted in Pakistan. Unemployment rate and income inequality move in in tandem, which is intuitive. As for the Kuznets relation, we find that the coefficient of real per capita GDP (GDPC) is positive and its squared (GDPC^2) is negative; both significant at the 1% level. The results support a Kuznets' inverted-U relationship and confirm the earlier finding by Shahbaz (2010).

[6] For more details see (Shahbaz et al. 2007b).

Table-5: Short Run Analysis

Dependent Variable: ΔGINI			
Variable	**Coefficient**	**T-Statistic**	**Prob.**
Constant	-0.0015	-0.3455	0.7328
$\Delta GINI_{t-1}$	0.8035	2.3676	0.0267
ΔGDPC	0.0357	1.6993	0.1027
$\Delta GDPC_{t-1}$	-0.0425	-2.8324	0.0094
ΔFDI	0.0035	1.8868	0.0719
ΔDEV	0.0472	2.4483	0.0224
ΔDEV_{t-1}	-0.0078	-0.4541	0.6540
ΔINF	-0.0011	-0.4039	0.6900
ΔTR	0.0218	1.3663	0.1850
ΔUNP	0.0117	1.6196	0.1189
ECM_{t-1}	-0.2307	-2.0629	0.0506
R-Squared = 0.5570 Adj-R-Squared = 0.3645 Akaike Info Criterion = -7.3787 Schwarz Criterion = -6.8848 F-Statistic = 2.8928 Prob(F-Statistic) = 0.0170 Durbin-Watson = 1.407			

Table-5 reports the short run elasticities. The response of income inequality to its own lag appears unhelpful, which suggests some momentum effect. Income inequality appears to be aggravated by economic growth. Even though statistically insignificant, it lends support to the old adage that economic growth alone is not sufficient for improved income distribution. FDI worsens income inequality, and is significant at the 10 percent level. This finding lends support to Bhagwati (2004) who see globalization through the prism of FDI and writes, "…there are the critics of globalization whose discontents are well within the parameters of mainstream dissent and discourse. In their essence, these discontents translate into the arguments that economic globalization is the cause of several social ills today, such as poverty in poor countries and deterioration of the environment worldwide." (p. 440). Stiglitz (2004) also argues that globalization may not have helped the poor. Nominal devaluation worsens income distribution which lends support to Lindert (1986). Nominal devaluation triggers inflation[7]. In Pakistan inflation helps income distribution perhaps due to high percentage of poor who are debtors.

[7] Shahbaz (2009) finds that nominal devaluation leads to real devaluation in Pakistan.

The short run results closely follow those of the long run. The estimated value of the error correction coefficient ($\mathbf{ECM}_{t-1}$) -0.2307, has the correct sign, and is significant at the 1 percent level. This implies that approximately 23.07 % of disequilibrium from the previous year's shock converges towards the long run equilibrium in the current year.

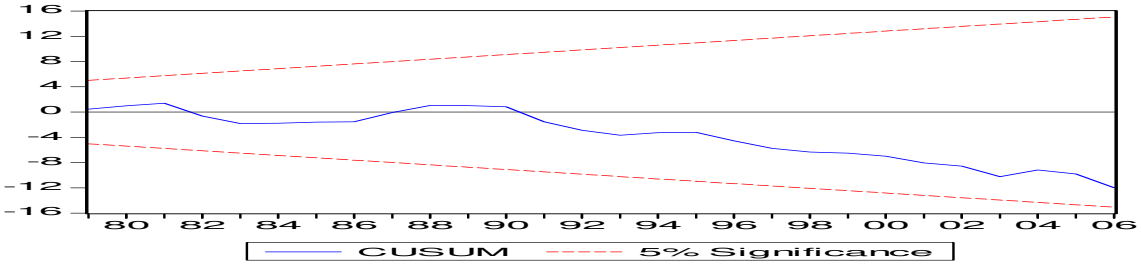
Sensitivity Analysis

Diagnostic tests results for normality, heteroscedisticity, serial correlation, and autoregressive conditional heteroscedisticity (ARCH), reported in Table-3, indicate absence of the above problems. There exists white heteroscedisticity in the model because of mixed order of integration[8], but not ARCH. Short and long run stability of the parameters are examined using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq) tests.

Graphical representation of CUSUM and CUSUMsq test is presented in Figures 1 and 2. Based on the figures, the null hypothesis of correct specification of the equation cannot be rejected. The plot of the statistics lies within the critical bounds of the 5% level. The model appears to be stable and correctly specified.

Figure 1

Plot of Cumulative Sum of Recursive Residuals

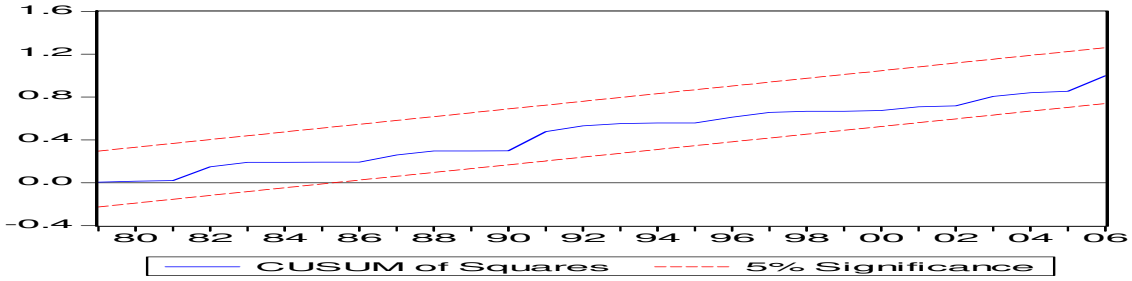


The straight lines represent critical bounds at 5% significance level.

[8] Shrestha and Chowdhury (2005) point out that it is natural to have heteroskedasticity if the variables are integrated mutually i.e. I(0) / I(1).

Figure 2

Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level.

4 Conclusions

The paper implements ARDL bounds testing approach to cointegration to examine long and short run relation between inequality in the distribution of income and devaluation. Government of Pakistan has used devaluation several times to address chronic balance of payments crisis without much success. Inequality in the distribution of income remains a major public policy concern as Pakistan pursues economic growth. Recent research suggests that the race for trade openness and adapting to changing needs of globalization may have not produced the much vaunted outcome. The results from Pakistan provide testimony to this contention. The aim for achieving equity and sharing the benefits of economic growth by all citizens has not been met.

The results confirm the existence of cointegration among the variables used in our model. Nominal devaluation aggravates income inequality in Pakistan. Economic growth exerts negative outcome on income distribution and so does unemployment. The inequality economic growth nexus provides evidence in favor of Kuznets' (1955) inverted-U relation. Foreign direct investment and trade openness worsen income distribution. However, inflation appear to help inequality in Pakistan

The challenge for Pakistan is to find a balance between growth vis-à-vis poverty. Pakistan has emphasized on export-led-growth which requires more production of goods and services, geared to meet the needs of the importing country. Due to chronic balance of payments problem, devaluation has been used several times to boost export. As the economy was growing there was more demand for production to meet exports needs

which required more energy. Pakistan is a net importer of energy. As a result, devaluation did not produce the desired outcome instead it created another serious problem – increased poverty. Pakistan's commercial policy does not appear to be properly aligned with her growth strategy which is part of the problem (Shahbaz and Islam, 2011). Too much emphasis on external balance may have been given at the expense of domestic issues e.g., rising unemployment and inflation in the face of a growing population. Pakistan appears to have few arsenals at hand that it can effectively use and turn the trend around. One possible solution may lie in reducing imports, particularly energy which will help external balance. This can be done crafting energy efficiency and conservation policies. Poverty is socially malign and destabilizing. The problem calls comprehensive fight at all levels. Policies directed at arresting and even reversing the trend in the rise of income inequality should be addressed early to avoid major crisis for a nation of 180 million, much of whom live in abject poverty! To reap benefits from devaluation export expansion must be accompanied by import reduction. In particular, financial reforms can improve human capital formation and development of entrepreneurial skill by making credit easily availability to those who deserve.

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