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ABSTRACT

This paper empirically investigates the impact of real exchange rates (RER) on growth of a large number of advanced (AE) and developing economies (DE) by employing the recent non-stationary panel data estimation procedures to estimate conventional growth models augmented with global financial and monetary conditions variables. Our results suggest that, the expansionary depreciation findings for DE are often based on a misinterpretation of an error correction mechanism coefficient. We find that external variables representing global financial and monetary conditions are strongly significant in explaining growth in DE along with the conventional variables including trade openness, human capital, domestic savings. Our data support the view that RER depreciations are contractionary for DE with high external debt and expansionary for AE. Higher trade openness enhances the contractionary impact of RER depreciations in both AE and DE. These results are found to be robust for different RER and per capita real income measures.

Key words: Balance Sheets, Developing economies, Exchange rates, Growth,
JEL Classification: F30, F41, F60, F65, O11.

I. INTRODUCTION

In the conventional Mundell–Flemming framework, which maintains that the Marshall-Lerner conditions are satisfied, systematic depreciations of real effective exchange rates (RER) are expansionary as they increase the competitiveness of tradable sectors in export markets. The success of China and some other East Asian countries with high growth under undervalued RER has been taken as evidence for this postulation. According to Rodrik (2008), for instance, by increasing the profitability of tradable sectors which suffers disproportionately from the institutional weaknesses and market failures, systematic RER undervaluations facilitate economic growth in developing economies (DE).

RER depreciations, according to Levy-Yeyati *et al.* (2013), are expansionary not through the "mercantalist" trade competitiveness channel but, instead, through higher domestic savings. In the absence of external vulnerabilities, the higher savings impact of depreciations is consistent with Diaz-Alejandro (1965) suggesting that RER depreciations lead to income transfer from labour to capital and thus to higher savings through this regressive income distribution.

The "mercantilist view" or the savings channel both advocating expansionary RER depreciations, however, do not consider the impacts of RER depreciation on high foreign currency (FX) external debt of country or the net financial positions of firms with high liability dollarization (LD). In this context, another strand of the literature, following the balance sheet (BS) channel (see, among others, Krugman, 1999; Calvo *et al*., 2004), often finds that RER depreciations are contractionary in developing economies (DE) due to mainly the presence of high LD. Under high LD and high external FX debt, currency mismatches between assets and liabilities, lead to deterioration of the financial position and net worth of the economy in the face of real depreciations.

The BS literature provides a strong rationale for contractionary RER depreciations. However, to the best of our knowledge, there is only a very limited number of studies empirically investigating the relationship between RER and growth explicitly taking into account the vulnerabilities of the BSs of economies. Furthermore, the empirical growth literature often ignores integration and cointegration properties of variables (Eberhardt and Teal, 2011) and estimates unbalanced equations including I(1) and I(0) variables. This paper also argues that, "undervaluation" variable coefficient in some studies following Rodrik (2008), indeed, represents an error correction mechanism instead of supporting the contractionary devaluations postulation. Growth of DE is often determined by not only

domestic fundamentals, but also global financial and monetary conditions. The conventional growth literature, however, often does not consider such variables. This paper attempts to fill these important gaps in the literature also by employing the recent panel data estimation procedures.

The plan for the rest of the paper is as follows. Section II presents a brief literature review. Section III is devoted to presentation of our empirical results. In Section III.1, we attempt to replicate the results by Rodrik (2008) and the following studies. The main finding of this section, based on simple panel autoregressive distributed lag (PARDL) and PARDL mean group (PARDL-MG) models, is that the results supporting contractionary devaluations in DE should be interpreted with an extreme caution, as they may be, indeed, representing an adjustment to deviations from cointegration between real exchange rates and per capita real output.

Global financial and monetary conditions are often found to be amongst the important determinants of growth in DE (Kose *et al.,* 2012; Erdem and Özmen, 2015). Section III.2, considers a conventional growth model augmented with external financial and monetary conditions variables. In the context of the BS literature, this section also considers the impact of external debt and its interaction with RER on growth in DE. Considering the potential endogeneity of the domestic explanatory variables for the long-run evolution of growth, we estimate the growth models by employing fully modified OLS (FM-OLS) procedure which takes into account the potential heterogeneity in the long-run relationships along with endogeneity and serial correlation. Finally, Section IV concludes.

II. REAL EXCHANGE RATES AND GROWTH: A BRIEF REVIEW OF THE LITERATURE

Under the conventional Mundell–Fleming framework and the Marshall-Lerner conditions, RER depreciations are expansionary as they increase the competitiveness of tradable sectors in export markets. According to this "neo-mercantilist" mechanism (Levy-Yeyati, *et al*., 2013), systematically under-valued domestic currency shifts domestic production from nontraded to traded goods which have a higher total factor productivity. According to Rodrik (2008), for instance, by increasing the profitability of the tradable sector, undervaluation of the real exchange rate facilitates economic growth in DE. The success of some East Asian countries with high growth under undervalued RER has been taken as evidence supporting the expansionary undervaluation postulations. The neo-

mercantalist literature, however, provides no monetary policy rule or transmission mechanism to maintain a sustained undervalued RER under flexible exchange regimes and inflation targeting.

Diaz-Alejandro (1965) suggests that RER depreciations causes income transfer from labour to capital and this regressive income distribution leads to higher domestic savings and lower growth. The higher savings impact of RER depreciations, on the other and, provide also a starting point for the recent expansionary devaluations arguments. RER depreciations, according to Gluzmann *et al*. (2012) and Levy-Yeyati *et al*. (2013) are expansionary not through the mercantalist trade competitiveness channel but, instead, through higher domestic savings. Accordingly, real devaluations relax the binding borrowing constraints of firms by means of saving channel. Eichengreen (2008), in the same vein, argues that both the competitiveness and savings (due to higher growth) are important determinants of expansionary RER depreciations.

The recent evidence on the impact of RER on growth is mixed. The results by Rodrik (2008), Di Nino *et al.* (2011), Gluzmann *et al*. (2012) and Levy-Yeyati *et al*. (2013) all provide empirical support for the expansionary RER depreciation postulation for DE. In all these studies, RER are "corrected" for the Balassa-Samuelson effect. Bussiere *et al.* (2015), using a propensity score matching procedure, finds that RER appreciations associated with higher productivity have a larger impact on growth than those associated with capital inflows. RER appreciations, *per se,* are found to be contractionary. Montiel and Serven (2008), on the other hand, argues that there is only weak analytical or empirical support for the argument that systematic RER depreciations promote increased domestic saving and consequently higher domestic capital accumulation and growth. Ahmed *et al*. (2002) finds that devaluations tend to be expansionary in AE whilst contractionary in DE. Nouira and Sekkat (2012) reports that they do not find any convincing support for the expansionary undervaluation postulation. According to Couharde and Sallenave (2013), high RER depreciations (misalignments) enhance growth, but in the presence of original sin (Eichengreen *et al.*, 2003), DE cannot solely base their growth strategies on this finding alone.

An important consequence of the expansionary RER depreciations is the "fear of appreciation" in DE (Levy-Yeyati *et al*., 2013). This clearly contradicts with the "fear of floating" argument by Calvo and Reinhart (2002). The presence of pervasive liability dollarisation (LD) is the basic reason of "fear of floating" in DE. High level of LD and FX

debt, indeed provides the basic starting point of contractionary RER depreciations argument in the context of the balance sheet (BS) literature (Krugman, 1999; Calvo *et al.*, 2004; and Frankel, 2005). The contractionary RER depreciations due to high FX debt, which is closely related with LD, was indeed clearly identified much earlier by Diaz-Alejandro (1965)[1].

The BS literature argues that the real decisions of economic agents, basically firms, depend crucially on their financial positions. Financial positions of economic agents, in turn, may not be invariant to the currency composition of their balance sheets (BS) and elasticity of their net income to RER. The presence of LD and high FX debt can make BS of economic agents to be vulnerable to RER depreciations through currency and maturity mismatches. For firms, for instance, the consequent deterioration of borrowing capacity leads to a decrease in their investment and production. The overall impact of RER changes is an empirical issue and critically depends on sector/country characteristics such as their import dependence of production, FX external debt along with currency composition of BS.

The literature survey by Frankel (2011) suggests that weak BS due to LD leads to not only contractionary devaluation, but also currency crises. The results by Cespedes *et al.* (2003) suggest that, negative BS effects dominate competitiveness effect when financial markets are less developed, the ratio of total debt to net worth is high and the share of FX debt in total debt is high. Céspedes (2005) finds that the interaction of large real devaluation and external debt has a significant negative effect on output. Ahmed *et al*. (2002) find that contractionary devaluations are often the case for DE. The results of the firm level studies for six Latin American countries, as summarized by Galindo *et al*. (2003), suggest that high LD often reverses the conventional expansionary competitiveness effect of devaluations on investment. Kesriyeli *et al.* (2011) reports that RER depreciations are contractionary for non-financial sectors of Turkey. Using different dollarization measures, for a panel data sample of 57 countries, Bebczuk *et al*. (2006) finds that when external dollarization or debt exceeds a certain level, contractionary effect of devaluation dominates the expansionary trade competitiveness effect.

[1] Obstfeld (2004, p. 42) cites Diaz-Alejandro (1965, p. 31) "Devaluation may produce another type of wealth effect when some groups of the country have debts to foreigners expressed in terms of foreign currencies. A devaluation will then increase the value of the debt expressed in domestic currencies and will exert a depressing influence on the expenditures of these groups, especially when the domestic prices they receive for the sale of their products or services do not increase proportionally with the devaluation. When a country has a net foreign debt, this effect will make more likely an improvement in the trade balance and a drop in output following devaluation, especially when the debt is held by the private sector and is concentrated in short-term maturities".

III. REAL EXCHANGE RATES AND GROWTH: EMPIRICAL RESULTS

III.1. Expansionary Depreciation or an Error Correction Mechanism?

To investigate the relationship between real exchange rates and growth, we first consider the baseline model[2] of Rodrik (2008):

$$\Delta y_{it} = a_0 + a_1 UNDERVAL_{it} + u_{it} \quad (1)$$

where UNDERVAL are the residuals from the estimation of:

$$rer_{it} = b_0 + b_1 y_{it} + v_{it} \quad (2)$$

In Eq. (1), y = ln(RGDP), RGDP = per capita real GDP at constant 2010 USD, reer =ln(RER), RER = real effective US$ exchange rate. We first use the real exchange rate index of the International Monetary Fund (IMF), RER^{IMF}. For robustness check we consider also the "price level of GDP" data by Penn World Tables (PWT) version 9.0 and define RER^{PWT}_{it} as PPP_{it}/XR_{it} where XR is the nominal exchange rate and PPP is the purchasing power parity conversion factor. Consequently, an increase in RER^{PWT} means real appreciation. Rodrik (2008), and Gluzmann *et al*. (2012) defines RER^{PWT}_{it} as XR_{it}/PPP_{it} and thus an increase in RER^{PWT} means real depreciation. Our unbalanced panel data contain 25 AE and 66 DE for the annual period of 1980-2014. The choice of countries is determined by data availability. Tables A1 and A2 of the Appendix present the data sources and the full list of countries, respectively.

According to Rodrik (2008), UNDERVAL is the RER "corrected" for the Balassa-Samuelson postulation suggesting that higher productivity causes appreciation[3]. A similar procedure is employed also by some other studies supporting expansionary depreciations, including Di Nino *et al.* (2011), Levy-Yeyati *et al*. (2013) and Gluzmann *et al*. (2012). Following Rodrik (2008), we estimate (1) and (2) by employing panel fixed effects procedure.

Consistent with the findings of Rodrik (2008), the estimation of (2) yielded the slope coefficient estimates as 0.38 for rer^{PWT} and 0.22 for rer^{IMF} with highly significant t-statistics. Rodrik (2008) interprets such result as supporting the Balassa-Samuelson postulation. The

[2] Rodrik (2008) uses 5-year averages and includes also an initial income variable. Following Pedroni (2007), we do not include an initial income variable in cointegrating equations. However, our results from these equations are consistent with the findings of Rodrik (2008).

[3] This procedure, however, may be subject to serious empirical modelling issues as convincingly argued by Woodford (2008).

results of the Levin *et al.* (2002) panel unit root tests (the lag lengths chosen as 3 by Akaike Information criterion, AIC) yielded -6.26 for rer^{PWT} and -6.48 for rer^{IMF} strongly suggesting the stationarity of the equation residuals. Considering the finding that the variables are integrated of order one (I(1), see Table 3, below), this result, suggests the presence of a long-run equilibrium relationship (cointegration) between real exchange rates and per capita real GDP[4].

Table 1 presents the results from the estimation of equation (1) for the whole sample of countries. The results appear to support the Rodrik (2008) finding that real depreciations are expansionary for both measures of real exchange rates. Table 1 contains also the estimation of equation (1) using $UNDERVAL_{it-1}$ instead of[5] $UNDERVAL_{it}$. The results remain essentially the same both for rer^{IMF} and rer^{PWT}.

Given that rer_{it} and y_{it} are cointegrated, the $UNDERVAL_{it}$ variable (residuals from the regression of rer_{it} on y_{it}) may, indeed, be representing deviations from long-run equilibrium. As already noted, UNDERVAL is a stationary combination of two I(1) variables, rer_{it} and y_{it}. Consequently, the $UNDERVAL_{it-1}$ coefficient (c_1) in:

$$\Delta y_{it} = c_0 + c_1 UNDERVAL_{it-1} + e_{it} \qquad (3)$$

may, indeed, be representing the adjustment coefficient in an error correction mechanism (EC) set up, rather than a real exchange rate impact. Therefore, the negative $UNDERVAL_{it-1}$ coefficients in equations (1.3) and (1.4) may better be interpreted as suggesting real income adjusting to deviations from long-run equilibrium rather than supporting the expansionary real depreciation postulation.

[4] The Pedroni (2004) residual-based panel cointegration test (panel Phillips-Perron statistics estimated with lag length 3) yielded -18.0 for y_{it} and rer_{it}^{PWT}, -29.2 for y_{it} and rer_{it}^{IMF}. This provides a further support for the presence of cointegration between the variables.

[5] Gluzmann *et al*. (2012) also uses the lagged values of the UNDERVAL variable to estimate (2).

Table 1. "Undervaluation", Growth and Error Correction Mechanism						
	Real Exchange Rate Measure					
	rer^{PWT}	rer^{IMF}	rer^{PWT}	rer^{IMF}	rer^{PWT}	rer^{IMF}
Equation	1.1	1.2	1.3	1.4	1.5	1.6
intercept	0.018** (0.001)	0.018** (0.001)	0.018** (0.001)	-0.018** (0.001)	0.016** (0.001)	0.014** (0.001)
$UNDERVAL_{it}$	-0.013** (0.005)	-0.016** (0.004)				
$UNDERVAL_{it-1}$			-0.017** (0.003)	-0.019** (0.004)	-0.017** (0.003)	-0.016** (0.003)
Δrer_{it-1}					-0.007 (0.006)	-0.002 (0.006)
Δy_{it-1}					0.256 (0.018)**	0.223 (0.019)**
Diagnostics	N=91, NT=2847 R^2 = 0.25 F = 7.19	N=91, NT=2724 R^2 = 0.25 F = 7.11	N=91, NT=2836 R^2=0.26, F=7.47	N=91, NT=2700 R^2=0.26 F=7.44	N=91, NT=2756 R^2=0.32 F=9.94	N=91, NT=2619 R^2=0.32 F=9.30
Notes. The values in parentheses are the standard errors and ** denotes the significance at the 5 % level. N and NT are, correspondingly, the effective numbers of countries and observations for the sample.						

We consider also the following reparametrized simple panel autoregressive distributed lag (PARDL) model:

$$\Delta y_{it} = d_0 + d_1 EC_{it-1} + d_2 \Delta y_{it-1} + d_3 \Delta rer_{it-1} + v_{it} \qquad (4)$$

In (4) EC_{it-1} is indeed $UNDERVAL_{it-1}$ and consequently the coefficient of this gives simply the adjustment coefficient. A negative and significant d_1 estimate simply suggest that real income adjusts to deviations from the equilibrium. Equations (1.5) and (1.6) in Table 1 presents the results. The estimated EC coefficients are essentially the same with the coefficients $UNDERVAL_{it}$ in Eqs. (1.1) and (1.2). Consequently, the interpretation of $UNDERVAL_{it}$ coefficients as the impact of real exchange rate may be seriously misleading and thus should be taken with an extreme caution.

We now proceed with the estimation of the following PARDL mean group (PARDL-MG) model:

$$\Delta y_{it} = e_0 + e_1 EC_{it-1} + e_{21} \Delta y_{it-1} + \ldots + e_{2p} \Delta y_{it-p} + e_{30} \Delta rer_{it} + \ldots + e_{3p} \Delta rer_{it-p} + v_{it} \qquad (4)$$

The PARDL approach is valid even if the regressors are not weakly-exogenous and the variables of interest are stationary, non-stationary or mutually cointegrated (Pesaran *et*

al., 1999; Chudik and Pesaran, 2015). The PARDL-MG procedure imposes the same long-run relationship but allow the short-run and EC coefficients to differ across countries. The EC and short-run PARDL-MG coefficients are the simple averages of individual country estimations. Table 2 reports the PARDL-MG results[6]. Accordingly, RER appreciations are contractionary for AE (eq. 2.2) and expansionary for DE (eq. 2.3). The significant EC_{t-1} coefficients support the hypothesis that real income adjusts to deviations from the long-run equilibrium.

The empirical growth literature often ignores integration and cointegration properties of variables and estimates unbalanced equations including I(1) and I(0) variables[7]. The results of this paper, so far, highlight the importance of this and related issues. RER changes, *per se*, may also be reflecting omitted domestic macroeconomic fundamentals and global financial conditions beyond the variables already contained in equations 1.1-1.6. Therefore, the following section proceeds with the estimation of a growth model.

[6] We started with a maximum lag of PARDL-MG (4,4) and the optimum lag lengths of the equations are chosen by the likelihood ratio tests of sequential lag length reduction.

[7] As noted by Pedroni (2007), the use of panel cointegration techniques allows to relax to continuous steady-state position of the conventional growth literature. The stationarity of residuals of the real income equation (thus the presence of a cointegration) is a necessary condition for income convergence. Consequently, Pedroni (2007) argues that there is no need to specify a lagged dependent variable (initial income) term as in the conventional convergence equations. Furthermore, the estimation of a cointegrating equation with an initial income variable is often not feasible. Therefore, we do not include this variable. Also note that, in the presence of an initial income variable which is often constant for individual countries, the estimation of the conventional models with an intercept term by employing a cross-section fixed effects procedure is not feasible due to perfect multicollinearity. Because of this, the empirical models containing a constant initial income variable do not include an intercept term. However, this may result in an identification problem as the initial income coefficient may indeed be representing the intercept term rather than convergence.

Table 2. Real Exchange Rates and Growth: PARDL-MG Results			
Country Grouping	ALL	AE	DE
Equation	2.1	2.2	2.3
Long-Run			
rer^{IMF}_{it}	0.900** (0.043)	-1.612** (0.191)	0.947** (0.053)
Short-Run			
EC_{t-1}	-0.027** (0.007)	-0.031** (0.006)	-0.033* (0.019)
Δrer^{IMF}_{it}	-0.031 (0.032)	-0.022 (0.039)	-0.002 (0.041)
Δrer^{IMF}_{it-1}	-0.082** (0.016)		
Δy_{it-1}	0.232** (0.027)	0.297** (0.038)	
intercept	0.169** (0.037)	0.620** (0.108)	0.196** (0.088)
Sample	N=91, NT=2610	N=25, NT=823	N=66, NT=1834
Notes. The values in parentheses are the standard errors and ** denotes t significance at the 5 % level. N and NT are, correspondingly, the effective numbe of countries and observations for the sample.			

III.2. Real Exchange Rates and Growth: Evidence from a Growth Model

To investigate the relationship between real exchange rates and growth, we now consider the following equation:

$$y_{it} = \gamma_0 + \gamma_1 rer_{it} + D'_{it}\gamma_2 + E'_t \gamma_3 + u_{it} \quad (5)$$

where, rer_{it} is rer^{IMF}_{it}, E´t are the transposes of the vectors of, respectively, domestic and external variables, γ_2 and γ_3 are the corresponding vector of coefficients and u_{it} is the error term[8]. D´ contains the main variables postulated by the growth literature[9]. These include human capital index, based on years of schooling and returns to education (HC, Feenstra *et al.*, 2015), trade openness (OPEN, expressed as the sum of exports and imports over GDP) and domestic savings (SAV, as a share of GDP).

Global financial conditions are often found to be amongst the important determinants of growth and business cycles especially in DE (Kose *et al.*, 2012; Erdem and Özmen, 2015). Many emerging market yields respond to "world interest rates" (Bahadir and Lastrapes, 2015). Borrowing costs of DE in international markets are often determined by global

[8] We considered also rer^{PWT}_{it} and obtained essentially similar results with rer^{IMF}_{it}. The results with rer^{PWT}_{it} are presented Table A1 of the Appendix.

[9] See, Eberhardt and Teal (2011), Barro (2015) and Rockey and Temple (2016) for the recent surveys.

financial conditions (Gonzalez-Rozada and Levy-Yeyati, 2008; Özatay *et al*., 2009; Özmen and Yaşar, 2016).

The external variables in (1) contain fed rate and vix where fed rate is $\ln(1+R^{FED}/100)$ with R^{FED} being the FED Funds target rate[10] and vix is the log of volatility implicit in U.S. stock options (VIX). The FED target rate is postulated to proxy monetary policy conditions in the USA. VIX is a widely used measure to capture global risk appetite or financial/liquidity conditions (Gonzalez-Rozada and Levy-Yeyati, 2008). According to Rey (2015) global financial cycles co-moves with VIX, which is important in creating boom and bust cycles in DE. The VIX data are available only after 1990. Therefore, the effective estimation sample for equations containing VIX is 1990-2014.

Considering the potential endogeneity of the domestic explanatory variables for the long-run evolution of growth, we estimate (1) by employing fully modified OLS (FM-OLS) procedure[11] (Pedroni, 2000). The FM-OLS procedure takes into account the potential heterogeneity in the long-run relationships along with endogeneity and serial correlation. As olready noted, the conventional growth literature often ignores integration and cointegration properties of variables and estimates unbalanced equations including I(1) and I(0) variables. The use of FM-OLS aims to tackle also this issue. Provided that the variables are cointegrated, the FM-OLS estimates are superconsistent implying that variable endogeneity does not significantly affect the results.

[10] IMF (2004, p.68) notes that, "measures of short-term rates, such as the Fed Funds target rate or three-month treasury bill rates, are very closely correlated with the three-month LIBOR rate".

[11] To the best of our knowledge, econometric theory is yet to provide a support to the use of PARDL-MG procedure in the presence of large number of regressors relative to the time span of the panel along with the inclusion of interaction variables. Therefore, Eq, 5 is not estimated by PARDL-MG.

Table 3. *Unit Root Tests*		
Variables	*LLC*	
	Levels	*First Differences*
rer^{IMF}_{it}	-0.61[3]	-43.0[1]**
rer^{PWT}_{it}	-0.57[3]	-32.8[3]**
y_{it}	-0.69[3]	-31.7[3]**
y^{PWT}_{it}	-1.37[3]	-41.0[3]**
HC_{it}	8.06[2]	-2.26[1]**
SAV_{it}	-0.72[2]	-32.3[2]**
$OPEN_{it}$	-1.44[2]	-48.7[2]**
$E.Debt_{it}$	-1.25[3]	-28.6[2]**
Variables	*ADF*	
vix_t	*-0.48[0]*	*-4.30[0]***
fed $rate_t$	*-1.55[1]*	*-5.39[1]***

*LLC and ADF are the Levin, Lin and Chu (2002) panel unit root and augmented Dickey-Fuller tests, respectively. ** denotes the rejection of the unit root null at the 5% level. The values in brackets [.] are the lag lengths determined by AIC.*

Table 3 reports the results of Levin, Lin and Chu (2002) panel unit root tests for the panel variables and augmented Dickey-Fuller tests for vix and fed rate. The results of unit root tests suggest that all the variables in (5) are I(1)[12]. Table 4 reports the FM-OLS results for different country groupings. The results of the Levin, Li and Chu (2002) panel unit root tests suggest that the equation residuals are stationary. Consequently, the equations in Table 4 may be interpreted as representing a long-run equilibrium relationships (cointegration)[13].

According to equations 4.1-4.4, human capital (HC), domestic savings (SAV) and trade openness (OPEN) all have positive and significant coefficients for the whole, AE and DE samples. The impact of HC (and thus education) appears to be the same for AE and DE. OPEN and SAV tend to enhance growth much more (about twice) in AE than in DE. RER appreciations, *per se*, are expansionary as suggested by the positive rer_{it} coefficients. However, consistent with the competitiveness channel, this impact decreases with higher trade openness. For AE, the net impact of rer_{it} becomes almost insignificant (decreases to

[12] The results are found to be robust to different country groupings and to the use of other commonly used unit root tests. These results are not reported to save the space but available on request.

[13] Note that, these residuals based cointegration tests maintains that there can be only one within group cointegration in the panel.

0.11) when evaluated at the mean trade openness (=0.37-0.90*0.29, where 0.9 is mean openness, 0.37 and 0.29 are the estimated coefficients of OPEN and OPEN*reer, respectively). Consequently, RER appreciations may be interpreted as contractionary or, at best, insignificant in highly open AE. The impact of RER through trade openness channel appears to be much more small in DE. The net impact at the mean trade openness (0.78) is around 0.21 which is, indeed, very close to the rer_{it} coefficient (0.23) in eq. 4.3 of Table 4. This lends a support to the contractionary RER depreciation hypothesis for DE.

Better global liquidity conditions (a decrease in VIX) and lower FED target rates both have a positive impact on growth in DE. The impact of the FED rate for both AE and DE is consistent with a view that "there is a powerful transmission channel of US monetary policy across borders via credit flows, leverage of banks, risk premia and the term spread" (Miranda-Agrippino and Rey, 2015). According to Rey (2015) global financial cycles co-moves with VIX, which is important in creating cycles in DE. The results by Kose *et al*., (2012) and Erdem and Özmen (2015) suggest that global financial conditions including VIX shocks are amongst the main determinants of business cycles in DE. The significant and negative vix_t coefficient is consistent with these studies. Contrasting to the DE evidence, a decrease in the global risk appetite (an increase in VIX) enhances growth in AE. An increase in VIX leads to a risk-aversion shock and consequently generates flight-to-quality due to preference to safer assets. The resulting capital flights from DE to AE (or sudden stops of capital inflows to DE) often leads to severe output contractions (or financial crises) in DE. The return to safety appears to enhance growth in AE, through potentially mainly capital-flow reversals and the resulting credit expansion.

As already discussed, the presence of high external debt and LD are the main mechanisms of the contractionary devaluation postulation of the BS literature. The direct measures of LD are, unfortunately, available only for a very limited number of DE. Alternatively, we follow Bebczuc *et al*., (2006) and define external dollarization as External Debt/GDP (E.Debt)[14]. Such a definition is consistent also with the pioneering contribution by Diaz-Alejandro (1965). World Bank's Global Development Finance data base does not report external debt data for AE. Therefore, equations (4.4) and (4.6) of Table 4 are estimated by using only the DE data.

Higher external debt in DE leads to higher risk premiums, lower credit ratings and

[14] Bebzcuk *et al*. (2006) multiplies E.Debt with the original sin (OSIN) measure built by Eichengreen et al. (2003). As the OSIN has very limited time variability, we maintain that it is unity for DE.

thus higher spreads and borrowing costs. The presence of original sin and the consequent BS mismatch potentially alleviate this negative impact. Furthermore, higher external net liabilities and debt increase the risk of financial crises (Bordo *et al.*, 2010; Catão and Milesi-Ferretti, 2014). Dell'Erba *et al.* (2013) finds that there is a significantly positive correlation between FX debt levels and sovereign spreads (and thus borrowing costs) in DE. Consequently, growth in DE may be expected to decline with higher external debt. The negative and significant E.Debt coefficient estimate in Eq. (4.4) strongly supports this postulation. RER appreciations, on the other hand, have a positive impact on growth as they lead to a decline both external debt and debt service in terms of domestic real income. This is indeed the main channel of the expansionary RER appreciations of the BS literature.

Table 4. RER and Growth: FM-OLS Results

Country Grouping	*All*	*AE*	*DE*	*DE*	*AE*	*DE*
Equation	***(4.1)***	***(4.2)***	***(4.3)***	***(4.4)***	***(4.5)***	***(4.6)***
Dependent variable	y_{it}				y^{PWT}_{it}	
$reer_{it}$	0.258** (0.008)	0.366** (0.023)	0.227** (0.009)	0.223** (0.006)	0.767** (0.024)	0.304** (0.011)
HC_{it}	0.692** (0.007)	0.665** (0.016)	0.728** (0.009)	0.733** (0.005)	1.129** (0.016)	0.895** (0.013)
SAV_{it}	0.527** (0.019)	0.991** (0.041)	0.419** (0.022)	0.516** (0.013)	1.336** (0.036)	0.831** (0.023)
$OPEN_{it}$	0.540** (0.055)	1.510** (0.122)	0.248** (0.065)	0.435** (0.040)	3.011** (0.153)	0.645** (0.054)
$OPEN_{it} * reer_{it}$	-0.082** (0.012)	-0.286** (0.028)	-0.024* (0.013)	-0.077** (0.009)	-0.607** (0.034)	-0.122** (0.012)
vix_t	-0.008** (0.002)	0.025** (0.004)	-0.025** (0.003)	-0.026** (0.002)	0.034** (0.004)	-0.047** (0.004)
fed $rate_t$	-1.018** (0.044)	-0.915** (0.070)	-1.067** (0.057)	-1.165** (0.034)	-1.149** (0.036)	-1.770** (0.067)
$E.Debt_{it}$				-0.114** (0.034)		-0.856** (0.074)
$E.Debt_{it}*reer_{it}$				0.037** (0.008)		0.198** (0.016)
Diagnostics	N=84, NT=2099 R^2 = 0.99 LRV= 0.002 LLC = -10.5 [0.00]	N=24, NT=6 R^2 = 0.96 LRV= 0.002 LLC) = -6.83 [0.00]	N=60, NT=1431 R^2 = 0.99 LRV= 0.002 LLC = -8.56 [0.24]	N=50, NT=1211 R^2 = 0.98 LRV= 0.001 LLC = -8.08 [0.00]	N=24 NT=667 R^2 = 0.93 LRV= 0.002 LLC = -7.32 [0.00]	N=50 NT=1217 R^2 = 0.97 LRV= 0.003 LLC = -7.44 [0.00]

Notes: LRV denotes long-run variance. The values in parentheses are the standard errors and ** denotes the significance at the 5 % level. N and NT are, correspondingly, the effective numbers of countries and observations for the sample. LLC is the Levin, Li and Chu (2002) panel unit root test for the equation residuals. The optimum lag lengths for the tests are chosen by the AIC. The values in brackets [.] are the p-values for the no cointegration null hypothesis.

For a robustness check, we consider also $y^{PWT} = \ln(RGDP^{PWT})$, $RGDP^{PWT}$ = per capita real GDP at purchasing power parities[15] (Feenstra *et al.*, 2015). Equations (4.5) and (4.6) in Table 4 reports the results. For the AE sample, we obtain essentially the same results (Eq. 4.5), albeit the coefficient estimates are substantially higher (in absolute values) especially for $reer_{it}$, HC_{it}, $OPEN_{it}$, and $OPEN*reer_{it}$. The $reer_{it}$ cooefficient is still positive (0.79) but, again, tends to vanish when considered along with the competitiveness impact (-0.61). For the DE sample, on the other hand, the earlier findings for y_{it} remains almost unchanged for y_{it}^{PWT}.

IV. CONCLUDING NOTES

RER depreciations increase the value of FX debt and debt service in terms of domestic currency and deteriorate financial positions of the debtor sectors of an economy. Consequently, RER depreciations may be contractionary for DE with higher FX debt as argued by Diaz-Alejandro (1965) much earlier. We find that balance sheet effects, captured by the interaction between RER and FX debt have a significant and negative impact on output in DE. This result provides a strong support for the Diaz-Alejandro (1965) proposition and some recent studies including Ahmed, *et al*. (2002), Galindo *et al*. (2003), Cespedes *et al*. (2003), Céspedes (2005), Bebczuk *et al*. (2006) and Frankel (2005, 2011). Our data, on the other hand, support that RER depreciations are expansionary (or at least not contractionary) for AE.

Another important finding of our paper is that, the studies interpreting "undervaluation" and/or "misalignment" variable coefficients as a support for expansionary deprecations postulation may be misleading and thus should be interpreted with an extreme caution. This is because, these coefficients may, indeed, be representing error/equilibrium correction mechanism to deviations from cointegration between RER and per capita real

[15]According to Cline (2015, p.5) "testing cross-country growth patterns without permitting a comparable cross-country level of real per capita income is a classic instance of staging *Hamlet* without the Prince of Denmark.

income.

Higher trade openness enhances the contractionary impact of RER depreciations in both AE and DE. This international competitiveness affect is much higher in AE than DE. Consequently, the net impact of RER appreciations becomes contractionary or, at best, insignificant in highly open AE.

We also find that external variables representing global financial (VIX) and monetary (FED funds target rate) conditions are strongly significant in explaining growth in DE along with the conventional variables including trade openness, human capital, domestic savings. An increase in the FED rate leads to an output decline in both AE and DE. Contrasting to the DE evidence, a decrease in the global risk appetite (an increase in VIX) enhances growth in AE. This is consistent with the sudden stops or capital-flow reversals from DE to AE due to the flight-to quality mechanism during turbulent times. The impact of HC (and thus education) appears to be the same for AE and DE. Trade openness and domestic savings tend to enhance growth much more (about twice) in AE than in DE.

The main tenet of the "mercantilist view" is export-led growth through systematic RER depreciation. According to Ahmed *et al.* (2015), on the other hand, RER elasticity of exports has substantially declined during the recent decades due to higher degree of globalization of production and trade. In this process, which is called global value chains (Johnson, 2014) or global supply chains (Baldwin and Lopez-Gonzalez, 2015), production of final product is sliced up into different stages and tasks are distributed among different countries. As countries has become more dependent on imports for production and exports, complementarity of exports and imports has increased (Johnson, 2014; Baldwin and Lopez-Gonzalez, 2015). A RER depreciation, improves the competitiveness of domestic value added in exports but increases the cost of imported inputs leading to a decrease in the exchange rate elasticity of trade. Together with the balance sheet effect of RER depreciation in countries with higher FX debt, the decline in the RER elasticity of exports with higher integration to global value/supply chains, provides another plausible explanation and a promising research agenda for the expansionary RER appreciation postulation.

According to Guzman *et al.* (2014) a competitive RER is crucial for the generation of backward and forward linkages of existing economic activities and should be complemented with industrial policies. In the international trade context, an industrial policy aiming to increase forward participation (the use of domestic intermediates in third country exports) and decrease backward participation (the use of foreign inputs in exports) appears

to be strategically important for a higher sustainable growth in DE.

Better education (higher human capital), higher savings and trade openness are amongst the complementary tools of higher sustainable growth goal. Lower level of LD and FX debt, are amongst the prerequisites of a successful export-led growth strategy. However, all these require macroeconomic stability. The literature, unfortunately, is yet to provide a convincing answer how a systematic undervalued currency can be achieved under a flexible exchange rate regime and inflation targeting (Woodford, 2008). Given the results that global financial and monetary conditions are amongst the important determinants of DE growth, the success of a sustained undervalued RER becomes more ambiguous. The recent studies on the "impossible trinity", including Rey (2015, 2016), Aizenman *et al.* (2015) and Obstfeld (2015), indeed, provide important insights and a promising research agenda also for investigating RER and growth relationships.

REFERENCES

Ahmed, S., Gust, C., Kamin, S. and Huntley, J. (2002). Are Depreciations as Contractionary as Devaluations? A Comparison of Selected Emerging and Industrial Economies. *FRB International Finance Discussion Paper* No. 737.

Ahmed, S., Appendino, M. and M. Ruta (2015) Depreciations without Exports? Global Value Chains and the Exchange Rate Elasticity of Exports, *World Bank Policy Research Working Paper* No. 7390.

Aizenman, J., Chinn, M. and H. Ito (2015) Monetary Policy Spillovers and the Trilemma in the new Normal: Periphery Country Sensivity to Core Country Conditions, *NBER Working Paper* 21128.

Bahadir, B. and W.D. Lastrapes (2015) Emerging market economies and the world interest rate, *Journal of International Money and Finance*, 58, 1–28.

Baldwin, R. and Lopez-Gonzalez, J. 2015. Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *The World Economy* 38(11),1682-1721.

Barro, R.J. (2015) Convergence and Modernisation, *The Economic Journal*, 125, 911-942.

Bebczuk, R., Galindo, A. and Panizza, U. (2006). An Evaluation of the Contractionary Devaluation Hypothesis, *Inter-American Development Bank Working Paper* No. 582.

Bordo, M.D., Meissner, C.M. and D. Stuckler (2010) Foreign currency debt, financial crises and economic growth: A long-run view, *Journal of International Money and Finance*, 29, 642–665.

Bussiere, M., Lopez, C. and C. Tille (2015) Do real exchange rate appreciations matter for growth? *Economic Policy*, January, 1–41.

Calvo, G. A., L. Leiderman and C.M. Reinhart (1993) Capital inflows and real exchange rate appreciation in Latin America -The role of external factors, *IMF Staff Papers*, 40(1), 108-51.

Calvo, G.A. and C. Reinhart (2002) Fear of Floating, *The Quarterly Journal of Economics*. 117, 379-408.

Calvo, G.A., Izquierdo A. and Mejía L.F. (2004). On the Empirics of Sudden Stops: the Relevance of Balance Sheet Effects. *NBER Working Paper*, 11492.

Catão, L.A.V. and Milesi-Ferretti, G.M. (2014) External liabilities and crises, *Journal of International Economics*, 94, 18-32.

Céspedes, L.F. 2005, "Financial Frictions and Real Devaluations," Central Bank of Chile Working Papers, No. 318.

Cespedes, L.F., Chang, R. and Velasco, A. (2003). IS-LM-BP in the Pampas, *IMF Staff Papers*,50, Supplement 1, 143–156.

Chudik, A., Pesaran, M.H., 2015. Large panel data models with cross-sectional dependence: a survey. In: Baltagi, B.H. (Ed.), *The Oxford Handbook of Panel Data*, 3–45. Oxford University Press, New York.

Couharde, C. and A. Sallenave (2015) How do currency misalignments' threshold affect economic growth?, *Journal of Macroeconomics*, 36, 106–120.

Cline, W.R. (2015) Further Statistical Debate on "Too Much Finance", *Peterson Institute for International Economics*, WP 15 - 16.

Dell'Erba, S., Hausmann, R. and U. Panizza (2013) Debt levels, debt composition, and sovereign spreads in emerging and advanced economies, *Oxford Review of Economic Policy*, 29(3), 518–547.

Diaz Alejandro, C., 1965. Exchange Rate Devaluation in a Semi-Industrialized Country. MIT Press, Cambridge, United States.

Di Nino, V., Eichengreen, B. and Sbracia, M. (2011). Real Exchange Rates, Trade, and Growth: Italy 1861-201, *Bank of Italy Working Paper*, No: 10.

Eberhardt, M. and F. Teal (2011) Econometrics for grumblers: A New Look at the Literature on cross-country growth empirics, *Journal of Economic Surveys*, 25(1), 109–155

Eichengreen B. (2008). The Real Exchange Rate and Economic Growth. *World Bank Growth Commission Working Paper* No: 4.

Eichengreen, B., Hausmann, R., and Panizza, U. (2003). Currency mismatches, debt intolerance and original sin: why they are not the same, why it matters, NBER WP No. 10036.

Erdem, F.P. and E. Özmen (2015) Exchange Rate Regimes and Business Cycles: An Empirical Investigation, *Open Economies Review*, 26, 1041-1058.

Feenstra, R.C., R. Inklaar and M.P. Timmer (2015) The Next Generation of the Penn World Table, *American Economic Review*, 105(10), 3150-3182.

Frankel, J.A. (2005). Mundell-Fleming Lecture: Contractionary Currency Crashes in Developing Countries, *IMF Staff Papers*, 55, 2, 149-192.

Frankel, J.A. (2011) Monetary Policy in Emerging Markets, in *Handbook of Monetary Economics*, edited by B. Friedman and M. Woodford, Vol. 3B, 1439-1520 (North Holland: The Netherlands).

Galindo, A., Panizza, U. and F. Schiantarelli (2003). Debt Composition and Balance Sheet Effects of Currency Depreciation: A Summary of the Micro Evidence, *Emerging Markets Review*, 4, 4, 330-339.

Gluzmann, P., Levy-Yeyati E. and Sturzenegger F. (2012). Exchange Rate Undervaluation and Economic Growth: Díaz Alejandro (1965) Revisited, *Economic Letters*, 117, 666-672.

Gonzalez-Rozada, M. and Levy-Yeyati, E., 2008. Global factors and emerging market spreads, *The Economic Journal*, 118 (533), 1917–1936.

Guzman, M., Ocampo, A. and J. Stiglitz. 2014. Real Exchange Rate Policies for Economic Development. Paper presented at the Department of Trade and Industry, South Africa.

IMF, 2004. Global financial market developments. *Global Financial Stability Report* (April, Ch. 2. IMF).

Johnson, R.C. (2014). Five Facts about Value-Added Exports and Implications for Macroeconomics and Trade Research, *Journal of Economic Perspectives* 28(2): 119–142.

Kesriyeli, M., Özmen, E. and S. Yiğit (2011) Corporate sector liability dollarization and exchange rate balance sheet effect in Turkey, *Applied Economics*, 43(30), 4741-4747.

Kose, A., Otrok, C. and E.S. Prasad (2012) Global business cycles: Convergence or decoupling? *International Economic Review*, 87, 178-90.

Krugman, P. (1999) Balance Sheets, the Transfer Problem and Financial Crises, *International Tax and Public Finance*, 6, 459-472.

Levin, A., Lin, C. F. and Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of econometrics*, *108*(1), 1-24.

Levy-Yeyati, E., Sturzenegger, F. and P.A. Gluzmann (2013) Fear of appreciation, *Journal of Development Economics*, 101, 233–247.

Miranda-Agrippino, S. and H. Rey (2015) World Asset Markets and the Global Financial Cycle, *NBER Working Paper* No. 21722.

Montiel, P. J. ve L. Serven (2008). Real Exchange Rates, Saving and Growth: Is There a Link?, *World Bank Policy Research Working Paper* No: 4636.

Nouira, R. and K. Sekkat (2012) Desperately seeking the positive impact of undervaluation on growth, *Journal of Macroeconomics*, 34, 537-552.

Obstfeld, M. (2004) "Globalization, Macroeconomic Performance, and the Exchange Rates of Emerging Economies," *Monetary and Economic Studies*, 22(1), 29–55.

Obstfeld, M. (2015) Trilemmas and tradeoffs: living with financial globalisation, *BIS Working Papers* No 480.

Özatay, F., Özmen, E. and G. Sahinbeyoglu (2009) Emerging market sovereign spreads, global financial conditions and U.S. macroeconomic news. *Economic Modelling*, 26, 526–531.

Özmen, E., Yaşar, Ö. D. 2016. Emerging market sovereign bond spreads, credit ratings and global financial crisis. *Economic Modelling* 59 (2016) 93–101.

Pedroni, P. (2000). 'Fully-modified OLS for Heterogeneous Cointegrated Panels', *Advances in Econometrics*, Vol. 15, pp. 93–130.

Pedroni, P. (2004). 'Panel cointegration; asymptotic and finite sample properties of pooled time series tests with an application to the PPP Hypothesis', *Econometric Theory*, 20(3), 597–625.

Pedroni, P. (2007) Social Capital, Barriers to Production and Capital Shares; Implications for the Importance of Parameter Heterogeneity from a Nonstationary Panel Approach, *Journal of Applied Econometrics*, 22, 429-51.

Pesaran, M.H., Y. Shin and R.P. Smith (1999) Pooled mean group estimation of dynamic heterogeneous panels, *Journal of the American Statistical Association*, 94, 621–634

Rey, H. (2015) Dilemma not trilemma: The global financial cycle and monetary policy independence, *NBER Working Paper* No. 21162.

Rey, H. (2016) International Channels of Transmission of Monetary Policy and the Mundellian Trilemma, *NBER Working Paper* No. 21852.

Rockey, J and J. Temple (2016) Growth econometrics for agnostics and true believers, *European Economic Review*, 8, 86–102

Rodrik, D. (2008). The Real Exchange Rate and Economic Growth, *Brookings Papers on Economic Activity*, Fall, 365-412.

Woodford, D. (2008). The Real Exchange Rate and Economic Growth: Comment, *Brookings Papers on Economic Activity*, Fall, 420-437.

V. Appendix

Table A1. Data Sources	
GDP, per capita real GDP at constant 2010 USD.	*World Bank, World Development Indicators (WDI)*
GDP, per capita real GDP at chained PPPs.	*PENN World Table, Version 9.0, Feenstra, et. al., (2015)*
RER^{IMF}, real effective exchange rates	*IMF-IFS, Bank for International Settlements[a] and Inter-American Development Bank[b]*
$REER^{PWT}$, real effective exchange rates	*PENN World Table, Version 9.0 Feenstra, et. al., (2015)*
HC, human capital per worker	*PENN World Table, Version 9.0 Feenstra, et. al., (2015)*
Population	*PENN World Table, Version 9.0 Feenstra, et. al., (2015)*
OPENNESS, trade openness (expressed as the sum of exports and imports over GDP)	*World Bank, WDI*
SAV, domestic savings (as a share of GDP).	*World Bank, WDI*
E.Debt, *External Debt/GDP*	*World Bank, WDI and Global Development Finance database[c].*
VIX, Volatility implicit in U.S. stock options	*Bloomberg*
R^{FED}, Effextive FED Funds target rate	*Federal Reserve Board*

Notes: **a.** *RER^{IMF}*data for Iceland, India, Indonesia, Korea R., Lithuania, Slovenia, Thailand, Turkey and Estonia are from Bank for International Settlements (BIS) database.
b. *RER^{IMF}* data for Argentina, Guatemela, Haiti, Honduras, Jamaica and Peru are from Inter-American Development Bank (IADB).
c. External Debt/GDP data for Argentina, Bahamas, Chile and Uruguay are from IADB.

Table A2. Country List				
Advanced (AE)		*Developing or Emerging (DE)*		
Australia	Spain	Algeria	Estonia	Nigeria
Austria	Sweden	Argentina	Fiji	Pakistan
Belgium	Switzerland	Armenia	Gabon	Paraguay
Canada	U. Kingdom	Bahamas	Gambia	Peru
Denmark	U. States	Belize	Ghana	Philippines
Finland		Bolivia	Guatemala	Poland
France		Brazil	Guyana	Romania
Germany		Bulgaria	Haiti	Russian F.
Greece		Burundi	Honduras	Sierra Leone
Iceland		Cameroon	Hungary	Slovakia
Israel		C.African R.	India	Slovenia
Italy,		Chile	Indonesia	S. Africa
Japan,		China	Iran	Thailand
Luxembourg		Colombia	Jamaica	Togo
Malta		Costa Rica	Korea R.	Tunusia
Netherlands		Cote D'Ivore	Latvia	Turkey
N. Zealand		Croatia	Lesotho	Uganda
Norway		Cyprus	Lithuania	Ukraine
Portugal		Czech R.	Malawi	Uruguay
Singapore		Dominica	Malaysia	Venezuela
		Dominican R.	Mexico	Zambia
		Ecuador	Morocco	

Table A3. RER and Growth: Robustness				
Country Grouping	*AE*	*DE*	*AE*	*DE*
Dependent Variable	y_{it}		y^{PWT}_{it}	
Equation	***(A.1)***	***(A.2)***	***(A.3)***	***(A.4)***
$reer^{PWT}_{it}$	0.260** (0.011)	0.496** (0.005)	0.373** (0.011)	0.509** (0.008)
HC_{it}	0.557** (0.011)	0.480** (0.005)	0.814** (0.020)	0.698** (0.011)
SAV_{it}	0.961** (0.034)	0.498** (0.012)	1.553** (0.031)	0.709** (0.018)
$OPEN_{it}$	0.243** (0.006)	0.095** (0.008)	0.316** (0.012)	0.041** (0.012)
$OPEN_{it}$ * $reer_{it}$	-0.105** (0.004)	-0.020** (0.007)	-0.246** (0.009)	-0.050** (0.009)
vix_t	0.044** (0.004)	-0.003 (0.002)	0.040** (0.004)	-0.026** (0.003)
fed $rate_t$	-0.377** (0.065)	-0.326** (0.033)	-1.389** (0.067)	-0.778** (0.059)
$E.Debt_{it}$		-0.073** (0.007)		-0.254** (0.009)
$E.Debt_{it}$*$reer_{it}$		-0.173** (0.006)		-0.283** (0.008)
Diagnostics	N=24 NT=667 R^2 = 0.96 LRV= 0.002 LLC = -6.20 [0.00]	N=50 NT=1263 R^2 = 0.98 LRV= 0.001 LLC = -8.91 [0.00]	N=24 NT=667 R^2 = 0.90 LRV= 0.002 LLC = -7.60 [0.00]	N=50 NT=1269 R^2 = 0.97 LRV= 0.003 LLC = -8.38 [0.00]
Notes: See Table 4.				