Deposit Dollarization in Emerging Markets: Efficient Risk Sharing or Prescription for Disaster?”

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Outline

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- Where do the facts take us?
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- Some policy implications.
Figure: Local Currency and Dollar Deposits

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- Convert local currency to dollars
- $i^*$ exchange-rate-adjusted dollar interest rate
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Deposit Dollarization

- Measure of deposit dollarization for a particular country:

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- Dollarization data:
  - We extend number of countries from 124 to 140 and extend to 2018.
Deposit Dollarization Still Important

Note: (i) sharp rise in deposit dollarization in 1980s and 1990s; (ii) after 2000, only slight downward trend.
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Deposit Dollarization versus How Much $S_t/P_t$ Jumps in Recession: 2000-2018
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- What shocks would make demand high i.e., make covariance between GDP & $S/P$ very negative?

- Standard: Disturbances to export demand, government irresponsibility, US crises (Gourinchas, Rey, Govillot (2017)).
- Sunspots: fear of financial crisis motivates deposit dollarization, which then causes anticipated crisis (will show evidence against this hypothesis).

$\star$ jumps in a recession, exactly when households have low income.

Implication: in a country with high demand for income insurance

- Shortage of local currency in loan market $\rightarrow i$ high (implicit assumption that foreigners reluctant to supply local currency).

- Relative abundance of dollar deposits $\rightarrow i^*$ low.

- Interest rate spread, $i - i^*$, high.
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  - Interest rate spread, $i - i^*$, high.
Interest Rate Spread, $i - i^*$, Against Dollarized Deposits

Note: Average deposit dollarization is 2004-2017 average
Implicit tax for Dollar Deposits

- Earnings on local deposits:

  \[ (d^* + d) i (1 - \tau) = d^* i^* + d i, \]

  solving:

  \[ \tau = \frac{(i - i^*) d^*}{i (d^* + d)}. \]
How Much is the Implicit Tax Paid by People that hold Dollar Deposits?

People in countries with high dollarization are paying 0.5 - 1.5 percent on their deposits for income insurance. That's close to what hedge funds make in management fees.
Who is Providing the Insurance to Dollar Depositors?

- Answer depends on whether and where currency mismatch appears.
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- Answer depends on whether and where currency mismatch appears.
- Since crises of 1980s and 1990s regulators seem to have been averse to currency mismatch in banks.
Little Currency Mismatch in Banks, 2005-2018

R2 = 0.887
Slope = 0.991
Deposit Dollarization as Insurance Arrangement

- Some people (ordinary households?), by putting dollar deposits in banks, in effect receive business cycle insurance from others (the households that own non-financial firms?).
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- Dollarization of financial markets looks like many other markets (e.g., commodity futures) in which risk is reallocated among people.
For example, when a depreciation occurs in a recession (i.e., $i^*$ is high), then
- firms owe banks a lot of money just when they don’t have very much.
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- Let’s look at the facts....
Data

- Data on systemic banking crises taken from Laeven & Valencia, 2018, ‘Systemic Banking Crises Revisited’
  - '1' in crisis, '0', not in crisis.
  - Crisis:
    - Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations).
    - Significant banking policy intervention measures in response to significant losses in the banking system.

- Data on Sudden Stops from Reinhart and Rogoff (2009).

- Data on cost of crisis: GDP growth from IMF.
Two Questions

- What is relation between deposit dollarization and *frequency* of crisis?

- What is relation between deposit dollarization and *intensity* of crisis when it happens?
Probability of a Banking Crisis versus Deposit Dollarization

Note: 1994-2018
Probability of a Sudden Stop versus Deposit Dollarization

Figure 1: Frequency of Sudden Stops and Dollarization
Note: Each point corresponds to a country. There are 34 countries in the data and 43 observed sudden stops between 1990-2014. In case of more than one sudden stop, I took the average deposit dollarization. I did not observe any country where deposit dollarization changed significantly over the years.

Intersection of 66 Reinhart and Rogoff (2009) countries for Sudden Stops and the countries for which we have dollar deposit data.
Loss of Output In a Banking Crisis versus Deposit Dollarization

1994-2018

2000-2018
Loss of Output In a Sudden Stop versus Deposit Dollarization

Figure 3: Severity of Sudden Stops and Dollarization

Note: Each point corresponds to an individual sudden stop. There are 34 countries in the data and 43 observed sudden stops between 1990-2014. I took log difference between average annual GDP (Consumption) one year before and after the observed sudden stop. From that number, I subtracted decade average growth to remove trend.
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Is Likelihood of Crisis Higher if Currency Depreciates in an Economy with Dollarized Deposits?

- Currency depreciation:
  - *Expenditure switching channel* - stimulates economy and improves balance sheets.
  - *Financial Channel* - hurts firms with unhedged dollar liabilities, who may put a drag on the economy by cutting back on investment.

Levy-Yeyati (Econ Policy, 2006) argues that financial channel dominates expenditure switching channel, when deposit dollarization is above 10 percent.

Eduardo kindly provide us with his own data, but we find that his results are fragile.

Using our data, we do not find that an exchange rate depreciation is significantly more likely to lead to crisis if the economy has dollarized deposits.
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Dollarization: Another Possible Pitfall

- Even if dollarization does not lead to crisis,
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  - We are looking more closely at non-financial firms in individual countries, such as Turkey, Peru and others.
Turkey: Foreign Currency Loans to Firms Apparently Not a Source of Instability

Note: Share of non-performing loans over total loans. FX loans represents loans in foreign currency; TRY loans represents loans in Turkish Lira. Data source: Central Bank of Turkey.
Peru: Fairly Big Depreciation Recently

Figure 1: Nominal Exchange Rate in Peru
Peru: Non-performing Local Currency (LC) and Foreign Currency (FC) Loans

Non-Performing Loans in Peru

Note:
Peru: 28 Largest Firms in Recent Depreciation

For each firm, have data on $Assets and $Liabilities, and S/ Assets and S/ Liabilities.
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- Compute, for 2014Q2-2017Q4 and as percent of firm equity
  - growth in total assets (proxy for investment)
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Figure: Credit Dollarization vs Asset Growth 2014Q2-2015Q4
Peru: Example of the Local Insurance Story?

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  - To understand better who is giving and receiving the insurance need to know better who is making deposits (households versus businesses).

- Concerns that deposit dollarization destabilizes, overall, does not seem to be a major concern in the data.
  - Can be minimized by:
    ⋆ keeping currency mismatch out of banks (they are highly leveraged).
    ⋆ ensure that banks assign proper risk weights in their capital requirements for dollar loans (that would in effect put a tax on dollarized deposits in countries where dollar loans are risky).

- All the usual reasons to regulate financial markets continue to apply.
  - Inability of government to commit to not bail out.
  - Various externalities.
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Crisis: Message of Preceding Example

- The example is extreme.

- In practice, firms borrow long-term and a crisis depreciation is partially reversed. In the case of Korea: depreciation 110% from January 1997 to January 1998. Depreciation from January 1997 to January 1999 'only' 50%.

- Dalgic, et al's 2017 study of Turkey suggests it is large firms and firms with exports that borrow the bulk of dollar credit. These firms are relatively resilient to exchange rate changes.

- Message: Insist that banks have no currency mismatch. Allow some mismatch in firms, which have lower leverage and can handle exchange rate shocks better. In this case, dollarization may not be so dangerous.
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    ★ Depreciation from January 1997 to January 1999 ‘only’ 50%.
  - Dalgic, et al’s 2017 study of Turkey suggests it is large firms and firms with exports that borrow the bulk of dollar credit.
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- Message:
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  - Insist that banks have no currency mismatch.
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  - In this case, dollarization may not be so dangerous.
Did We Get the Causality Backwards?

- We have argued that exchange rate depreciations in recessions drive the demand for deposit dollarization.

- But, is it possible that causality goes the other way around? Could it be that deposit dollarization is the cause of recessions accompanied by currency depreciation?

- That possibility seems inconsistent with the evidence that deposit dollarization is uncorrelated with:
  - frequency of sudden stops and financial crisis.
  - the severity of recessions that follow a sudden stop and/or financial crisis.

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Levy-Yeyati Evidence

- Levy-Yeyati: with deposit dollarization, financial dominates expenditure switching channel.
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- We find: Levy-Yeyati’s results fragile.
Levy-Yeyati Evidence

- Levy-Yeyati: with deposit dollarization, financial dominates expenditure switching channel.
- We find: Levy-Yeyati’s results fragile.
  - not statistically significant using improved new econometric methods Mitchell (Review of Finance, 2009) used.
  - Very sensitive to exactly how ‘deposit dollarization’ is measured.
  - Point estimates reversed when post-2003 data are used.
### Different Standard Errors

<table>
<thead>
<tr>
<th>left hand variable: Crisis Dummy</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS SE</td>
<td>Country Cluster</td>
<td>Country-Year Cluster</td>
</tr>
<tr>
<td>( \Delta er_{-1} )</td>
<td>-0.829</td>
<td>-0.829</td>
<td>-0.829</td>
</tr>
<tr>
<td></td>
<td>(1.263)</td>
<td>(0.706)</td>
<td>(0.799)</td>
</tr>
<tr>
<td>( FL / FA_{-1} )</td>
<td>0.00348</td>
<td>0.00348**</td>
<td>0.00348**</td>
</tr>
<tr>
<td></td>
<td>(0.00303)</td>
<td>(0.00139)</td>
<td>(0.00137)</td>
</tr>
<tr>
<td>( dollar_{-1} )</td>
<td>0.674**</td>
<td>0.674*</td>
<td>0.674</td>
</tr>
<tr>
<td></td>
<td>(0.333)</td>
<td>(0.359)</td>
<td>(0.429)</td>
</tr>
<tr>
<td>( FL / FA \times \Delta er_{-1} )</td>
<td>0.0715</td>
<td>0.0715**</td>
<td>0.0715**</td>
</tr>
<tr>
<td></td>
<td>(0.0619)</td>
<td>(0.0312)</td>
<td>(0.0313)</td>
</tr>
<tr>
<td>( dollar \times \Delta er_{-1} )</td>
<td>1.310</td>
<td>1.310*</td>
<td>1.310</td>
</tr>
<tr>
<td></td>
<td>(1.250)</td>
<td>(0.695)</td>
<td>(0.834)</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01
Different Standard Errors

Notes on previous table.
These are logit regressions. \( \Delta er_{-1} \) log change in exchange rate (depreciation if positive), lagged one period.
\( FL/FA_{-1} \) ratio, foreign liabilities to foreign assets (whether to residents or non-residents) in domestic banking system.
\( dollar_{-1} \) 1 if dollarization was greater than 10% in previous period; 0 otherwise
Sample period: 1975-2002
Column 2 exactly reproduces L-Y results (thanks to LY for sending us his code and data). Country Cluster standard errors assume dependence of error term over time within countries and independence across countries. Column 1 computes standard errors assuming errors independent over time and across countries.
Column 3 implements Peterson’s method which allows, in addition to dependence over time, dependence across countries for a given point in time. Crisis have a tendency to be correlated across countries. If a crisis (i.e., ‘1’) persists for more than one year, observations on subsequent years are dropped. The dropped data are treated as ‘missing observations by STATA’. We follow L-Y in this procedure.

Note sensitivity of results to method of computing standard errors. Arguably, Peterson’s approach is more appealing in this setting because of the cross-country ‘contagion’ associated with crises.
## Deposit Dollarization

**Table:** Different Measures of Deposit Dollarization in Levy-Yeyati’s Table 5 Results

<table>
<thead>
<tr>
<th></th>
<th>10 Percent</th>
<th>15 Percent</th>
<th>20 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crisis Dummy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta er$</td>
<td>-0.829</td>
<td>0.0781</td>
<td>0.0364</td>
</tr>
<tr>
<td></td>
<td>(0.706)</td>
<td>(0.371)</td>
<td>(0.356)</td>
</tr>
<tr>
<td><strong>FL/FA</strong></td>
<td>0.00348**</td>
<td>0.00268***</td>
<td>0.00259***</td>
</tr>
<tr>
<td></td>
<td>(0.00139)</td>
<td>(0.000568)</td>
<td>(0.000550)</td>
</tr>
<tr>
<td><strong>dollar</strong></td>
<td>0.674*</td>
<td>0.569*</td>
<td>0.335</td>
</tr>
<tr>
<td></td>
<td>(0.359)</td>
<td>(0.333)</td>
<td>(0.321)</td>
</tr>
<tr>
<td>*<em>FL/FA</em>$\Delta er$**</td>
<td>0.0715**</td>
<td>0.0533***</td>
<td>0.0517***</td>
</tr>
<tr>
<td></td>
<td>(0.0312)</td>
<td>(0.0136)</td>
<td>(0.0132)</td>
</tr>
<tr>
<td>*<em>dollar</em>$\Delta er$**</td>
<td>1.310*</td>
<td>0.433</td>
<td>0.503</td>
</tr>
<tr>
<td></td>
<td>(0.695)</td>
<td>(0.460)</td>
<td>(0.451)</td>
</tr>
</tbody>
</table>

**Observations:** 1104 1104 1104

*Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Deposit Dollarization

Notes on previous table:
First column reproduces Levy-Yeyati’s second column in ‘Different Standard Errors’ table. The other two columns in this table define the ‘dollarization dummy’ as 1 when deposit dollarization exceeds 15 and 20 percent, respectively. Levy-Yetati’s results depend on using a dummy that is unity when deposit dollarization exceeds 10 percent.
Note that significance of produce of dummy and exchange rate depreciation sensitive to definition of dollarization.
### Levy-Yeyati Analysis on Post-2003 Data

**Table: Our Data: Levy-Yeyati Table 5, Column 2**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Whole Sample</td>
<td>Without Armenia, 1994</td>
<td>2003 and Before</td>
<td>After 2003</td>
</tr>
<tr>
<td>LV Crisis Dummy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dollar (-1)</td>
<td>0.0954</td>
<td>0.141</td>
<td>0.547*</td>
<td>-0.408</td>
</tr>
<tr>
<td></td>
<td>(0.334)</td>
<td>(0.332)</td>
<td>(0.314)</td>
<td>(0.530)</td>
</tr>
<tr>
<td>Δer (-1)</td>
<td>-0.795**</td>
<td>-0.795**</td>
<td>-1.075</td>
<td>-0.777***</td>
</tr>
<tr>
<td></td>
<td>(0.366)</td>
<td>(0.366)</td>
<td>(1.920)</td>
<td>(0.293)</td>
</tr>
<tr>
<td>dollar (×) Δer (-1)</td>
<td>1.436***</td>
<td>0.923</td>
<td>1.632</td>
<td>-6.659**</td>
</tr>
<tr>
<td></td>
<td>(0.420)</td>
<td>(0.660)</td>
<td>(2.046)</td>
<td>(2.659)</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.001***</td>
<td>-4.001***</td>
<td>-4.007***</td>
<td>-3.989***</td>
</tr>
<tr>
<td></td>
<td>(0.589)</td>
<td>(0.589)</td>
<td>(0.367)</td>
<td>(1.009)</td>
</tr>
<tr>
<td>Observations</td>
<td>2861</td>
<td>2860</td>
<td>1161</td>
<td>1700</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Levy-Yeyati Analysis on Post-2003 Data

Notes on previous table. Here, we use our data set, which we extended to 2018. Interestingly, when we extend L-Y’s analysis to the end of our sample (column 1), we get his result. In particular, the coefficient on \( \text{dollar} \times \Delta er_{-1} \) is statistically significant and it is larger than the coefficient on \( \Delta er_{-1} \). This means that an exchange rate depreciation in a country with above 10% deposit dollarization raises the probability of crisis by \((-1.436 - .795) > 0\). An exchange rate depreciation in a country without deposit dollarization reduces the probability of a crisis by 0.795, presumably because in the absence of dollarization only the expenditure switching channel works, so that an exchange rate depreciation improves the health of all economic entities, not just banks. We see from column 2, however, that the results are driven by one single data point, Armenia in 1994. In that period there was a gigantic change in the exchange rate associated with Armenian independence from the Soviet Union (that was actually formally declared on September 21, 1991). So, if we drop the one outlier data point, the whole sample completely reverses L-Y’s results. We suspect that’s because many of the crises in the pre-2003 period occurred in emerging markets where deposit dollarization tends to be relatively high while the post-2003 crises occurred in developed economies where deposit dollarization is low (see columns 3 and 4). This is why analysis using only the later period seems to indicate that deposit dollarization immunizes you from crisis. Our inference is that deposit dollarization actually has little to do with crisis.
### Levy-Yeyati Analysis on Post-2003 Data

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<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Sample</td>
<td>External Debt Available</td>
<td>External Debt Available</td>
<td></td>
</tr>
<tr>
<td>LV Crisis Dummy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dollar</td>
<td>0.0954</td>
<td>0.694</td>
<td>0.675</td>
</tr>
<tr>
<td></td>
<td>(0.334)</td>
<td>(0.429)</td>
<td>(0.439)</td>
</tr>
<tr>
<td>∆er_{-1}</td>
<td>-0.795**</td>
<td>-0.0958</td>
<td>0.524</td>
</tr>
<tr>
<td></td>
<td>(0.366)</td>
<td>(1.139)</td>
<td>(0.773)</td>
</tr>
<tr>
<td>dollar × ∆er_{-1}</td>
<td>1.436***</td>
<td>0.851</td>
<td>0.758</td>
</tr>
<tr>
<td></td>
<td>(0.420)</td>
<td>(1.268)</td>
<td>(0.896)</td>
</tr>
<tr>
<td>Interest Paid on External Debt_{-1}</td>
<td></td>
<td></td>
<td>0.252***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0745)</td>
</tr>
<tr>
<td>Interest Paid on External Debt × ∆er_{-1}</td>
<td></td>
<td></td>
<td>-0.578</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.357)</td>
</tr>
</tbody>
</table>
Levy-Yeyati Analysis on Post-2003 Data

Notes on previous table. The results in Table 2 do not include Levy-Yeyati’s variable, $FL/FA$, because we have not yet been able to find that variable for the post 2003 period. The table attempts to shed (preliminary) light on whether the omission of $FL/FA$ in our Table 2 biases our results against Levy-Yeyati’s hypothesis: when deposit dollarization is high, the financial channel dominates the expenditure switching channel of an exchange rate change. The results in the previous table go against the hypothesis. The first column in the table of the previous page reproduces the first column of Table 2 (so, we include the 1994 observation on Armenia). We found a variable that is not the same as $FL/FA$ but which may in practice carry the same information. It is "Interest payments on external debt (% of GNI)", obtained from the World Bank. A difficulty is that we could find this variable for only 60% of our sample (the variable is available for major developing countries, but not advanced economies or very small ones). Column 2 redoes the calculations in column 1 using only the countries for which we have data on 'Interest payments on external debt'. Note that the L-Y results (the coefficient on $dollar \times \Delta er_{-1}$) are less significant on this sample. Column 3 reports the same econometric analysis, but also includes the 'interest payments on external debt' variable. We see little difference between columns 2 and 3 in terms of the major parameter of interest, $dollar \times \Delta er_{-1}$. This is the basis for our preliminary conclusion that excluding $FL/FA$ has not biased our results against L-Y’s hypothesis.
Deposit Dollarization versus How Much $S_t/P_t$ Jumps in Recession: 2000-2018 (Bivariate one-lag VAR)

\[ B = -0.308^{***} \]
\[ R^2 = 0.0869 \]
Foreigners Lend Little Domestic Currency into EME’s

Note: foreign currency debt issued into international securities markets divided by total debt issuance (e.g., including debt denominated in domestic currency). Issuers include all entities of the given nationality. Debt is of all ratings, maturities, etc. Importance of measuring debt issuance by nationality rather than residence stressed in Hyun Shin, ‘The Second Phase of Global Liquidity…’, November, 2013). Data source: BIS.
Share of Foreign Currency Borrowing By Selected Countries

Note: there is substantial variation in this share across countries. In two (Turkey and Indonesia) there is essentially no change.
Domestic currency share of sov’n debt growing. But, sovereigns don’t borrow much in emerging countries.

Note that the although the total is rising, it reaches a rather low max of 20%.
Computing $i - i^*$

- We use data for roughly 30 countries, on which we have observations from currency futures markets.

- For the foreign (risk-free) interest rate, we use the EURO for European Emerging markets and the US dollar for the others.
  
  Foreign interest rate: $i^* = \frac{R^* S'}{S}$, $S, S'$ denote current and next month’s realized spot exchange rate; $R^*$ foreign nominal rate (e.g., three month US gov't securities).

- For domestic risk-free interest rate we use Covered Interest Parity and Futures markets: $i = \frac{R^* F}{S}$

- So, the spread (APR) is: $i - i^* = 1200 \times \frac{R^*}{S} [F - S']$ we will only take averages for this object, so that $S'$ is the expected exchange rate if forecast error in $S'$ orthogonal to current variables.

- The only uncertainty in our measure of the spread is exchange rate uncertainty.
Peru: Stress Test for Exchange Rate Depreciation

Figure 3. Share of net worth of bankrupted firms


Source: Estados financieros de empresas. Vademécum bursátil de la BVI
Peru: Firms in 2000s Much More Robust to Stress

Note: Data for unbalanced sample of Peruvian 80-100 firms covering the years 1999-2014 (the data were kindly passed on to us by Paul Castillo; they were constructed for the work in N. R. Ramírez-Rondán (Empirical Economics, May 2018)). Results are reported for the three indicated years. Vertical axis: net worth of all firms in the sample that are bankrupted by the (counterfactual) exchange rate depreciation on horizontal axis (50 means a 50 percent depreciation). Analysis uses data on local and foreign denominated assets and liabilities. According to the results, with a 100 percent depreciation the net worth of the bankrupted firms is less than 1.5 percent of total net worth. With a 200 percent depreciation, the net worth of bankrupted firms is less than 10 percent of total net worth.
Peru: 28 Largest Firms in Recent Depreciation

Figure: Cumulative FX losses and Net Earnings between 2014Q2 and 2017Q4
Is Likelihood of Crisis Higher if Currency Depreciates in an Economy with Dollarized Deposits? Seemingly, not.

Table: Expenditure Switching versus Balance Sheet Effects: OLS

<table>
<thead>
<tr>
<th></th>
<th>Whole Data Set</th>
<th>2003 and Before</th>
<th>After 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>dollar_{t-1}</td>
<td>0.141</td>
<td>0.547*</td>
<td>-0.408</td>
</tr>
<tr>
<td></td>
<td>(0.332)</td>
<td>(0.314)</td>
<td>(0.530)</td>
</tr>
<tr>
<td>Δer_{t-1}'</td>
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<td>-0.777***</td>
</tr>
<tr>
<td></td>
<td>(0.366)</td>
<td>(1.920)</td>
<td>(0.293)</td>
</tr>
<tr>
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<td>0.923</td>
<td>1.632</td>
<td>-6.659**</td>
</tr>
<tr>
<td></td>
<td>(0.660)</td>
<td>(2.046)</td>
<td>(2.659)</td>
</tr>
</tbody>
</table>

Observations 2860 1161 1700

Note: Annual data; standard errors in parentheses (robust to error correlation across years and across countries);

Δer_{t-1}' is the lagged exchange rate change; ‘dollar’ = 1 > 10%; constant term not displayed; * p<0.1, ** p<0.05, *** p<0.01
Systemic Banking Crises by Laeven & Valencia 2018

1970-2017

• 151 banking crises

Source: Authors’ calculations.

Source: L. Laeven & F. Valencia “Systemic Banking Crises Revisited” IMFWP 2018
Selected Asian-Crisis Countries (Malaysia and Thailand do not allow Deposit Dollarization Now)
Crisis When Currency Mismatch is Held by Firms

- Korean Won depreciated by a factor of 2.1 from 800 to 1,700 during Asian Financial Crisis.
Crisis When Currency Mismatch is Held by Firms

- Korean Won depreciated by a factor of 2.1 from 800 to 1,700 during Asian Financial Crisis.

- Suppose:
  - Leverage is 2 (this is the US and, arguably, Turkey (see Dalgic, et al)).
  - Credit dollarization is 50%.
Crisis When Currency Mismatch is Held by Firms

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**Table**: Assets and Liabilities of a Firm (all numbers in Won)

<table>
<thead>
<tr>
<th></th>
<th>Before Crisis</th>
<th>After Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Liabilities</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>50 local currency debt</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>50 dollar debt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 equity</td>
<td>100 dollar debt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 equity</td>
</tr>
</tbody>
</table>
Crisis When Currency Mismatch is Held by Firms

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<th>After Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Liabilities</td>
<td>Assets</td>
</tr>
<tr>
<td>200</td>
<td>50 local currency debt</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>50 dollar debt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 equity</td>
<td>100 dollar debt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 equity</td>
</tr>
</tbody>
</table>

- The firm can weather this storm.
Crisis When Currency Mismatch is Held by Banks

- Banks have much higher leverage, maybe 10.
- Suppose bank has 50% dollar credit.
Crisis When Currency Mismatch is Held by Banks

- Banks have much higher leverage, maybe 10.
- Suppose bank has 50% dollar credit.

**Table: Assets and Liabilities of a Bank (all numbers in Won)**

<table>
<thead>
<tr>
<th>Before Crisis</th>
<th>After Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>90 local currency debt</td>
<td>90 local currency debt</td>
</tr>
<tr>
<td>90 dollar debt</td>
<td>180 dollar debt</td>
</tr>
<tr>
<td>20 equity</td>
<td>-70 equity</td>
</tr>
</tbody>
</table>
Banks have much higher leverage, maybe 10.

Suppose bank has 50% dollar credit.

**Table: Assets and Liabilities of a Bank (all numbers in Won)**

<table>
<thead>
<tr>
<th>Before Crisis</th>
<th>After Crisis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Liabilities</td>
</tr>
<tr>
<td>200</td>
<td>90 local currency debt</td>
</tr>
<tr>
<td>90 dollar debt</td>
<td></td>
</tr>
<tr>
<td>20 equity</td>
<td></td>
</tr>
</tbody>
</table>

This bank is now insolvent!