Gradual Versus Big-Bang Devaluations: An Empirical Analysis
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Abstract

This paper examines the pros and cons of gradual versus big-bang approaches toward devaluations. It presents original empirical evidence regarding output, consumption, investment and trade balances associated with gradual and big-bang devaluation episodes. It finds that big-bang devaluations are associated with lower output, investment and consumption, while gradual devaluations are not associated with any contemporaneous drops. Five case studies of gradual devaluations are also conducted.

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JEL Classification: E50, E52, F41

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Gradual Versus Big-Bang Devaluations: An Empirical Analysis
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Introduction

There are two approaches toward large devaluations: big bang and gradual. The first approach is to do a large one-off devaluation. The second approach is to devalue gradually and credibly. In this short paper, we will discuss the pros and cons of gradual versus big-bang devaluations and present original empirical evidence regarding output, consumption, investment and trade balances associated with gradual and big-bang devaluation episodes.

Our empirical results indicate that with a big-bang devaluation, while the trade balance improves, exports do not increase. More importantly, large devaluations are associated with significant contemporaneous drops in GDP, investment and consumption, as well as consumption the year after. Some of these negative effects may be associated with the fact that bad economic times sometimes force countries to carry out a large exchange rate adjustment; the worsening of the indicators may not only be dependent on the exchange rate adjustment.

Gradual devaluations seem to lead to better outcomes. After a gradual devaluation, the trade balance improves. There are no negative contemporaneous effects. This is arguably because the economy will only have to deal with incremental changes, as opposed to large devaluations that shock the economy. A potential downside to a gradual devaluation is that runaway expectations to further exchange rate adjustments may occur, which need to be carefully managed. Since the final outcome of any gradual devaluation, however, is also determined by the initial conditions of a country, we discuss a number of case studies to identify success factors and challenges before concluding.

This analysis was originally carried out in support of the World Bank’s client dialogue in two African countries in 2016.

Pros and Cons of Gradual versus Big-Bang Devaluations

A big-bang devaluation brings several challenges: a large and sudden devaluation will bring disruptions to trade, as exports suddenly become cheaper, and imports suddenly become more expensive. In addition, a sharp devaluation will raise the value of foreign debts (which are usually denominated in hard currencies such as the dollar) and generate problems in servicing international debt. If “currency mismatch” is a problem, that is, if domestic banks are heavily dollar-denominated in their liabilities, a large sudden devaluation could lead to a banking crisis. This could cause a credit crunch and consequently, a decline in investment and output. Finally, spikes in import prices, particularly food import prices, and the ensuing inflation, could lead to social chaos. A key advantage for big-bang devaluation is that it does not reinforce expectations for further rounds of depreciations (Katseli, 1988).

On the other hand, an upside to gradual valuation approach is that the economy will only have to deal with incremental changes in relative prices. This is especially useful when the country has a large liability position in foreign currencies, for example, when the country has a high level of external debt, or when they rely on imports for their domestic consumption. A downside of this gradual approach is the difficulty in managing depreciation expectations.
First, incentives to hoard foreign exchanges would create a black market for foreign exchanges and put pressure on the central bank to either defend the domestic currency (which drains central bank’s foreign reserves) or devalue earlier than planned. Second, speculative capital outflows could lead to a spiral of repeated rounds of self-fulfilling currency devaluations, or worse, a currency crisis. For this reason, taming and managing expectation is key, when choosing a gradual approach to currency devaluation (McKenzie, 1969).

Identification of and Empirical Evidence for the Impact of Gradual Versus Big-Bang Devaluations

a) Approach

Identification of Big-bang devaluation episodes. To identify large, discrete and one-off devaluation events, we apply the following criteria: (i) the current year depreciation rate is at least 20 percent (December/December); (ii) the previous year’s depreciation rate did not exceed 12 percent\(^1\); (iii) an event that met these two criteria did not occur in the previous three years. These criteria rule out cases where there were multiple consecutive years of sharp depreciation, which could reflect excessively high inflation, for example.

We also added a few additional restrictions to the sample to exclude events that were not relevant. Especially, we excluded cases, where:

- the nominal exchange rate two years after the devaluation was less depreciated compared to the levels observed in the two years prior to devaluation. This is to help eliminate temporary large commodity-price induced fluctuations in exchange rates.
- The exchange rate events coincided with armed conflicts as identified by the Correlates of War dataset to avoid distortions from security events that affect output and exchange rates.

We also exclude cases where countries belong to Common Monetary Areas (currency unions). Applying these criteria, we identified 217 big-bang devaluation episodes between 1960 and 2015.

Identification of Gradual devaluation episodes. To identify gradual devaluations, we apply the following rules: (i) the nominal exchange rate depreciates from between 5 to 20 percent for at least 3 consecutive years; (ii) the year right before gradual devaluation starts, the nominal exchange rate does not depreciate more than 20 percent; (iii) the country does not adopt a floating exchange rate at the time of gradual devaluation. There are 92 gradual devaluation episodes between 1960 and 2015.

b) Regressions

There are two sets of regressions. For big-bangs:

\[
\Delta y_{c,t} = \beta_0 + \beta_1 \text{BigBang}_{c,t} + \beta_2 \text{BigBang}_{c,t-1} + \beta_3 \text{BigBang}_{c,t-2} + \beta_4 \text{controls}_{c,t-1} + f e_t + f e_c + \epsilon_{c,t}
\]

\(\text{BigBang}_{c,t}\) takes the value of 1 if there is a big-bang devaluation in year \(t\) in country \(c\). If there is no big-bang nor gradual devaluations, it will take the value of 0. Note that we exclude all

\(^1\) The 12 percent threshold was chosen instead of the round 10 percent, so we can increase the number of identified large depreciations in the sample for the analysis.
episodes of gradual devaluations. The point is to compare growth in big-bang episodes with that in normal times.

\( f_e \) are time fixed-effects; and \( f_c \) are country fixed-effects. The time fixed-effects are to capture world factors that affect growth of all countries at time \( t \). The country fixed-effects capture all time-invariant country characteristics. In other words, we compare growth between big-bang devaluations in the regression versus normal times within a country.

Similarly, we estimate the impact of gradual devaluations with the following regression:

\[
\Delta y_{c,t} = \beta_0 + \beta_1 \text{Gradual}_{c,t} + \beta_2 \text{Gradual}_{c,t-1} + \beta_3 \text{Gradual}_{c,t-2} + \beta_4 \text{controls}_{c,t-1} + f_e \nonumber + f_c + \varepsilon_{c,t}
\]

\( \text{Gradual}_{c,t} \) takes the value of 1 if there is a gradual devaluation in year \( t \) in country \( c \). If there is no big-bang nor gradual devaluations, it will take the value of 0. Note that in this regression we exclude all episodes of big-bang devaluations. The point is to compare growth in gradual devaluation episodes with that in normal times.

The dependent variables are:

- Log change in real output per capita (in US Dollars)
- Log change in real investment per capita (in US Dollars)
- Log change in real consumption per capita (in US Dollars)
- The change in net export (export minus import) between \( t \) and \( t-1 \), as a fraction of output in \( t-1 \) (in US Dollars)
- Log change in real gross export (in US Dollars)
- Log change in real gross imports (in US Dollars)

In addition, we also interact some interesting variables with devaluations to see if they matter in devaluations. They are:

- Credit, measured as credit to the private sector as \% of GDP
- Wealth: takes the value of 1 if the country is above the median of Real GDP per capita in 2014. Ethiopia belongs to the lower median.
- Debt: a country’s external debt as \% of GNI

The regression with the interaction terms are as follows:

For big-bangs:

\[
\Delta y_{c,t} = \beta_0 + \beta_1 \text{BigBang}_{c,t} + \beta_2 \text{BigBang}_{c,t-1} + \beta_3 \text{BigBang}_{c,t-2} + \beta_4 \text{controls}_{c,t-1} + \beta_5 \text{controls}_{c,t-1} \times \text{BigBang}_{c,t} + f_e + f_c + \varepsilon_{c,t}
\]

For gradual devaluations:

\[
\Delta y_{c,t} = \beta_0 + \beta_1 \text{Gradual}_{c,t} + \beta_2 \text{Gradual}_{c,t-1} + \beta_3 \text{Gradual}_{c,t-2} + \beta_4 \text{controls}_{c,t-1} + \beta_5 \text{controls}_{c,t-1} \times \text{Gradual}_{c,t} + f_e + f_c + \varepsilon_{c,t}
\]

We will focus on \( \beta_3 \) to examine if the country characteristics matter in devaluations.

c) Data

Several sources of data are collected. World Development Indicators (WDI) dataset provides data on output, investment, consumption, exports, credit, population, real GDP per capita and exchange rate. Exchange rate regimes are from Ilzetzki et al (2017). We drop observations of countries while they had floating exchange rate regimes. The Correlates of War dataset is from
Sarkess et al (2010). We drop observations where countries had armed conflicts. The econometric exercises are done with country-level panel data and country fixed effects. That is, we compare the performance of the same country between big-bang devaluations and non-events. Separately, we compare the performance of the same country between gradual devaluations and non-events.

**Empirical Results**

**Baseline results: Impact on output, investment, and consumption**

*Big-bang devaluation.* Table 1 reports the results for big-bang devaluations. Big-bang devaluations are associated with large and significant drops in output, investment, consumption in the same year. Two explanations are possible. The first is that bad economic times force countries to do large devaluations. This is clearly seen in many crisis episodes, when countries had to abandon defending their exchange rates. We try to somewhat remove that effect by controlling for lag of output. The second reason is that large devaluations cause the economy to tank, via several channels. The first channel operates via balance sheet effects. This refers to the case when the countries’ liability is denominated in foreign currencies (most popularly is US dollars). Large devaluations suddenly increase the real value of the countries’ liabilities. This could lead to banking crises, credit crunches, and a decline in borrowing, which inevitable lead to declines in investment and output. The second channel operates via the decline in import, as imports are now more expensive. If the country imports important capital, such as machinery, big-bang devaluations depress the ability to import. We observe big-bang devaluations improve the trade balance; yet not through an increase in exports, but via a decrease in imports.

**Table 1: Impact of Big-Bang Devaluations**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(2) ΔGDP per capita</th>
<th>(3) Δ Investment</th>
<th>(4) Δ Consumption</th>
<th>(5) Δ Trade Balance</th>
<th>(6) Δ Exports</th>
<th>(7) Δ Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged GDP</td>
<td>-1.20e-06***</td>
<td>-3.53e-07</td>
<td>-5.30e-07</td>
<td>1.02e-06</td>
<td>-1.61e-06**</td>
<td>-4.47e-07</td>
</tr>
<tr>
<td></td>
<td>(3.87e-07)</td>
<td>(1.04e-06)</td>
<td>(3.47e-07)</td>
<td>(1.03e-06)</td>
<td>(7.08e-07)</td>
<td>(5.74e-07)</td>
</tr>
<tr>
<td>Big-bang</td>
<td>-0.0176***</td>
<td>-0.0220</td>
<td>-0.0281***</td>
<td>0.0196***</td>
<td>0.00460</td>
<td>-0.0532**</td>
</tr>
<tr>
<td></td>
<td>(0.00413)</td>
<td>(0.0426)</td>
<td>(0.00855)</td>
<td>(0.00887)</td>
<td>(0.0153)</td>
<td>(0.0226)</td>
</tr>
<tr>
<td>Big-bang (t-1)</td>
<td>-0.000787</td>
<td>-0.00712</td>
<td>-0.00339</td>
<td>-0.0112</td>
<td>0.0213</td>
<td>-0.0000906</td>
</tr>
<tr>
<td></td>
<td>(0.00397)</td>
<td>(0.0262)</td>
<td>(0.0117)</td>
<td>(0.0218)</td>
<td>(0.0130)</td>
<td>(0.0198)</td>
</tr>
<tr>
<td>Big-bang (t-2)</td>
<td>0.000624</td>
<td>0.0641**</td>
<td>0.00177</td>
<td>-0.0217</td>
<td>-0.000470</td>
<td>0.00330</td>
</tr>
<tr>
<td></td>
<td>(0.00479)</td>
<td>(0.0258)</td>
<td>(0.00978)</td>
<td>(0.0280)</td>
<td>(0.0155)</td>
<td>(0.0192)</td>
</tr>
<tr>
<td>Credit (t-1)</td>
<td>-0.000142**</td>
<td>-0.00108***</td>
<td>-0.000156**</td>
<td>5.91e-05</td>
<td>-4.27e-05</td>
<td>-0.000552***</td>
</tr>
<tr>
<td></td>
<td>(6.35e-05)</td>
<td>(0.000245)</td>
<td>(6.96e-05)</td>
<td>(0.000130)</td>
<td>(0.000142)</td>
<td>(0.000148)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0285***</td>
<td>0.0890**</td>
<td>0.0149**</td>
<td>-0.0122*</td>
<td>0.0629***</td>
<td>0.0474**</td>
</tr>
<tr>
<td></td>
<td>(0.00595)</td>
<td>(0.0377)</td>
<td>(0.00751)</td>
<td>(0.00658)</td>
<td>(0.0185)</td>
<td>(0.0199)</td>
</tr>
</tbody>
</table>

Observations 5,125
R-squared 0.078
Number of Country 159

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

*Gradual devaluation.* Table 2 reports the results for gradual devaluations. Gradual devaluations are not associated with a drop in output, investment or consumption. Gradual devaluations are associated with a contemporaneous improvement in the trade balance, the result is weakly significant.
Table 2: Impact of Gradual Devaluations

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>ΔGDP per capita</th>
<th>Δ Investment</th>
<th>Δ Consumption</th>
<th>Δ Trade Balance</th>
<th>Δ Exports</th>
<th>Δ Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged GDP</td>
<td>-1.15e-06***</td>
<td>-5.14e-07</td>
<td>-2.99e-07</td>
<td>5.02e-07</td>
<td>-1.48e-06**</td>
<td>-3.23e-07</td>
</tr>
<tr>
<td>Gradual</td>
<td>(3.76e-07)</td>
<td>(8.48e-07)</td>
<td>(2.50e-07)</td>
<td>(4.01e-07)</td>
<td>(6.74e-07)</td>
<td>(4.84e-07)</td>
</tr>
<tr>
<td>Gradual (t-1)</td>
<td>-0.00183</td>
<td>0.0212</td>
<td>0.00149</td>
<td>0.0114*</td>
<td>0.00170</td>
<td>0.0148</td>
</tr>
<tr>
<td>Gradual (t-2)</td>
<td>0.00444</td>
<td>-0.0364</td>
<td>0.00222</td>
<td>0.00136</td>
<td>0.00084</td>
<td>-0.0124</td>
</tr>
<tr>
<td>Credit (t-1)</td>
<td>-0.000149***</td>
<td>-0.000821***</td>
<td>-0.000232***</td>
<td>0.000107</td>
<td>-2.83e-05</td>
<td>-0.000608***</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0279***</td>
<td>0.0827***</td>
<td>0.0292***</td>
<td>-0.00943</td>
<td>0.107***</td>
<td>0.113***</td>
</tr>
</tbody>
</table>

Observations 4,656 2,473 2,566 4,191 3,256 3,256
R-squared 0.071 0.070 0.049 0.029 0.071 0.104
Number of Country 159 130 131 153 134 134

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Additional effects: The role of credit, and the wealth/size of the population

**Big-bang devaluation.** We focus on the interactions between big-bangs and the control variable (Table 3). In large, one-off devaluations, high credit ratios are associated with a negative impact on GDP per capita. To be precise, big-bang devaluations combined with existing high credit ratios lower GDP per capita with a one-year lag. The size of the country does not seem to matter, however, the level of wealth does. Consumption experiences a larger decline in a richer country, however, this is accompanied by a lower imports and higher exports.

**Gradual devaluation.** Unlike in big-bang episodes, credit does not affect output in gradual devaluation episodes, except through investment (Table 4). There is no statistically significant difference in the effect of the gradual devaluation due to the size of the population; however, less wealthy countries tend to benefit more from the devaluation. Wealthier countries see a drop in their GDP per capita and lower exports.
Table 3: Country Characteristics and Big-Bangs

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) ΔGDP per capita</th>
<th>(2) Δ Investment</th>
<th>(3) Δ Consumption</th>
<th>(4) Δ Trade Balance</th>
<th>(5) Δ Exports</th>
<th>(6) Δ Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged GDP</td>
<td>-1.13e-05***</td>
<td>-2.46e-05***</td>
<td>-2.89e-06</td>
<td>-2.30e-06*</td>
<td>-1.36e-05***</td>
<td>-1.69e-05***</td>
</tr>
<tr>
<td></td>
<td>(1.65e-06)</td>
<td>(8.88e-06)</td>
<td>(2.48e-06)</td>
<td>(1.26e-06)</td>
<td>(3.49e-06)</td>
<td>(4.24e-06)</td>
</tr>
<tr>
<td>Big-bang</td>
<td>0.00155</td>
<td>0.251</td>
<td>-0.0121</td>
<td>0.0222</td>
<td>0.00378</td>
<td>0.146</td>
</tr>
<tr>
<td></td>
<td>(0.0118)</td>
<td>(0.160)</td>
<td>(0.0405)</td>
<td>(0.0394)</td>
<td>(0.0575)</td>
<td>(0.0953)</td>
</tr>
<tr>
<td>Big-bang (t-1)</td>
<td>0.0150**</td>
<td>0.0366</td>
<td>0.000460</td>
<td>0.000940</td>
<td>0.0171</td>
<td>0.00788</td>
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<tr>
<td></td>
<td>(0.00629)</td>
<td>(0.0430)</td>
<td>(0.0116)</td>
<td>(0.00954)</td>
<td>(0.0172)</td>
<td>(0.0308)</td>
</tr>
<tr>
<td>Big-bang (t-2)</td>
<td>-0.000210</td>
<td>0.0604**</td>
<td>0.00416</td>
<td>-0.00243</td>
<td>-0.00565</td>
<td>0.0165</td>
</tr>
<tr>
<td></td>
<td>(0.00500)</td>
<td>(0.0282)</td>
<td>(0.00882)</td>
<td>(0.00696)</td>
<td>(0.0176)</td>
<td>(0.0216)</td>
</tr>
<tr>
<td>Credit (t-1)</td>
<td>-3.43e-05</td>
<td>-0.000740*</td>
<td>-4.88e-05</td>
<td>0.000271***</td>
<td>0.000101</td>
<td>-0.000461*</td>
</tr>
<tr>
<td></td>
<td>(8.72e-05)</td>
<td>(0.000417)</td>
<td>(0.000120)</td>
<td>(9.10e-05)</td>
<td>(0.000244)</td>
<td>(0.000250)</td>
</tr>
<tr>
<td>Credit (t-1) x Big Bang</td>
<td>-0.00046***</td>
<td>-0.0037***</td>
<td>-0.00071***</td>
<td>0.000524**</td>
<td>-0.000871</td>
<td>-0.000828</td>
</tr>
<tr>
<td></td>
<td>(0.000165)</td>
<td>(0.00101)</td>
<td>(0.000258)</td>
<td>(0.000215)</td>
<td>(0.000581)</td>
<td>(0.000798)</td>
</tr>
<tr>
<td>Credit (t-2) x Big Bang (t-1)</td>
<td>-0.000519**</td>
<td>-0.00137</td>
<td>-0.000372</td>
<td>0.000227</td>
<td>-0.000174</td>
<td>-0.000727</td>
</tr>
<tr>
<td></td>
<td>(0.000210)</td>
<td>(0.00154)</td>
<td>(0.000319)</td>
<td>(0.000244)</td>
<td>(0.000360)</td>
<td>(0.000778)</td>
</tr>
<tr>
<td>Large (t-1) x Big Bang</td>
<td>-0.00570</td>
<td>-0.102</td>
<td>0.0285</td>
<td>-0.0214</td>
<td>0.00632</td>
<td>-0.134</td>
</tr>
<tr>
<td></td>
<td>(0.0111)</td>
<td>(0.149)</td>
<td>(0.0373)</td>
<td>(0.0353)</td>
<td>(0.0549)</td>
<td>(0.0938)</td>
</tr>
<tr>
<td>Rich (t-1) x Big Bang</td>
<td>-0.0104</td>
<td>-0.159**</td>
<td>-0.0391**</td>
<td>-0.0379*</td>
<td>0.0633**</td>
<td>-0.133**</td>
</tr>
<tr>
<td></td>
<td>(0.0105)</td>
<td>(0.0852)</td>
<td>(0.0196)</td>
<td>(0.0222)</td>
<td>(0.0308)</td>
<td>(0.0652)</td>
</tr>
<tr>
<td>Debt (t-1)</td>
<td>6.14e-05***</td>
<td>0.000187</td>
<td>-1.45e-05</td>
<td>0.000132***</td>
<td>3.04e-05</td>
<td>-2.29e-05</td>
</tr>
<tr>
<td></td>
<td>(2.06e-05)</td>
<td>(0.000115)</td>
<td>(2.76e-05)</td>
<td>(3.77e-05)</td>
<td>(4.21e-05)</td>
<td>(6.31e-05)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0611***</td>
<td>0.157***</td>
<td>0.0252*</td>
<td>-0.00899</td>
<td>0.0919**</td>
<td>0.101***</td>
</tr>
<tr>
<td></td>
<td>(0.00936)</td>
<td>(0.0477)</td>
<td>(0.0150)</td>
<td>(0.00898)</td>
<td>(0.0365)</td>
<td>(0.0230)</td>
</tr>
</tbody>
</table>

Observations: 3,121  R-squared: 0.130
Number of Country: 116

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Table 4: Country Characteristics and Gradual Devaluations

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) &amp; Delta GDP per capita</th>
<th>(2) &amp; Delta Investment</th>
<th>(3) &amp; Delta Consumption</th>
<th>(4) &amp; Delta Trade Balance</th>
<th>(5) &amp; Delta Exports</th>
<th>(6) &amp; Delta Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged GDP</td>
<td>-0.04e-05***</td>
<td>-2.59e-05***</td>
<td>-3.70e-06</td>
<td>-2.17e-06*</td>
<td>-1.54e-05***</td>
<td>-1.66e-05***</td>
</tr>
<tr>
<td>(1.70e-06)</td>
<td>(8.97e-06)</td>
<td>(2.66e-06)</td>
<td>(1.27e-06)</td>
<td>(4.18e-06)</td>
<td>(2.95e-06)</td>
<td></td>
</tr>
<tr>
<td>Gradual</td>
<td>-0.00377</td>
<td>0.0188</td>
<td>-0.0122</td>
<td>0.0154</td>
<td>0.0252</td>
<td>0.0431</td>
</tr>
<tr>
<td>(0.00944)</td>
<td>(0.112)</td>
<td>(0.0132)</td>
<td>(0.0112)</td>
<td>(0.0532)</td>
<td>(0.0403)</td>
<td></td>
</tr>
<tr>
<td>Gradual (t-1)</td>
<td>0.00181</td>
<td>0.107</td>
<td>-0.0192</td>
<td>-0.00161</td>
<td>0.0374</td>
<td>0.00946</td>
</tr>
<tr>
<td>(0.00723)</td>
<td>(0.0855)</td>
<td>(0.0128)</td>
<td>(0.0108)</td>
<td>(0.0524)</td>
<td>(0.0329)</td>
<td></td>
</tr>
<tr>
<td>Gradual (t-2)</td>
<td>0.00755</td>
<td>-0.0428</td>
<td>0.00582</td>
<td>0.00392</td>
<td>0.00422</td>
<td>0.00482</td>
</tr>
<tr>
<td>(0.00499)</td>
<td>(0.0489)</td>
<td>(0.0125)</td>
<td>(0.00623)</td>
<td>(0.0145)</td>
<td>(0.0146)</td>
<td></td>
</tr>
<tr>
<td>Credit (t-1)</td>
<td>-7.89e-05</td>
<td>-0.000687</td>
<td>-0.000243</td>
<td>0.000292***</td>
<td>0.000194</td>
<td>-0.000578**</td>
</tr>
<tr>
<td>(8.72e-05)</td>
<td>(0.000466)</td>
<td>(0.000146)</td>
<td>(0.000100)</td>
<td>(0.000272)</td>
<td>(0.000273)</td>
<td></td>
</tr>
<tr>
<td>Credit (t-1) x Gradual</td>
<td>0.000284</td>
<td>1.00e-05</td>
<td>-0.000316</td>
<td>0.000531</td>
<td>0.00103</td>
<td>-0.00114</td>
</tr>
<tr>
<td>(0.000243)</td>
<td>(0.000234)</td>
<td>(0.000334)</td>
<td>(0.000349)</td>
<td>(0.00117)</td>
<td>(0.00107)</td>
<td></td>
</tr>
<tr>
<td>Credit (t-2) x Gradual (t-1)</td>
<td>-0.000167</td>
<td>-0.00329**</td>
<td>0.000124</td>
<td>-8.76e-05</td>
<td>-0.00121</td>
<td>-0.000701</td>
</tr>
<tr>
<td>(0.000244)</td>
<td>(0.000125)</td>
<td>(0.000333)</td>
<td>(0.000311)</td>
<td>(0.00163)</td>
<td>(0.000914)</td>
<td></td>
</tr>
<tr>
<td>Large (t-1) x Gradual</td>
<td>-0.000703</td>
<td>0.0173</td>
<td>0.0355***</td>
<td>-0.0198**</td>
<td>-0.0385</td>
<td>0.0159</td>
</tr>
<tr>
<td>(0.00611)</td>
<td>(0.0590)</td>
<td>(0.0111)</td>
<td>(0.00868)</td>
<td>(0.0286)</td>
<td>(0.0295)</td>
<td></td>
</tr>
<tr>
<td>Rich (t-1) x Gradual</td>
<td>-0.0162**</td>
<td>-0.0704</td>
<td>-0.000939</td>
<td>-0.00864</td>
<td>-0.0511**</td>
<td>-0.0387*</td>
</tr>
<tr>
<td>(0.00630)</td>
<td>(0.0470)</td>
<td>(0.0104)</td>
<td>(0.00701)</td>
<td>(0.0208)</td>
<td>(0.0231)</td>
<td></td>
</tr>
<tr>
<td>Debt (t-1)</td>
<td>3.21e-05</td>
<td>0.000947***</td>
<td>3.59e-05</td>
<td>0.000111**</td>
<td>-4.84e-05</td>
<td>-1.53e-05</td>
</tr>
<tr>
<td>(2.94e-05)</td>
<td>(0.000268)</td>
<td>(6.59e-05)</td>
<td>(4.24e-05)</td>
<td>(7.84e-05)</td>
<td>(9.07e-05)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.0409***</td>
<td>0.0172</td>
<td>0.0270***</td>
<td>-0.0228*</td>
<td>0.0610***</td>
<td>0.0507</td>
</tr>
<tr>
<td>(0.00676)</td>
<td>(0.0373)</td>
<td>(0.00994)</td>
<td>(0.0119)</td>
<td>(0.0219)</td>
<td>(0.0410)</td>
<td></td>
</tr>
</tbody>
</table>

Observations   2.824  1.633  1.703  2.648  2.063  2.063
R-squared       0.117  0.114  0.085  0.060  0.077  0.123
Number of Country  115  96  97  108  98  98

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Summary of Results

1  Big-bang devaluations
2  Gradual devaluations
3  Big-bang devaluations are associated with significant contemporaneous drops in GDP, investment, and consumption.
4  Gradual devaluations are associated with neither declines nor increases in GDP, investment, and consumption.
5  Trade balance increases significantly in the same year.
6  Trade balance increases in the same year.
7  Countries with pre-existing higher credit/GDP ratios before devaluations see larger drops in GDP.
8  Countries with pre-existing higher credit/GDP ratios before devaluations see no difference.
9  Poor countries do better than rich countries in big-bang devaluations.
10 Poor countries don’t do better than rich countries in gradual devaluation.
11 Being small/large does not matter.
12 Being small/large does not matter.
Case Studies

The final outcome of any gradual devaluation depends not only the size and mechanics of the devaluation – as described so far in this paper – but also depends on the initial conditions of a country. To understand how different conditions impact the outcome of a devaluation, we discuss a number of case studies. In each case, we present key facts on the economy, why each country decided to devalue (i.e. the goal of devaluation), and how they did it. We try to provide as much information as possible and discuss lessons from the case studies.

- **BOLIVIA: a case for the importance to control inflation during devaluation (1988-1994)**

Bolivia had a population of 6 million and a GDP per capita of USD 791 in 1988. The devaluation took place through daily foreign exchange auctions, where the Central Bank buys foreign exchange from the public at the average price set in the previous day’s auction. The objective of this policy initiative was to redress the economy’s initial over-valuation of the currency, as well as to “catch up” with its neighbors who were conducting rapid depreciations at the time (Morales, 1991). Annual depreciation rate ranged from 3.6 to 15.8 percent, with a cumulative devaluation over the six years of 125 percent.

The country experienced substantial economic growth. Real GDP per capita grew at an average of 7 percent, compared to a negative growth rate of 18 percent in the period prior. Exports also saw a significant boost, growing at an average rate of 42 percent, versus declining at 19 percent per year on average in the period prior. Inflation was kept under control, averaging 13 percent versus the hyper-inflationary environment beforehand with an average 2049 percent inflation rate per year.

**Key findings:** The Bolivian case saw a crawling peg successfully curb inflation and maintain a competitive exchange rate, while keeping balance sheet effects manageable within a highly dollarized environment (IMF, 2007). Under its crawling-peg policy, the Bolivian authorities committed themselves to manage the exchange rate smoothly so as to compensate for the internal-external inflation differential. The exchange rate policies gave Bolivia scope for adjustment to short-term shocks, such as El Nino and the global financial crises of 1998, but also use the exchange rate as it if were fixed to maintain price stability. The crawling peg was successful thanks to a relatively high foreign-exchange reserve buttressing the policy as well as a balanced asset base to mitigate adverse exchange rate exposure in a dollarized banking system (Beckerman, 2005).

- **COLOMBIA: sound macroeconomic management supported the positive effects of the devaluation (1968-1982)**

Colombia had a population of 21 million and a GDP per capita of over US$1,600. In 1968, the government wanted the devaluation to achieve several key objectives. One, the administration wanted to address the balance of payments problem of 1966, where the country ran up a large current account deficit without sufficient international reserves. A managed and gradual adjustment would “allow Colombia to maintain international competitiveness while avoiding

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2 Three case studies are provided in the main text (Bolivia, Columbia, and Sudan). Two additional case studies are in Appendix A1 (Korea and Venezuela). Korea’s overall positive devaluation experience (1970-1972) was coined by monetary and fiscal restraint as well as a sizable, but not overly large opening adjustment. Venezuela’s overall negative devaluation experience (1998-2001) was determined by the economy’s over-reliance on oil revenues, paired with pro-cyclical and ultimately inflationary fiscal policy.
large, abrupt and politically unpopular devaluations” (Garc and Javasuriva, 1997). The country also had an extremely unstable real exchange rate due to a lack of consistency in government policies, with multiple rates for different types of exports and imports. With the devaluation, the government abolished the dual exchange rate system and applied the crawling peg to the major certificate market rate, where each week the peso would be devalued by 1-2 cents without prior official notice. In all, the currency devalued by 340 percent.

The country experienced substantial improvement in economic growth. Real GDP per capita increased to over USD 2,300, and average GDP grew by 27 percent versus 7 percent in the period prior. Exports also grew significantly at 39 percent versus 6 percent average growth in a similar period prior. Inflation did not see a huge increase, rising from 10 to 19 percent on average during the period.

Key findings: The Colombian case shows how devaluations accompanied by sound macroeconomic management can help the economy overcome a balance of payments crisis. Colombia initially instituted stringent quantitative restrictions to curb imports; however, it soon turned to promote exports through direct incentives and a depreciation of the peso. The authorities also acted to control monetary expansion and inflation, through both an increase in the reserve requirement at banks as well as a restriction on credit to the private sector. These policies helped make exchange rate management easier and more effective.

- SUDAN: how structural rigidities and wrong timing jeopardized the devaluation effort (1978-1981)

Sudan had a population of 13 million and a GDP per capita of USD 513 as of 1978. Its devaluation was part of the IMF’s structural adjustment program to mitigate its balance of payments problems. There were three devaluations: June 1978, September 1979 and November 1981 of 33 percent, 25 percent and 80 percent respectively (World Bank, 1980).

By the end of the period, real GDP per capita fell to USD 480, average GDP growth fell to -14 percent, versus 23 percent in the period prior. Real exports saw only a marginal improvement, from USD 1.15 billion to 1.35 billion. However, inflation skyrocketed: growing at a rate of 482 percent versus 11 percent in the period prior.

Key findings: The Sudan episode showed that structural rigidity of the economy can prevent an effective devaluation: exports in Sudan required substantial imported inputs, which had a near-zero demand elasticity. Wages and other local costs were also very sensitive to the exchange rate. As a result, the price effect dominates, leaving a much smaller change in real exchange rate. Indeed, the real exchange rate following the 30 percent nominal devaluation was only 5 percent (Killick, 1990).

Additionally, Sudan was considered a small country for the devaluation policy prescription, but this assumption proved inappropriate for the economy, as it commanded a large market share for its key exports. For example, Sudan accounted for 80-90 percent of world exports in gum Arabic and increases in its export depressed the world prices of the commodity.

Finally, the timing of the currency adjustment is of particular importance for agriculture-centric economies, where the net impact of devaluation depends on whether input prices, such as fuel, fertilizer and seeds increase first, or output prices increase first. Most of Sudan’s agricultural commodities are annual summer crops grown in the June-July period and harvested and sold in October-January (e.g sorghum, sesame, millet, gum Arabic and groundnut). Any change in
the value of the currency between December and July will raise input prices before the revenue from higher output prices are received. Such devaluation can prevent output growth or force cutbacks (Elamin and Mak, 1997).

- **SUMMARY of success factors**

Positive outcomes are associated with situations where: (1) the central bank is able to keep inflation stable throughout the depreciation path; (2) there is a favorable external environment, for instance in that there is enough world demand to absorb higher levels of exports from the country. A gradual devaluation in a global recession is unlikely to succeed for a country; (3) the central bank adopted a crawling peg exchange rate arrangement that can be adjusted for the inflation differential; (4) the country has relatively high levels of foreign exchange reserves that provide positive signaling to the markets; and (5) where complementary policies to increase the competitiveness of a country are being pursued simultaneously. Exchange rate reform in isolation is not likely to bring long-lasting effects.

- **SUMMARY of challenges**

More challenging situations, and negative outcomes are associated with situations where: (1) debt ratios in the economy were already high and the exchange rate-induced increased debt burden represents a burden on the country and firm level; (2) there is a high import content of exports; (3) a country commands a global market power position in the economy’s main export, which leads to a situation of price erosion when exports are increased; (4) the devaluation came at the wrong time, for instance when global food prices are high and inflationary pressures mount already going into the devaluation; and (5) a central bank pursues unsound monetary policy, for instance, monetization of deficit, which leads to inflation that ‘eats-up’ competitive gains through devaluation.

**Conclusion**

This short paper examines the pros and cons of gradual versus big-bang approaches toward devaluations. As both big-bang and gradual approaches have their own challenges, it is not clear from the onset which approach is advisable to policy makers. To address this important policy question, the paper presents original empirical evidence on the impact on output, consumption, investment and trade balances of gradual and big-bang devaluation episodes, respectively. It finds that big-bang graduations are associated with lower output, investment and consumption, while gradual devaluations are not associated with any contemporaneous drops. Case studies of gradual devaluations are also conducted. There is a possibility that the finding is influenced by the fact that bad economic times force countries to carry out a large exchange rate adjustment; the worsening of the indicators (contemporaneous and the next period) may not only be dependent on the exchange rate adjustment. This is true. But in turn, countries that are in good economic times and contemplate an exchange rate adjustment can decide from a position of strength; this analysis indicates, that this position of strength is best exploited through a gradual devaluation over a credibly established and defendable path. The case studies also showed that gradual devaluations are most successful if initiated by a sizable, but not overly large opening adjustment.
References


Campos, María Isabel, José L. Torres, and Esmeralda Villegas (2006). *The credibility of the Venezuela crawling-band system.*


## Appendix A1: Summary of Case Studies

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Real GDP per capita @ Devaluation</th>
<th>Exports @ Devaluation (Billions $US)</th>
<th>Exports/GDP @ Devaluation (%)</th>
<th>Average Exports Growth</th>
<th>Average GDP Growth</th>
<th>Population</th>
<th>Length of Devaluation (Years)</th>
<th>Size of Devaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>Korea</td>
<td>$1,968</td>
<td>2.63</td>
<td>43</td>
<td>44%</td>
<td>17%</td>
<td>Large</td>
<td>3</td>
<td>36%</td>
</tr>
<tr>
<td>1988</td>
<td>Bolivia</td>
<td>$791</td>
<td>0.97</td>
<td>6</td>
<td>42%</td>
<td>7%</td>
<td>Small</td>
<td>7</td>
<td>125%</td>
</tr>
<tr>
<td>1968</td>
<td>Colombia</td>
<td>$1,630</td>
<td>3.58</td>
<td>13</td>
<td>39%</td>
<td>27%</td>
<td>Large</td>
<td>15</td>
<td>340%</td>
</tr>
<tr>
<td>1978</td>
<td>Sudan</td>
<td>$514</td>
<td>1.15</td>
<td>65</td>
<td>0%</td>
<td>-15%</td>
<td>Small</td>
<td>4</td>
<td>60%</td>
</tr>
<tr>
<td>1998</td>
<td>Venezuela</td>
<td>$5,583</td>
<td>62.6</td>
<td>81</td>
<td>-3%</td>
<td>-6%</td>
<td>Large</td>
<td>4</td>
<td>48%</td>
</tr>
</tbody>
</table>
**Additional Case Studies on Korea and Venezuela**

**Korea (Period considered: 1970-1972)**

With a population of 32 million and a GDP per capita of USD 1,967 in 1970, Korea was still a developing country. The first devaluation episode took place between 1970 and 1972, followed by an unknown number of gradual adjustments, with the objective of economic expansion through stimulation of exports. Official records are lacking on the level of devaluation in each step, but the data indicates that there was a 7 percent depreciation of the Korean won in 1970, 11 percent in 1971 and 12 percent in 1972. Cumulatively, Korea underwent a devaluation of 36 percent.

The country grew economically, with some caveats. Real GDP per capita grew by 17 percent, outpacing its average growth in the two years prior. However, real exports grew by 44 percent, less than the 64 percent compared to before. The huge increase in exports in the period prior could have been due to the large devaluation episodes in the 1960s (Yoo, 2017). **Key findings:** The Korean case saw devaluation accompanied by monetary and fiscal restraint. The confluence of the devaluation (and Japan’s appreciation of the yen in late 1972) (Cole and Park, 1983), strong world demand and continued high investment lead to a boost in exports. However, continuing high domestic interest rates, cheaper domestic currency and tight credit control hit domestic firms hard. By 1971, the number of bankrupt enterprises that had received foreign loans climbed to 200, and Korea faced the first debt crisis.

**Venezuela (Period considered: 1998-2001)**

Venezuela had a population of 23 million and a GDP per capita of USD 5,583 in 1998. It accounts for 37 percent of the Andean Economies’ aggregate GDP, largely through its large-scale oil production (Beckerman, 2005). In the late 1990’s, large oil price declines created a significant budget deficit. As a result, the government decided to let the currency float to determine the market equilibrium rate, then established a crawl (Campos et al, 2006). The aim of the policy was to use the exchange rate as a nominal anchor to keep inflation under control. The rate of crawl was initially set at 0.046 percent/day between January 1998 and December 2000 and slowed to 0.030 percent/day in 2001. The bolívar was allowed to fluctuate 7.5 percent in either direction from a central parity, which in turn was allowed to move in accordance with an annual inflation target.

The devaluation episode did moderate inflation: from 67 percent in the period prior down to 20 percent in this period. However, Venezuela did not experience economic growth. Real GDP per capita fell to USD 5,318. Average GDP growth fell to -6 percent versus -3 percent in the period prior. Real exports also faltered, declining from USD 62 billion to 57 billion. **Key findings:** The Venezuelan devaluation was successful in controlling inflation. However, the economy’s over-reliance on oil revenues hindered any long-lasting progress. Low oil prices and a pro-cyclical fiscal policy led to a large deficit that Venezuela eventually had to monetize. The growing political uncertainty in the country caused an increase in the demand for dollars, leading to a speculative attack. The Central bank, without sufficiently large reserves, had to abandon the crawling band system.34

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