INTERNATIONAL MONETARY FUND

Staff Country Reports

January 2010
IMF Country Report No. 10/43

Uruguay: Selected Issues

This Selected Issues paper for Uruguay was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on November 9, 2009. The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of Germany or the Executive Board of the IMF.

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INTERNATIONAL MONETARY FUND

URUGUAY

Selected Issues

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Approved by Western Hemisphere Department

October 21, 2009

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I. Exchange Rate and Competitiveness Assessment[1]

A. Introduction

1. **This selected issues paper (SIP) provides a real exchange rate and competitiveness assessment for Uruguay.** The assessment was conducted during the 2009 Article IV mission to comply with the requirements of the IMF's 2007 Decision on Bilateral Surveillance. It comprises two parts. The first part looks at the recent developments in key external competitiveness indicators such as the bilateral real effective exchange rates, export volumes, export market shares, export unit values, unit labor costs as well as FDI performance. The second part pursues an assessment of the real exchange rate following a broad-based strategy of applying four different approaches, including the purchasing power parity approach, the macroeconomic balance approach, the external sustainability approach, and the equilibrium real exchange rate approach. For the last approach both panel data estimation techniques and a specific vector error correction model (VECM) for Uruguay are considered.

2. **Despite the substantial appreciation of the Uruguayan peso since 2003, there are no signs of competitiveness problems.** Following a marked real depreciation of the peso during the 2002 crisis, the real effective exchange rate (REER) has tended to appreciate since 2003. This appreciation has been partly the result of inflationary pressures in Uruguay relative to the ones in trading partners, in particular the US and Brazil. In spite of this, key indicators suggest that Uruguay has remained competitive. Export performance has been buoyant as confirmed by the increasing export volumes and market share in the world. There is also evidence of attractive profit margins in the export sector. In addition, Uruguay continues to attract increasing amounts of FDI, which is already high even by regional standards.

3. **The real exchange rate is assessed to be broadly in equilibrium.** The application of the four approaches mentioned above point to deviations of the REER from its equilibrium value that are smaller than six percent. Three out of the four approaches reveal that the peso would need to appreciate slightly to reach its equilibrium value, whereas the simple PPP approach suggests the opposite. These results are similar to those from the previous exchange rate assessment of 2008 the Article IV, which found that the REER was moderately undervalued.

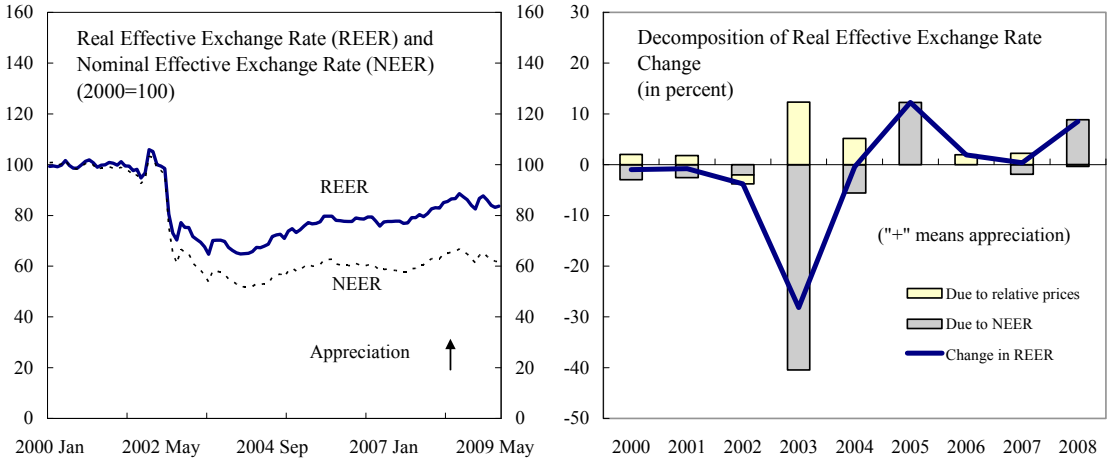
B. Competitiveness Assessment Based on Key Indicators

4. **Overall the real effective exchange rate (REER) has appreciated since 2003.** After depreciating significantly in 2002–03, both the REER and the nominal effective exchange rate (NEER) have followed similar appreciation trends. However, in some years,

[1] Prepared by Felipe Zanna.

the appreciation of the REER has been more pronounced than that of the NEER due to inflationary pressures in Uruguay relative to the ones in trading partners, in particular the U.S. and Brazil (see Figure 1). For instance, in 2007, the REER appreciated by 0.4 percent as a result of relative inflationary pressures of about 2.2 percent, while the NEER depreciated by 1.8 percent.

Figure 1. Uruguay

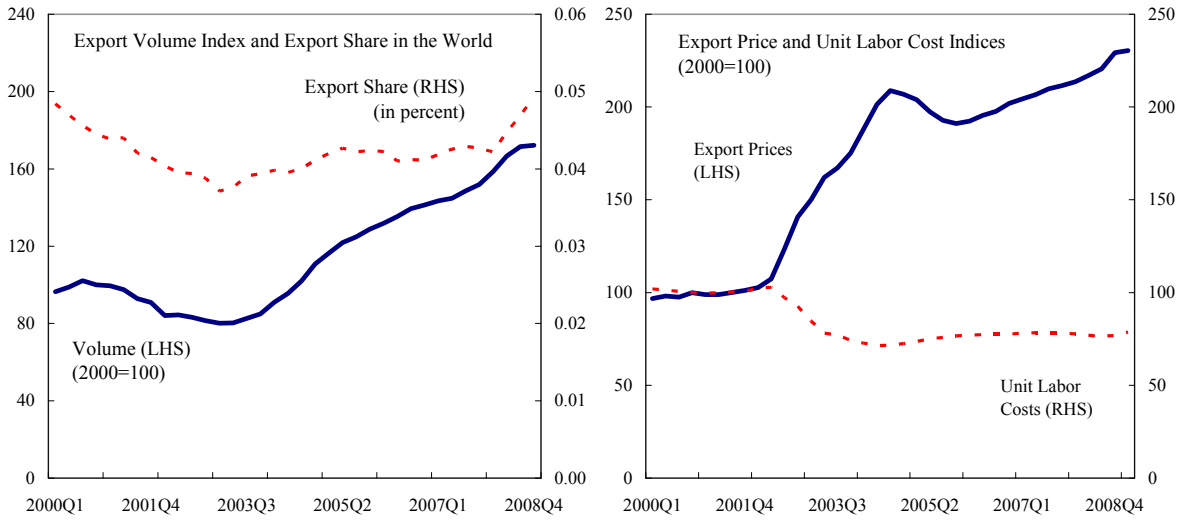


Source: INS, Fund staff estimates

5. **The bilateral REERs with respect to the main trading partners, namely Argentina and Brazil, reveal contrasting tendencies.** While the bilateral REER with respect to Brazil has shown a tendency to depreciate, the bilateral REER with respect to Argentina has tended to appreciate since 2003. The depreciation of the REER with respect to Brazil has been mainly driven by a depreciation of the bilateral NEER, which has offset the positive inflationary differentials between Uruguay and Brazil. On the other hand, the appreciation of the REER between Argentina and Uruguay is largely explained by an appreciation of the bilateral NEER. Meanwhile, the bilateral REER with respect to the U.S. has also generally appreciated, although, in light of the global crisis, there was some depreciation in the second semester of 2008.

6. **Uruguay's export volumes, as well as the world market shares, have increased, despite the REER appreciation.** Since 2003, growth in export earnings has been strong in an environment that benefited from booming commodity prices, particularly for three of the main traditional export products for Uruguay including meat, leather, and wool. In fact, volumes of exports have been on an increasing trend in the last six years, while Uruguay's export market share has also somewhat risen, especially in 2008 (see Figure 2). Certainly, Uruguay's market share in exports to its two main trading partners, Argentina and Brazil, has been declining over the last few years. However, this decline has been more than offset by an increase of the market share in exports to other countries including the US, Russia, China, and Japan.

Figure 2. Uruguay



Source: Central Bank of Uruguay, WEO, and Fund staff estimates.

7. **Moreover, the export sector continues to be attractive, as reflected by positive profit margins and strong foreign direct investment (FDI) inflows.** Although wages have risen substantially since 2003, productivity, especially in the traded sector, has also improved. As a result, unit labor costs (ULC) have remained broadly constant since 2003 (see Figure 2). Export prices, on the other hand, have tended to go up pointing to increasing profit margins in the external sector. In addition, FDI inflows, which tend to develop favorably under conditions of sustained competitiveness, have soared in recent years reaching 5.7 percent of GDP in 2008. These inflows have been particularly concentrated in traded sectors such as agriculture and forestry. And although they are expected to decrease to 3.0 percent of GDP, due to the global crisis, they are still higher by regional standards.

C. Exchange Rate Assessment[2]

8. **This assessment followed a broad-based approach based on a variety of methods.** Since Uruguay is not currently covered by the IMF's estimates of the consultative group in exchange rate issues (CGER) for real exchange rate evaluations, this assessment relied on the application and adaptation of the following four approaches: the purchasing power parity approach, the macroeconomic balance approach, the external sustainability approach, and the equilibrium real exchange rate approach. For some of the approaches, different estimations were considered. For instance, the application of macroeconomic balance approach considered the estimations by Vitek (2009) and Medina et al. (2009), as well as the CGER estimates presented in the IMF Occasional Paper 261. Similarly, the application of the equilibrium real exchange rate approach included the estimations based on

[2] These results are based on the WEO assumptions of August 2009.

panel data analysis by Vitek and CGER, and the results from a vector error correction model estimated for Uruguay. Table 1 presents the results derived from the application of these methodologies.

Table 1. Uruguay: Assessment of the Real Effective Exchange Rate

Real Exchange Rate Deviation from Equilibrium (in percent) overvaluation (+), undervaluation (-)							
I. PPP Approach	II. Macroeconomic Balance Approach			III. External Sustainability Approach	IV. Equilibrium Real Exchange Rate Approach		
	Panel				Panel		VECM
	CGER	Vitek	Medina et al.		CGER	Vitek	
1.2	-4.1	-4.4	-0.8	-0.5	-5.6	-4.0	-4.9

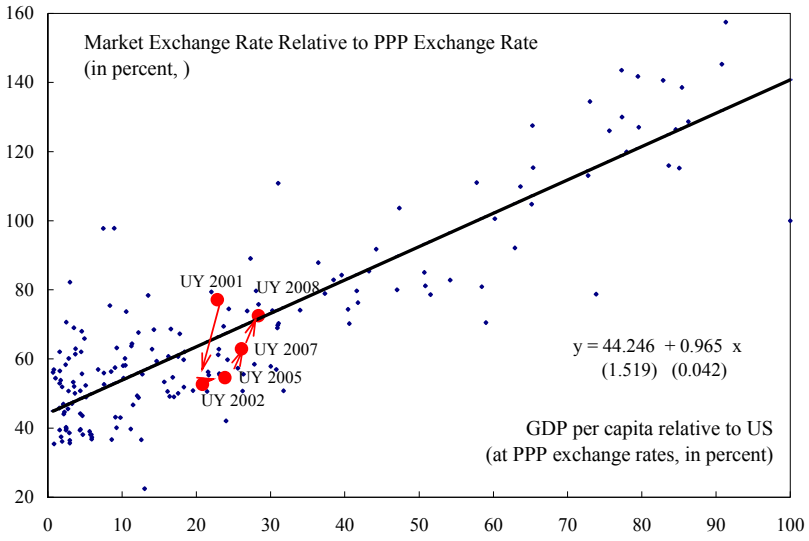
Source: Fund Staff estimates.

9. **Across different approaches and estimations, the assessment reveals that the REER is not far from equilibrium.** While the PPP approach suggests that the REER should depreciate by 1.2 percent to reach the equilibrium, the remaining three approaches point to a necessary appreciation of about six percent or even lower. In particular, the external sustainability approach implies an almost insignificant undervaluation of 0.5 percent, whereas the CGER estimates for the equilibrium real exchange rate approach suggests a very slightly undervaluation of 5.6 percent. Given that all of these deviations are within ten percentage points of zero, the conclusion is that the REER is broadly in equilibrium. This SIP proceeds to elaborate on the details of the application of the differing approaches.

The PPP Approach

10. **According to the PPP approach, the value of the peso appears to be close to equilibrium.** The 2008 regression line in Figure 3 reflects the notion that a country's real exchange rate tends to appreciate as its productivity increases (see Box 1). By this measure, Uruguay's exchange rate appears broadly in line with differences in productivity. Having depreciated substantially during the 2002 crisis, it appreciated in 2004–07, approximating the regression line from below. In 2008, the exchange rate surpassed the adequate level defined by this regression line. As a result, in 2008, Uruguay's exchange rate appeared to be very slightly overvalued by 1.2 percent. Given that this approach has been strongly criticized by Zalduendo (2008), among others, it is important to apply other methodologies to inform the assessment.

Figure 3. Uruguay: PPP Approach



Source: WEO and Fund staff estimates.

Box 1. The Purchasing Power Parity (PPP) Approach

Rogoff (1996) argues that the PPP approach is based on the premise that the PPP concept serves as an anchor for long-run real exchange rates. The approach is reminiscent of the Balassa-Samuelson hypothesis, as it underscores the difference in relative productivity levels as the main driving factor of the deviations of the real exchange rate from its long-run equilibrium: higher productivity in the tradable sector tends to increase tradable sector wages, and as wages equalize across sectors, this induces higher prices for non-tradable goods and thus an increase in consumer prices relative to trading partners, leading to a real appreciation. The approach may be implemented by running a cross-country regression of the implied PPP exchange rates on the per-capita income levels (a proxy for productivity in the tradable sector). Countries above the regression line are interpreted to have a relatively more appreciated exchange rate than explained by differences in productivity.

The Macroeconomic Balance Approach

11. **The macroeconomic balance (MB) approach indicates that the real exchange rate seems to be in line with fundamentals.** This assessment reflects the estimates of both the equilibrium and the underlying current account balances as well as the adjustment of the real exchange rate that is necessary to close the gap between these two balances (see Box 2):

- **The underlying current account (CA) deficit in 2008 was found to be smaller than the estimated norm.** The underlying CA was calculated to be about -0.3 percent of GDP in 2008, taking into account temporary factors such as the commodity price shock and the import effect of a positive output gap in the domestic economy, among others (see Box 3). On the other hand, staff considered three different estimations to calculate the equilibrium CA or norm (See Table 2): 1) CGER, 2) Vitek (2009), and

3) Medina et al. (2009). Vitek's estimates implied a CA norm of -3.1 percent of GDP; Medina et al.'s estimates suggested that this norm is around -0.8 percent of GDP; and CGER's estimates yielded a CA norm of -2.9 percent of GDP (see Table 3 and Figure 4).

Table 2. The Macroeconomic Balance Approach

	CGER	Vitek	Medina et al.
Fiscal Balance	0.1893	0.2182	0.5000
	(0.0426)	(0.1361)	(0.0410)
Old-age Dependency Ratio	-0.1234	-0.1435	-0.0684
	(0.0483)	(0.117)	(0.1100)
Young-age Dependency Ratio			-0.0598
			(0.0220)
Population Growth	-1.0285		-0.1160
	(0.4035)		(0.2400)
Oil Balance	0.1688	0.3622	0.2210
	(0.03)	(0.0498)	(0.0340)
Relative Income	0.0196	0.0098	-0.0040
	(0.0109)	(0.0095)	"(0.0030)
Relative Income Growth		-0.5271	
		(0.1911)	
Output Growth	-0.1570		-0.1880
	(0.0789)		(0.0390)
Aid Inflows		0.1301	
		(0.1251)	
FDI			-0.1710
			(0.1000)
Banking Crisis	0.0103		
	(0.0065)		
Asian Crisis			0.0426
			(0.0110)
Initial Foreign Assets		0.0465	0.0178
		(0.0128)	(0.0100)
Lagged NFA			0.0526
			(0.0090)
Lagged Current Account	0.3656		
	(0.0883)		
Constant	-0.0029	0.0012	0,0296
	(0.0039)	(0.0052)	(0.031)

Sources: OP 261, Medina et al. (2009), and Vitek (2009).

- **The exchange rate adjustment that eliminates the difference between the underlying CA and the norm implies a very slightly undervaluation.** This adjustment was calculated to be in the range of -4.4 percent and -0.8 percent (see Table 3). Key to calculate this adjustment is the elasticity of the current account to the real exchange rate. In these calculations staff used the most recent estimates of export supply and import demand elasticities for Uruguay by Tokarick (2009), which imply an elasticity of the current account to the real exchange rate of -0.64.[3]

[3] Tokarick (2009) provides estimates of elasticities for several countries using GATP and ERALIC project data. The estimate for Uruguay is -0.64, assuming that, as a small country, its export demand and import supply elasticities are infinite. This contrasts with the CGER assumptions, which correspond to infinite export supply and import supply elasticities, implying that a country is able to influence *foreign* prices by how much they sell. Under these assumptions, the (continued)

Box 2. The Macroeconomic Balance Approach

The macroeconomic balance approach calculates the real exchange rate adjustment that is necessary to close the gap between the current account (CA) stripped from temporary factors, or underlying current account, and an estimated equilibrium CA balance or norm. This adjustment is obtained using the country-specific elasticity of the CA with respect to the real exchange rate, while the norm is calculated with an econometric model assuming that it depends on the following fundamentals:1/

Fiscal Balance. In the absence of full Ricardian equivalence, a higher government fiscal balance raises national saving, lowering the CA deficit.

Demographics (population growth rate, young-age and old-age dependency ratios). A higher share of economically inactive dependent population (young or old) reduces national saving and increases the CA deficit.

Oil Trade Balance. Higher oil prices increase the CA balance of oil-exporters and decrease the balance of oil-importers.

Relative Per Capita Income at PPP. Relatively poorer countries may need to invest more and thus import more capital leading to higher CA deficits.

Relative Income and Economic Growth. Among countries at a similar stage of development, the stronger is economic growth (relative to trading partners), the lower the CA balance.

Aid Inflows. In some countries, particularly low-income countries, aid is an important source of CA deficits.

Foreign Direct Investment. Higher FDI provides a stable source of external financing signaling improvements in the investment climate. It may lower CA balances through increased imports.

Economic Crises. During economic crises, sharp current account adjustments occur as a byproduct of macroeconomic contraction and the reduced availability of international financing, among others.

Lagged Net foreign assets (NFA). On the one hand, countries with higher NFA can afford to run larger CA deficits without jeopardizing their solvency. On the other hand, higher NFA imply higher net foreign income flows from abroad reducing the deficits.

Lagged CA. The lagged current account is intended to both proxy for NFA but also to capture the gradual nature of current account adjustments.

Using panel data techniques, the Occasional Paper 261 by the Fund's Consultative Group in Exchange Rate issues (CGER), Vitek (2009) and Medina et al. (2009) provide estimates of the importance of these fundamentals in determining the CA norm. The econometric techniques, the length of the sample, the country sample, and the definitions of the variables vary across these estimations.

1/ See the IMF Occasional Paper 261.

elasticity for Uruguay is close to -0.2, which appears to be on the low side and implies a required adjustment of the real exchange rate in the range of -14 and -2.5 percent.

Box 3. Calculating the Underlying Current Account Balance

The underlying current account balance can be calculated as the observed balance stripped from temporary factors at a particular point in time. Since the selected year for the analysis is 2008, then the calculations of this underlying measure involved some adjustment associated with higher commodity prices, which affect both exports and imports, as well as more imports due to the cyclical effect of a positive output gap, among others. The table below lists all the adjustments considered in the analysis. The underlying current account balance was calculated to be about -0.3 percent in 2008.

Underlying Current Account Balance in 2008
(in percent of GDP)

Current Account (CA)		Adjustment Factor	Concept
Observed CA	-4.6		Additional
		-2.7	Oil imports due to higher oil prices and drought.
		3.7	Exports due to higher commodity prices.
		-3.8	Imports of non-oil goods due to positive output gap and high commodity prices and FDI.
		-0.7	Imports of services due to positive output gap.
		-0.9	Factor income transfers due to FDI and interest payments.
Underlying CA	-0.3		

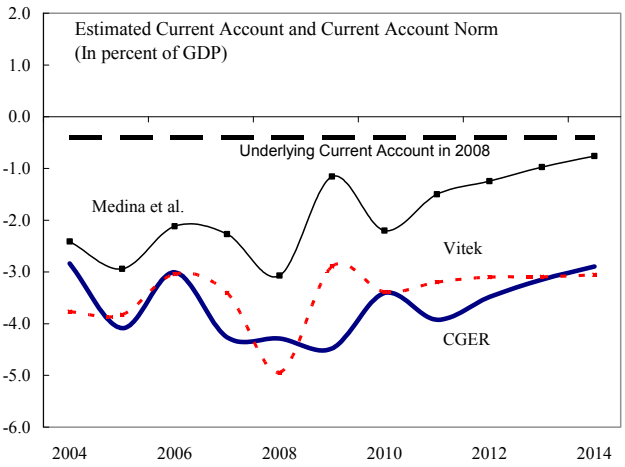
Source: Central Bank of Uruguay, WEO, and Fund staff estimates.

Table 3. The Macroeconomic Balance Approach

	CGER	Vitek	Medina et al.
Underlying Current Account	-0.3	-0.3	-0.3
CA Norm	-2.9	-3.1	-0.8
CA-REER Elasticity	-0.6	-0.6	-0.6
REER Adjustment (+ =overvaluation)	-4.1	-4.4	-0.8

Source: Fund staff estimates.

Figure 4. Uruguay



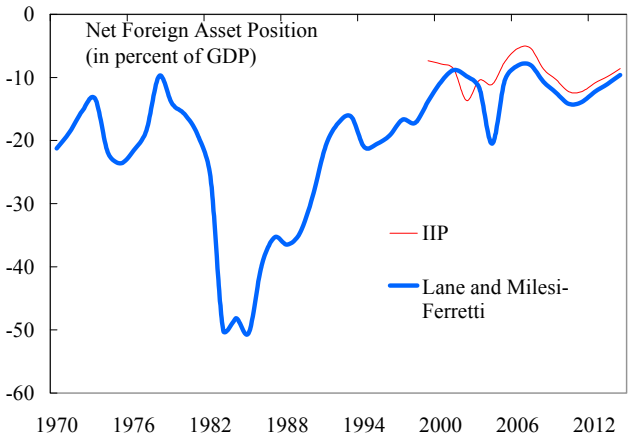
Source: Fund Staff estimates, using WEO, UN, and WBWDI data.

The External Sustainability Approach

12. **The external sustainability approach also suggests that the real exchange rate is broadly in equilibrium.** As the SIP proceeds to explain, this result is based on the estimated adjustment of the real exchange rate that is required to close the difference between the net foreign asset (NFA) stabilizing current account balance and the underlying current account balance (see Box 4):

- **Two different measures of the NFA position were constructed, based on data from the International Investment Position (IIP) and Lane and Milesi-Ferretti (2006).** Figure 5 shows that despite some differences in the databases, the NFA position of Uruguay has reached levels that are greater than -17 percent of GDP and is expected to improve further by 2014. The 2008 NFA position was selected as the benchmark level. For the IIP data, this level corresponds to -8.6 percent of GDP, whereas under the Lane and Milesi-Ferretti methodology, this level is around -10.7 percent of GDP.

Figure 5. Uruguay



Source: BPTSTSUB, WEO, Lane and Milesi-Ferretti (2006), and Fund staff estimates.

- **Maintaining the NFA position at the end-2008 level would require a stabilizing current account (CA) deficit of about 0.5 percent of GDP.** The NFA-stabilizing CA balance is calculated using equation (1) of Box 4. The inflation rate and the growth rate were set to medium term values of 2.2 percent and 3.9 percent. Table 4 presents the results for the end-2008 NFAs using IIP data and the level implied by Lane and Milesi-Ferreti (2006). The differences are not substantial. Using IIP data the NFA-stabilizing CA balance corresponds to -0.5 percent of GDP. On the other hand, for the NFA level implied by Lane and Milesi-Ferretti (2006), the stabilizing Ca is close to -0.6 percent.

- **The exchange rate adjustment necessary to equalize the NFA-stabilizing current account (CA) and the underlying CA is less than 1 percent.** Table 4 shows that, given an underlying CA balance of -0.3 percent and an elasticity of -0.64, to achieve a NFA-stabilizing CA balance of -0.5 percent of GDP it would be necessary a real exchange rate appreciation of about 0.4 percent. On the other hand, to achieve a balance of -0.6 percent of GDP it would be necessary an adjustment of almost 0.6 percent.[4] Clearly the real exchange rate adjustment depends on the level of the NFA-stabilizing CA balance, which in turn depends on the benchmark for NFA. Targeting a much lower benchmark of -28 percent would imply an adjustment of about -2 percent. This corresponds to a still very small undervaluation and reinforces the assessment that the real exchange rate is broadly in equilibrium (see Figure 6).

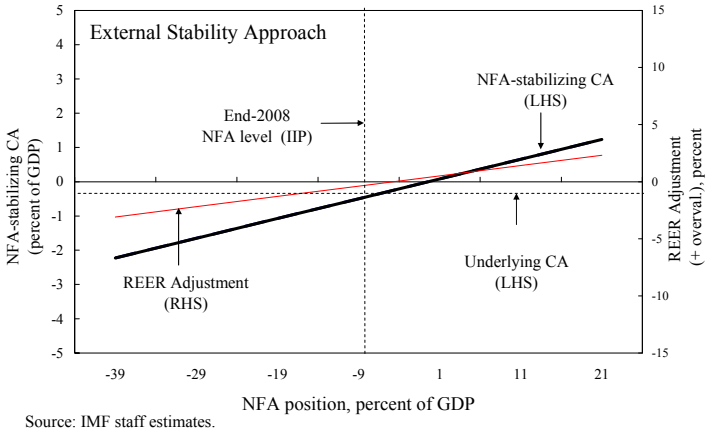
[4] Using the CGER implied elasticity for Uruguay of -0.2, which seems to be on the low side, would imply a required adjustment of the real exchange rate of -1.5 percent, on average.

Table 4. The External Sustainability Approach

	IIP Data	Lane Milesi-Ferretti
2008 NFA level (in percent of GDP)	-8.6	-10.7
US Inflation in 2014 (in percent)	2.2	2.2
Real GDP Growth in 2014 (in percent)	3.9	3.9
NFA-Stabilizing Current Account (in percent of GDP)	-0.5	-0.6
Underlying Current Account (in percent of GDP)	-0.3	-0.3
CA-REER Elasticity	-0.6	-0.6
REER Adjustment (in percent) (+ means overvaluation)	-0.4	-0.6

Source: WEO and BPTSTSUB Data, Fund staff estimates.

Figure 6. Uruguay



Source: IMF staff estimates.

Box 4. The External Sustainability Approach

The external sustainability (ES) approach calculates the real exchange rate adjustment that, over the medium term, is necessary to close the difference between the actual current account balance (CAB) stripped from temporary factors (underlying CAB) and the balance that would stabilize the net foreign assets (NFA) position of the country at some benchmark level. The approach relies on the intertemporal budget constraint for the economy, which states that changes in NFAs are due either to net financial flows or to changes in the valuation of outstanding foreign assets and liabilities. Ignoring capital gains from valuation changes and other factors such as capital transfers and errors and omissions, this constraint can be written as follows: $B_t - B_{t-1} = CA_t$, where CA_t is the CAB and B_t denotes NFA. Dividing this equation by GDP, it can be demonstrated that the CAB to GDP ratio ca^s that stabilizes the NFA at the benchmark level b^s can be calculated as:

(1) $$ca^s \approx \frac{g+\pi}{1+g+\pi} b^s$$

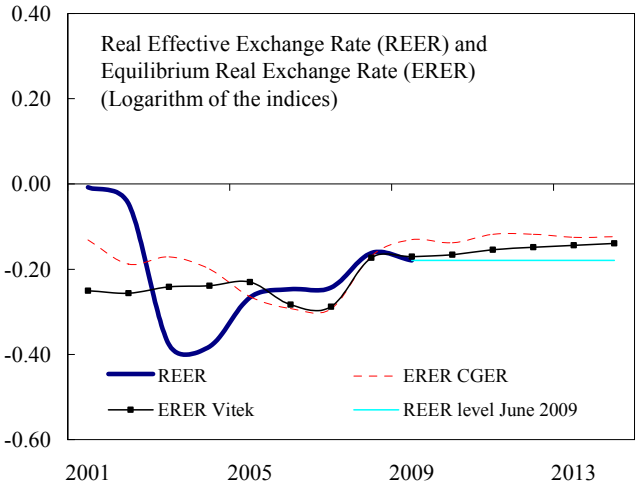
where g is the growth rate of real GDP and π is the inflation rate. CGER uses the NFA/GDP level at the end of the prior year as the benchmark level and recommends to use the medium-term inflation rate of the US instead of the medium-term inflation of the domestic economy, as using domestic inflations could in some cases overstate the ability of a country to run deficits.

The Equilibrium Real Exchange Rate Approach

13. **Different estimates of the equilibrium real exchange rate (ERER) point to a very slight undervaluation of the Uruguayan peso.** To obtain these estimates, staff used parameters from cross-country studies and estimated a vector error correction model for Uruguay, which allowed to find a long-run cointegrating relationship between the real exchange rate and some fundamentals. Box 5 briefly explains this approach, while this SIP proceeds to elaborate on the details associated with its application.

- **Using cross-country studies to calculate the ERER indicates that the real exchange rate is in line with fundamentals.** Staff used two different sets of estimated parameters corresponding to the studies by CGER (see IMF Occasional Papers 167 and 261), and Vitek (2009). Table 5 presents the list of variables considered in each estimation, while Figure 7 shows that the estimates of the ERER were found to be not very different over the medium-term. The real exchange rate misalignment was calculated to be around -5.6 percent under CGER estimates and -4 percent under Vitek's estimates (see Table 6).[5] Therefore, both estimates suggest a rather mild undervaluation, implying that the real exchange rate is broadly in equilibrium.[6]

Figure 7. Uruguay



Source: WEO and Fund staff estimates

Table 5. The Equilibrium Real Exchange Rate Approach
(under panel data estimation techniques)

	CGER	Vitek (2009)
Net Foreign Assets	0.0423	
	(0.0146)	
Productivity Differential	0.1869	0.2805
	(0.0641)	(0.1825)
Terms of Trade	0.5463	0.1062
	(0.1161)	(0.1054)
Government Consumption	2.9068	1.1346
	(0.3958)	(1.0563)
Trade Restriction Index	0.1238	
	(0.0464	
Price Controls	-0.0366	
	(0.0156)	
Constant (including Fixed Effects)	0.0100	-0.1048
	NA	NA

Sources: OP 261 and Vitek (2009).

Table 6. The Equilibrium Real Exchange Rate Approach
(under panel data estimation techniques)

	CGER	Vitek
Logarithm of REER	-0.18	-0.18
Logarithm of ERER	-0.12	-0.14
REER Adjustment (+ =overvaluation)	-5.6	-4.0

Source: Fund staff estimates.

[5] The misalignment was computed as the deviation of the medium-term ERER from the medium-term real effective exchange rate (REER). The latter was held constant at the current level of -0.18, in log terms (corresponding to 83.6) and calculated as the average of the first 6 months of 2009. On the other hand, CGER's and Vitek's estimates project medium-term ERERs of -0.12 and -0.14 (in log terms), respectively.

[6] Since the constant is country specific and Uruguay is not in the CGER sample, the constant to apply the CGER estimates was obtained by setting the sample-average ERER equal to the sample-average REER, for the post-liberalization period 1990-2008; thus, the implicit assumption was that the average misalignment in the estimation period is zero.

Box 5. The Equilibrium Real Exchange Rate Approach

The equilibrium real exchange rate (ERER) approach directly estimates an equilibrium real exchange rate for a country as a function of medium-term fundamentals including: 1/

Net Foreign Assets. Theory predicts that economies with relatively high NFA can afford more appreciated real exchange rates—and the associated trade deficits—while still remaining solvent.

Productivity Differential. If productivity in the tradables sector grows faster than in the non-tradables sector, the resulting higher wages in the tradables sector will put upward pressure on wages in the non-tradables sector, resulting in a higher relative price of non-tradables and therefore in a real appreciation (Balassa-Samuelson effect).

Openness and Trade restrictions. A less open trade regime is likely to be associated with a more appreciated real exchange rate. In particular, trade restrictions may induce real exchange rate appreciation as they may lead to higher domestic prices.

Commodity Terms of Trade. Higher commodity terms of trade should appreciate the real exchange rate through real income or wealth effects.

Government Consumption. Since higher government consumption falls more on non-tradables than tradables, then this consumption is likely to appreciate the real exchange rate.

Price controls. When price controls are removed, the rise in administered prices toward market levels induces a higher CPI, which would be accompanied by a real appreciation.

The Real Interest Rate Differential. Higher differentials may attract capital flows inducing appreciation pressures on the real exchange rate.

The approach can be implemented by using panel regression techniques. Based on these techniques, the Occasional Paper 261 by CGER and Vitek (2009) provide estimates of different models that include some of the previously discussed fundamentals. The estimation method, the length of the sample, the country sample, and the definitions of the variables vary across these works. An alternative method is based on estimating a vector error correction model for the country under consideration. In the estimation, Johansen cointegration techniques can be applied to determine how much of the long-run behavior of the real exchange rate, which is a measure of its equilibrium, is explained by the discussed fundamentals.2/

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1/ See the Occasional Paper 261.
2/ See McDonald and Ricci (2003).

- **In the vector error correction model (VECM), a cointegrating relationship was found among the REER and two key fundamentals.** Staff used quarterly data from 1980:3 to 2009:1 to find a long-run relationship between the real exchange rate and some of the fundamentals described in Box 5. Although Augmented Dickey-Fuller unit root tests revealed that all the variables that were

Table 7. Selected VECM Results

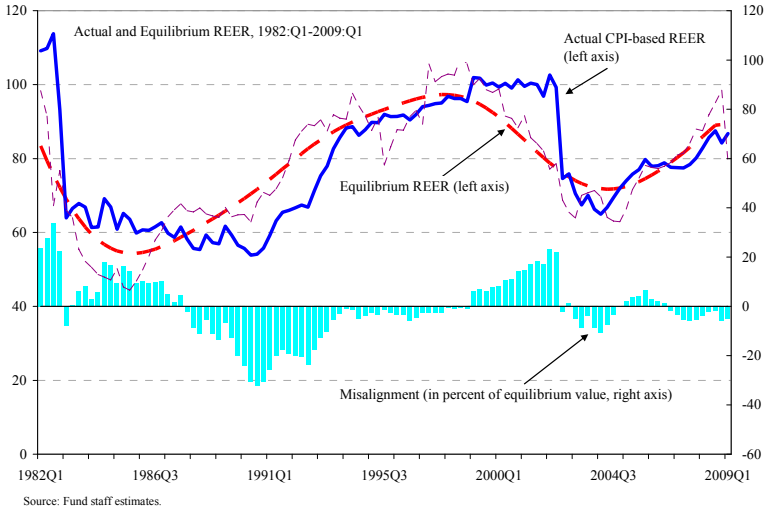
	Coefficient	t-statistic
Cointegrating Relationship		
REER (logarithm) [-1]	1	…
Relative Productivity (logarithm) [-1]	-2.055	-5.582
NFA (in percent of GDP) [-1]	-0.012	-5.322
Constant	2.081	…
Estimated Speed of Adjustment	-0.172	-4.703

Source: Central Bank of Uruguay, WEO and Fund staff estimates.

considered were integrated of order 1, only one stable co-integrating relation was found between the real effective exchange rate, real GDP relative to trading partners and net foreign assets (see Table 7). The variables in the estimated long-run co-integrating relationship showed the expected signs. In particular, an increase in relative real per capita GDP by 1 percent is associated with a real appreciation of 2 percent, and an increase in net foreign assets of 1 percent of GDP is associated with a real appreciation of 0.01 percent. Moreover, 17 percent of the deviation of the REER from its estimated long-run relation is eliminated within one quarter.

- **The estimated long-run equilibrium relation based on the VECM also suggests that the REER is close to its equilibrium value.** Figure 8 plots the estimated equilibrium rate, after filtering it using the Hodrick and Prescott filter. Relative to the estimated equilibrium relation, Uruguay's REER was fairly well aligned throughout the second half of 1990s. From late 2000 until the crisis, the REER was then increasingly overvalued, as the exchange rate regime prevented the REER from depreciating. With the floating of the exchange rate in mid-2002, the REER returned close to equilibrium, and since then both the equilibrium REER and the REER have tended to go up. At end of the first quarter of 2009, the REER was slightly below equilibrium, implying a very slightly undervaluation of less than 5 percent.

Figure 8. Uruguay



Source: Fund staff estimates.

D. Conclusions

14. **This SIP finds that although the Uruguayan peso has appreciated since 2003, there is no evidence of competitiveness problems and a potential misalignment of the real exchange rate.** In fact, most external indicators suggest that the Uruguayan remains competitive. The exchange rate is assessed to be near or possibly slightly below its equilibrium value. This finding is consistent across most of the differing methods applied to assess the real exchange rate.

REFERENCES

International Monetary Fund, 2007, Bilateral Surveillance over Members' Policies, Executive Board Decision, June.

Isard, Peter, and Hamid Faruqee, 1998, "Exchange Rate Assessment: Extensions of the Macroeconomic Balance Approach," *Occasional Paper* No. 167, (Washington: International Monetary Fund).

_____, 2001, "Methodology for Current Account and Exchange Rate Assessment," *Occasional Paper*, No. 209, (Washington: International Monetary Fund).

Lane, Philip and Gian Maria Milesi-Ferretti, 2006, "The External Wealth of Nations Mark II: Revised and Extended Estimates of External Assets and Liabilities, 1970–2004," Working Paper 06/69, (Washington: International Monetary Fund).

Lee, Jaewoo, Gian Maria Milesi-Ferretti, Jonathan Ostry, Alessandro Prati, and Luca Antonio Ricci, 2008, "Exchange Rate Assessments: CGER Methodologies," *Occasional Paper*, No. 261, (Washington: International Monetary Fund).

MacDonald, Ronald and Luca Antonio Ricci, 2003, "Estimation of the Equilibrium Real Exchange Rate for South Africa," Working Paper 03/44 (Washington: International Monetary Fund).

Medina Leandro, Jordi Prat, and Alun Thomas, 2009, "The Macro Balance Current Account Estimates for Emerging Markets Economies," Manuscript (Washington: International Monetary Fund).

Rogoff, Kenneth, 1996, "The Purchasing Power Parity Puzzle," *Journal of Economic Literature,* Vol. 34, No.2.

Tokarick, Stephen, 2009, "A Method For Calculating Export Supply and Import Demand Elasticities," Manuscript (Washington: International Monetary Fund).

Vitek Francis, 2009, "Exchange Rate Assessment Tools for Advanced, Emerging, and Developing Economies," Manuscript (Washington: International Monetary Fund).

Zalduendo, Juan, 2008, "Bivariate Assessments of Real Exchange Rates Using PPP Data," Working Paper 08/153 (Washington: International Monetary Fund).

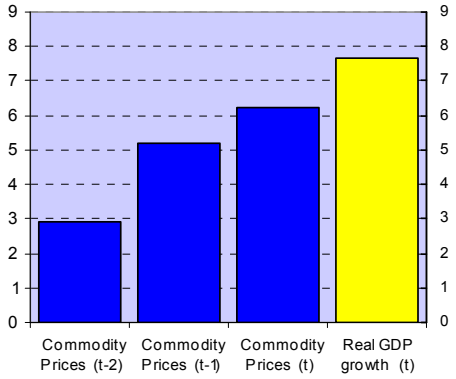
II. Commodity Prices, Growth and the Fiscal Position in Uruguay[1]

A. Introduction

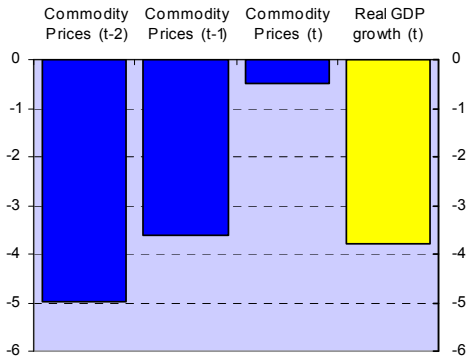
1. **Commodity prices are an important external factor for growth and fiscal performance in a small open economy like Uruguay's**. When agricultural commodity prices rise, Uruguay stands to gain with stronger external current account balances, output growth, and fiscal positions. However, when oil prices rise in tandem, as a net oil importer, Uruguay's terms of trade deteriorate, as may growth and the fiscal position. Moreover to the extent that the economy is dependent on commodities, volatility in their prices introduces uncertainty for the growth and fiscal outlook.

2. **Periods of high growth in Uruguay have historically occurred during commodity price booms and vice versa**. An analysis of trends in growth and commodity prices during the period 1970-2008 points to a positive correlation between growth and an index of Uruguay specific commodity prices, i.e., non oil primary commodity prices exported by Uruguay. Periods of high growth have typically been preceded by rising commodity prices. Similarly, periods of negative growth have also been preceded by a sharp decline in commodity prices.

Growth and Commodity Prices, 1970-2008
(percent)



Average real GDP growth in the years when growth was highest during the period 1970-2008, and the corresponding average growth in non-oil commodity prices (CP) at t=0, t-1and t-2.



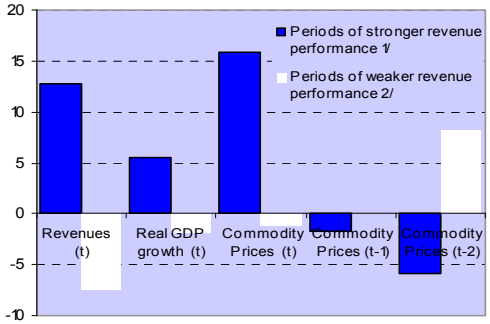
Average real GDP growth in the years when growth performance was lowest (i.e., negative) during 1970-2008, and the corresponding average growth in non-oil commodity prices (CP) at t=0, t-1and t-2.

3. **The impact of commodity prices on Uruguay's fiscal performance is more difficult to delineate**. Large commodity exporters in the region (Argentina, Brazil, Chile and Peru) have experienced a boost in tax revenues during the recent run-up in prices, which in some cases has fueled an increase in government spending (IMF, April 2009). In the case of Uruguay, the government does not rely directly on revenues from commodity exports, and

[1] Prepared by Rita Babihuga.

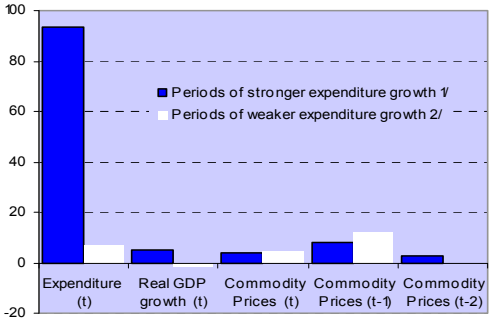
any revenue windfalls deriving from commodities accrue indirectly through higher incomes. Moreover, lagged and often times incomplete tariff adjustments to oil price increases have carried significant fiscal costs. Historically, periods of strong revenue performance have coincided with high growth in both, real GDP and commodity prices, while periods of poor revenue performance have also coincided with low real GDP growth and commodity prices. However, the links between expenditures, growth and commodity prices are less evident.

Fiscal Performance and Commodity Prices, 1970-2008
(percent)



1/ Average real revenue growth in years when revenue performance was strongest (i.e., real revenue growth > 10 percent) during 1970-2008, and corresponding average GDP growth and growth in non-oil commodity prices (CP) at t=0, t-1 and t-2.

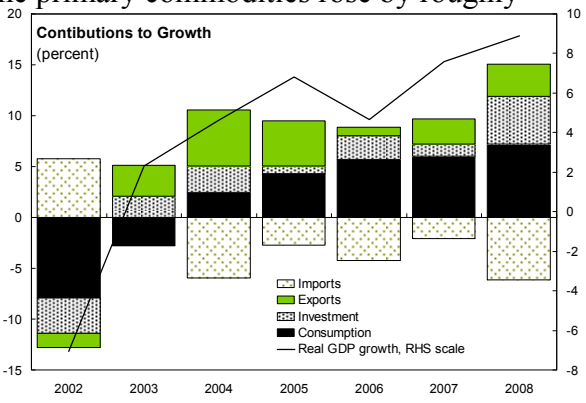
2/ Average real revenue growth in years when revenue performance was the weakest (i.e., negative real revenue growth) during 1970-2008, and average GDP growth and growth in non-oil commodity prices (CP) at t=0, t-1 and t-2.



1/ Average real expenditure growth in the years when spending was the highest (i.e., highest percentiles of real expenditure growth) during 1970-2008, and average growth in GDP and non-oil commodity prices (CP) at t=0, t-1 and t-2.

2/ Average real expenditure growth in the years when spending was the lowest (i.e., expenditure growth < 10 percent) during 1970-2008, and average growth in GDP and non-oil commodity prices (CP) at t=0, t-1 and t-2.

4. **The most recent run-up in global commodity prices appears to have had a mixed impact on the Uruguayan economy**. On one hand, higher commodity prices boosted the economic fortunes of Uruguayan exporters and raised incomes. Over 50 percent of Uruguayan exports during 2006-2008 comprised primary commodity exports (see Table A1), and on average international prices of these same primary commodities rose by roughly 90 percent over the same period.[2] The share of exports in real GDP growth rose steadily with the commodity price boom. Moreover, with its strong economic links to Argentina (and to a lesser extent Brazil), the Uruguayan economy stood to benefit *indirectly* from the positive impact of the commodity price boom on output in those countries. However, the oil import bill rose too, with total imports more than offsetting the increase in exports.



[2] Based on data from WITS (World Integrated Trading System).

5. **This paper quantifies the overall extent to which Uruguay is affected by commodity price movements.** It does this by focusing on two main issues: (1) the overall effect of commodity prices on growth and the fiscal position; and (2) the importance of indirect channels of transmission of commodity price shocks, particularly through neighboring countries. The paper employs both a standard VAR methodology as well as a Bayesian VAR to assess commodity prices changes (and the corresponding impact on Uruguay specific terms of trade) on the government sector (primary fiscal balances) and on households (gross domestic product and income).

6. **We find that commodity price shocks have a significant effect on growth and fiscal indicators, with intermediate channels of transmission via Argentina playing a key role**. In general, the models yield the following results:

a. An increase in commodity prices has a direct positive and significant effect on growth in Uruguay with the effect lasting approximately one year.

b. Moreover, commodity price shocks also have a strong positive effect on Argentine growth, which in turn has a strong positive effect on Uruguayan growth. On the contrary, we do not find evidence of significant transmission channels to Uruguayan growth through higher growth in Brazil.

c. Commodity price shocks also affect the fiscal position, although the effects are short-lived—revenues of the non-financial public sector initially fall in response to higher commodity prices, but expenditures (in line with declining revenues) fall even more, resulting in a temporary improvement in the primary balance. The deterioration in revenues reflects the *negative* impact of oil price shocks on public enterprises. Following the initial decline, expenditures quickly return to their initial level (with their increase likely reflecting in part higher spending on subsidies) and the primary balance deteriorates. These effects are complete within 2–3 quarters.

B. Commodity Prices, Terms of Trade and the Macroeconomy

7. **The impact of simultaneous increases in oil and food commodity prices is difficult to disentangle**. Changes in the terms of trade do not directly affect the level of real output, but influence real purchasing power, both through nominal incomes and through their effect on domestic prices. The indirect effects of changes in the terms of trade on real output in turn depend on the impact of these changes on spending. Moreover, domestic activity and income receives an additional boost from the indirect impact of commodity prices shocks on neighboring country GDP, Argentina and Brazil in the case of Uruguay, particularly when economic links between the countries are strong.

8. **Higher commodity prices have a potential impact on both government spending and revenues**. On the expenditure side, to mitigate the negative impact of higher food prices, the government implemented a range of subsidies in 2008 roughly equivalent to 2 percent of

GDP. At the same time, the impact on revenues has been mixed. On one hand, higher oil commodity prices have had an adverse effect on fiscal performance, eating into the operating surpluses of two key public enterprises, the state fuel company (ANCAP) and the electricity generation company (UTE). On the other hand, it is plausible that the government sector would have captured rents due to higher commodity prices, directly through taxes on income and profits of enterprises, as well as indirectly through taxes on household incomes. While the government could save a large portion of buoyant revenues, it could also use revenue windfalls to finance growing government spending. The latter appears to have been the case in Uruguay with real expenditures growing faster than real revenues in recent years.

C. Some Stylized Facts

9. **Preliminary evidence points to a strong correlation between commodity prices and measures of growth, but a weaker correlation with respect to fiscal variables**. Commodity prices have a strong positive correlation with GDP growth, manufacturing output and the CERES leading indicator of activity. However, despite correlating strongly with revenues, commodity prices appear to have a weaker relationship with expenditures and the primary and overall balances. Moreover, Uruguayan export prices have a high positive correlation with international oil prices, particularly in the period 1980-2005—but this relationship is much weaker after 2005.

Covariance Analysis: Ordinary
Sample (adjusted): 1993Q1 2009Q1
Balanced sample (listwise missing value deletion)

Correlation	Commodity Prices	Non fuel Commodity Prices	CERES	CERES_SA	GDP	GDP_SA	Manufacturing	Manufacturing w/o refinery	REV	EXP	Primary Balance
Commodity Prices 1/											
Commodity Prices	1.00										
Non Fuel Commodity Prices	0.97	1.00									
Economic Activity Indicators											
CERES leading indicator	0.69	0.76	1.00								
CERES_SA	0.69	0.76	1.00	1.00							
Real GDP	0.74	0.69	0.94	0.94	1.00						
Real GDP_SA	0.82	0.77	1.00	1.00	0.93	1.00					
Manufacturing Output	0.85	0.84	0.95	0.95	0.93	0.96	1.00				
Manufacturing Output without Refinery	0.89	0.90	0.97	0.97	0.97	0.97	0.96	1.00			
Fiscal Indicators 2/											
Revenue	0.61	0.57	0.79	0.79	0.78	0.85	0.79	0.82	1.00		
Expenditure	0.47	0.33	0.59	0.59	0.69	0.70	0.65	0.65	0.81	1.00	
Primary Balance	0.45	0.46	0.19	0.19	0.10	0.23	0.13	0.16	0.37	-0.10	1.00

1/ WEO commodity and non fuel commodity prices
2/ Non financial public sector expressed in real terms

10. **Moreover, the strong relationship between commodity prices and growth and revenues is specific to some commodities, but not others (Figure A1)**. Real GDP growth appears to have a strong positive correlation with prices of soybeans, wood and wheat, but a weaker (still positive) correlation with rice, beef and leather for example. Revenues appear to correlate strongly with prices of beef and soybeans, but not rice, wood or wheat prices.

D. Methodology

11. **First, we estimate parsimonious VARs analyzing the direct and indirect effects (via their effect on GDP) of commodity prices on revenues and expenditures**. This method allows us to analyze the general impact of commodity prices on growth and fiscal variables using a simple model, given that a crucial transmission channel of commodity prices to the fiscal position in the case of Uruguay is through economic activity. We estimate three variable recursive VARs using quarterly data, covering the period 1994Q1-2009Q1 for commodity prices, real GDP growth and real revenues; then commodity prices, real GDP growth and real expenditures. A key motivation, is to allow for comparison with similar models estimated for other net commodity exporters in the region by Medina (2009), discussed in paragraph 18.

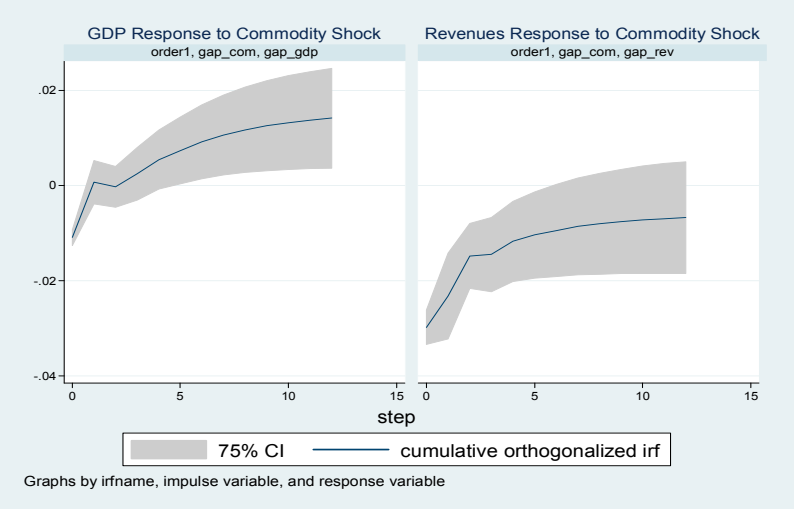
12. **We construct a 'Uruguay specific' commodity price index designed to reflect more accurately the share of primary commodities in Uruguay's export basket**. The primary commodity price index is based on 2006-2008 export values for Uruguay, with the trade data derived from the UN's World Integrated Trade Solutions (WITS). This constructed index, in our view, more accurately reflects Uruguay's trade composition,[3] and hence allows us to apply the relevant commodity price shocks to which it is vulnerable.

13. **Impulse response functions derived from the VAR estimations indicate how growth, revenues and expenditures have responded to commodity price shocks**. These responses take into consideration not only the direct impact of the shocks, but also their indirect impact through their feedback on real GDP growth, the endogenous variable. We impose strict exogeneity conditions on commodity prices as they are assumed not to be affected by domestic conditions in Uruguay. A Cholesky factorization is used with the following ordering: domestic economic growth; and real revenues (real expenditures).

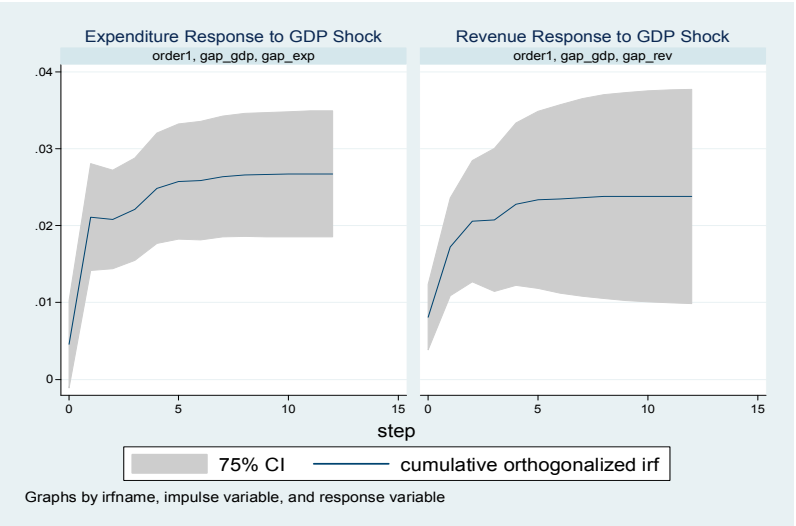
14. **The results confirm the positive impact of commodity price shocks on growth, but a more mixed impact on revenues**. Commodity price shocks initially lower growth (at t=0), likely reflecting the immediate adverse impact of oil price shocks on the current account balance. However, within the first two quarters, growth increases and the impulse response becomes positive before eventually dying out after roughly 10 quarters. The impact of shocks on revenues is initially negative, again reflecting the adverse impact of oil price shocks on public enterprises and implied revenues of the non-financial public sector. Despite becoming less negative in the subsequent two quarters, the impulse response never turns

[3] Generalized commodity price indices e.g.,. the IMF commodity price index is weighted in favor of advanced economies' trade, while the World Bank index is weighted toward developing economies' trade—and hence may not provide the most accurate representation of trade weights for Uruguay. Uruguay specific terms of trade indices are not available for a sufficiently long period of time—the central bank's index has been discontinued.

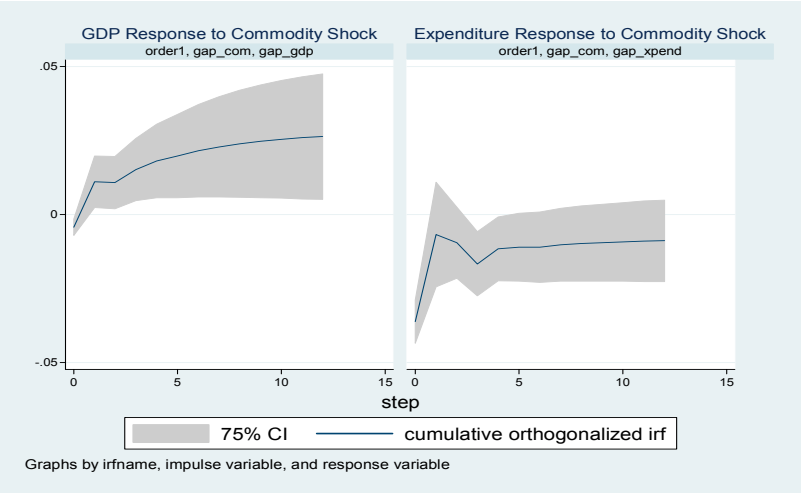
positive—all in all, the negative impact of oil shocks appears to outweigh any potential benefits for higher revenues from higher export prices.



15. **The fiscal response to GDP shocks suggests expenditures may tend to follow revenue developments**. A GDP shock leads revenues and expenditures to rise instantaneously (at t=0)—with revenues rising by slightly more. Thereafter, both revenues and expenditures continue to rise for about a year, with the impulse responses becoming imprecise after that.



16. **The response of expenditures to commodity price shocks appears similar to that of revenues**. The response of GDP to commodity price shocks is as before. Like revenues, expenditures initially fall in response to commodity price shocks--this may be a response to revenues themselves falling. Thereafter, the impulse response of expenditures rises sharply within the first two quarters after the shock as expenditures return to previous levels. The response becomes imprecise after about 5 quarters.



17. **These results bear a striking difference when compared to results from the large *net* commodity exporters of Latin America**. A recent study by Medina (August 2009) analyzes the impact of commodity prices on the fiscal positions of a set of countries, including the main commodity exporters in Latin America (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru and Venezuela). The paper finds heterogeneity in the response of revenues and expenditures to commodity price shocks, attributing this varied behavior in part to the diversity in fiscal institutional frameworks across these countries. Nonetheless, the response to commodity price shocks in these countries is broadly similar when compared to a *net* commodity importer such as Uruguay. Our findings for Uruguay compare as follows:

a. Government revenues in the net commodity exporters are generally positively affected by commodity price shocks. As seen earlier, the response of revenues to commodity price shocks in the case of Uruguay is negative, appearing to be heavily influenced by oil price shocks;

b. Like in Uruguay, revenues in Colombia initially fall sharply in response to commodity price shocks (Colombia is an outlier in this sense)—however, unlike in Uruguay, the revenue impulse response then recovers within the next 3 quarters, becoming positive within a year;

c. With the exception of Chile (and to a lesser extent Peru), expenditures are highly procyclical in the net commodity exporters. In Uruguay, this result is less clear—expenditures can be thought of as procyclical to the extent that they follow the pattern of revenues (which become less negative within a few quarters of the initial commodity price shock), however, unlike the other countries they do not rise sharply in response to the commodity price shocks.

d. The response of GDP to commodity price shocks is similar in all countries (including Uruguay)—positive commodity price shocks appear to have a strong positive influence on growth.

E. A Bayesian VAR Approach

18. **In order to take better account of a full set of external shocks to Uruguayan growth and the fiscal position, we next estimate a Bayesian VAR.**[4] This methodology is in the same vein as Adler and Mansilla (2008) and Abrego and Pär Österholm (2008) who analyze the impact of external shocks on Uruguayan and Colombian growth, respectively. We adapt the model to examine the impact of commodity price shocks on growth and on fiscal variables, taking into account, in addition to fuel and non-fuel commodity prices, growth in Argentina and Brazil (an important conduit of commodity price shocks to Uruguayan growth and hence fiscal performance) and global financial conditions. The basic specification of the empirical model is based on the following set of variables:

$$x_t = f\{CP^{com}, y^{ARG}, y^{BRA}, EMBI^{LA}, y^t, PB\}$$

where:

- CP^{com} is the cyclical component of the IMF's world commodity price index, including both oil and non-oil commodities;[5]
- y^{BRA} denotes the cyclical component of Brazil's GDP;
- y^{ARG} denotes the cyclical component of Argentina's GDP;
- $EMBI^{LA}$ is the Latin American JP Morgan EMBI Spread, and it used as a proxy for financial conditions in the region;
- y^t denotes the cyclical component of Uruguay's GDP;
- PB is the primary balance of the non financial public sector.
- We also include a dummy variable for the period 2001Q1-2003QII to control for the impact of the financial crisis.

[4] This methodology allows for the specification of informative steady-state priors for the variables used in the model, which reduces the problem of degrees of freedom arising from the generous parameterization associated with conventional VAR models, and improves forecasting performance. Interpreting the impulse response functions (which allow for imposing block exogeneity) is sufficient for the narrow purposes of this paper and we leave the discussion of the forecasts for a forthcoming working paper.

[5] We estimate an alternative specification of the model using URY specific commodity price index.

19. **The model is estimated using quarterly data for the period 1994Q1-2009Q1**. The steady state priors are based both on recent history and the author's assumptions about plausible medium term ranges. The priors assume potential growth in Uruguay of a median of 3.5 percent (which is higher than the historical potential), mainly reflecting the wave of investment growth from 2006-2008. Growth in Argentina and Brazil is assumed to remain at levels in the sample period (3 percent median, respectively). The prior distribution of the $EMBI^{LA}$ (centered at 400bps) reflects likely higher risk aversion towards the region than in the last few years, while the prior distribution for the change in commodity prices is centered on 0 percent (no change over the medium term).

20. **The model yields plausible results and confirms the findings of the earlier simple VAR estimations**.[6] The basic specification confirms the importance of key external factors for growth and the primary fiscal balance. For example, a one standard deviation shock in the exogenous variables (expressed in each variable's units) would cause the following effects on Uruguay's GDP growth and primary balance (Figure 1):

a. On balance, an increase in commodity prices raises Uruguayan growth by roughly 0.5 percentage points, with the positive impact fading away after about 5 quarters.[7] An alternative specification including both oil and non-oil commodity indices indicates that the positive impact of commodity prices on growth derives mainly from the non-oil commodity index. Surprisingly, the oil index also has a positive and significant effect on Uruguayan growth, likely reflecting positive externalities from the positive effects of oil shocks on Argentine growth;

b. Not surprisingly, the Argentina channel in particular represents an important transmission channel of commodity price shocks to Uruguay.[8] First, commodity price shocks have a positive and significant impact on Argentina's and Brazil's growth. Secondly, an increase in Argentine growth has a strong positive and significant effect on Uruguayan growth, with the effects persisting for 8 quarters. By contrast, growth in Brazil has a very small impact on Uruguayan growth, with the impulse response becoming imprecise within 2 quarters.

c. Commodity price shocks initially improve the primary balance (as expenditures fall more than revenues), however, the primary balance quickly reverts back as

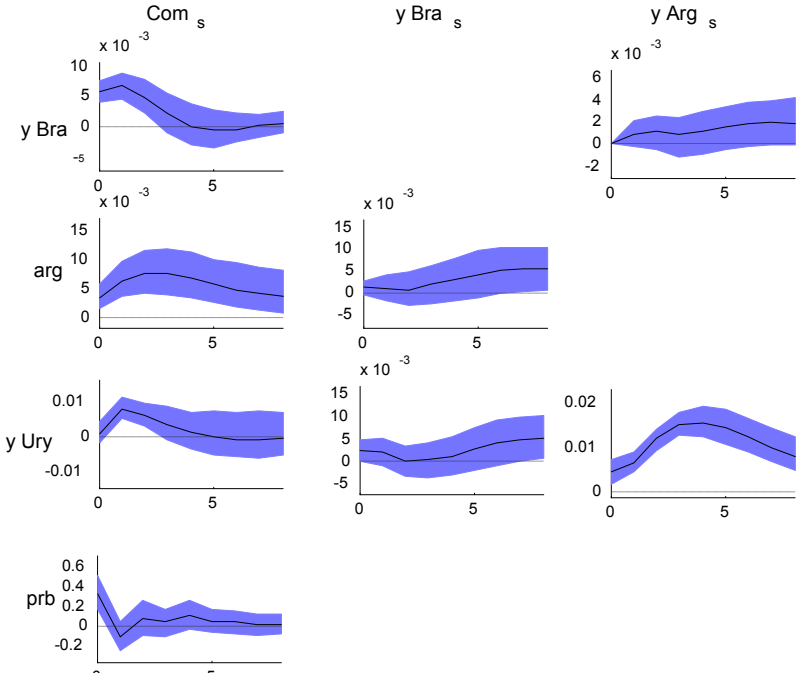
[6] We estimate several alternative specifications and report the results based on the general commodity price index (as opposed to the Uruguay specific index), as well as the separate impact of non oil commodity price shocks, and the impact on revenues and expenditures.

[7] One standard deviation shock is roughly equivalent to a 17 percentage point increase in commodity prices.

[8] This result is corroborated in the companion selected issues paper "The Influence of "Big Brother:" Does Uruguay Face Two Rests of the World?

expenditures rise (with increased subsidies) and revenues of the non-financial public sector continue to fall reflecting the negative impact of oil price increases on public enterprises. This is consistent with our earlier VAR estimations where the impulse response of revenues to commodity price shocks is negative and V-shaped, while that of expenditures is negative but rising.

Figure 1.Impulse Response Functions 1/
(At 95 percent confidence levels)



F. Conclusion

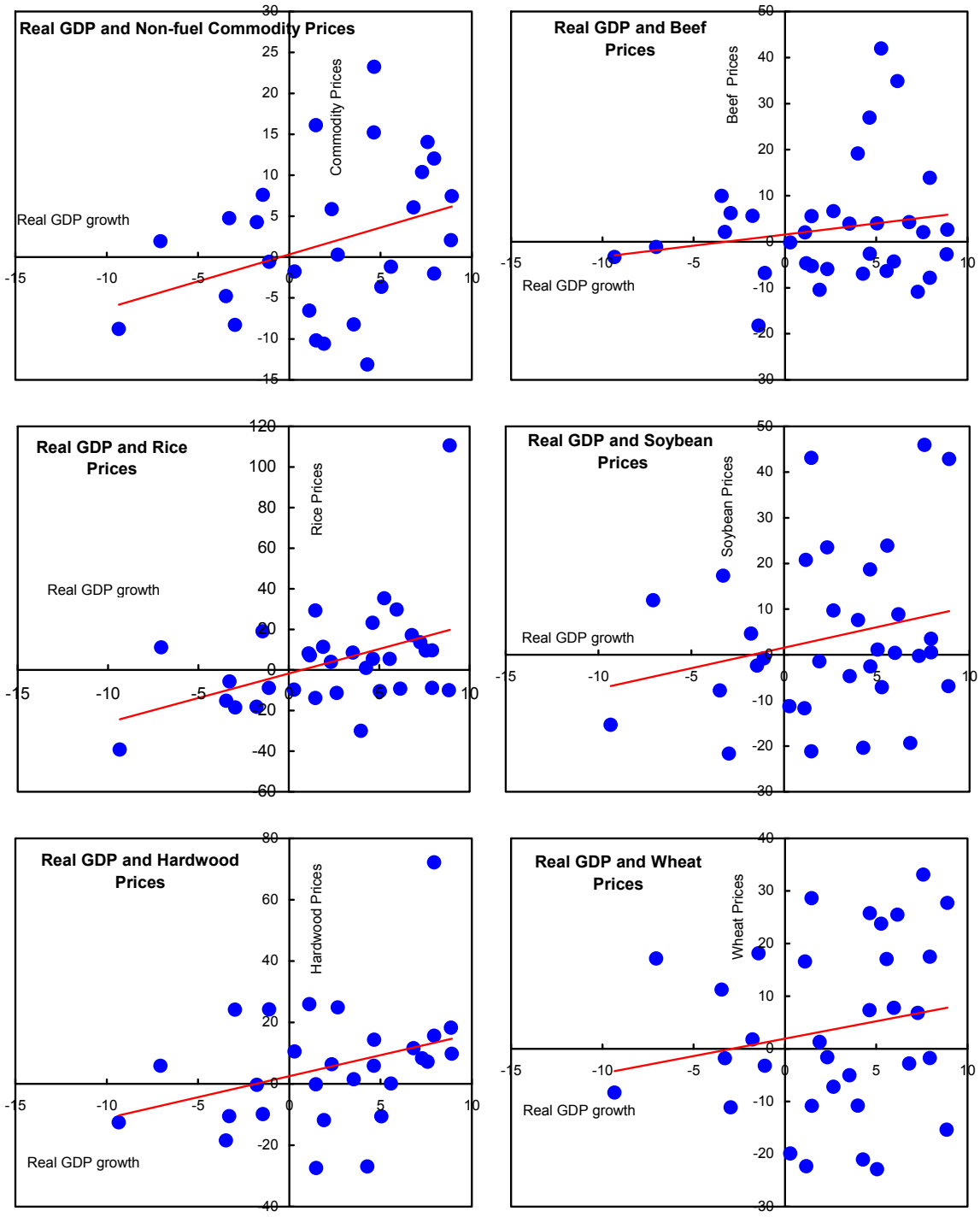
21. **Commodity prices are important for growth and the fiscal position**. Econometric estimates suggest that Uruguayan growth is sensitive to movements in commodity prices and even as a net commodity importer, the effects on growth are positive. Moreover, Uruguay's strong economic links to the region provide an indirect channel through which commodity price shocks feed into Uruguayan growth, considering the positive impact of commodities on neighboring country growth. However, given the structure of fiscal revenues in Uruguay, any boost to revenues (from higher agricultural commodity prices) is indirect through higher growth, and easily wiped out by the negative impact of oil shocks on public enterprises. Moreover, commodity price shocks appear to raise expenditures (on subsidies for example), thus resulting in a deterioration of the primary balance.

Table A1. Uruguay: Primary Commodity Exports

Category	Share in total export value (2006-2008) (in percent)
Beef	20.36109
Rice	6.55302
Leather	5.86181
Hardwood & Softwood	5.21635
Wool	3.71732
Petroleum	3.09912
Wheat	1.39511
Lamb	1.17745
Fish meal	1.16873
Oranges	0.68883
Aluminum	0.28245
Rubber	0.25434
Barley	0.23536
Hides	0.17075
Maize	0.14236
Poultry	0.10125
Copper	0.03608
Tea	0.01451
Swine Meat	0.01239
Fish	0.01056
Sunflower/Safflower Oil	0.01050
Palm Oil	0.00784
Rapeseed	0.00579
Lead	0.00528
Cocoa beans	0.00359
Rapeseed oil	0.00345
Cotton	0.00226
Zinc	0.00133
Iron ore	0.00116
Sugar	0.00042
Shrimp	0.00038
Coffee	0.00024
Olive Oil	0.00002
Nickel	0.00001
Bananas	0.00001
Total	**50.54**

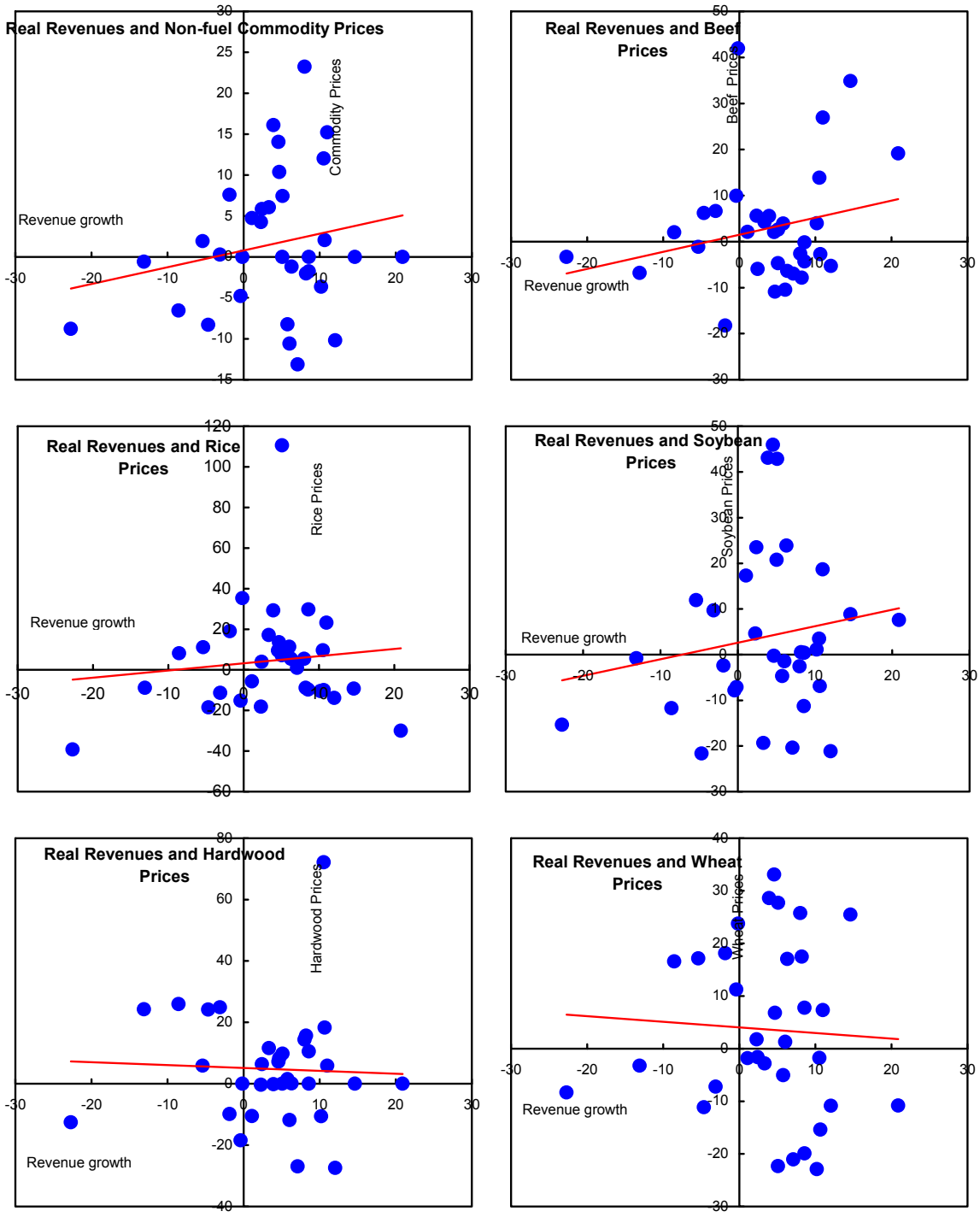
Source: UN WITS (World Integrated Trade Solution)

Figure A1. Uruguay: Real GDP and Selected Commodity Prices, 1970-2008
(annual percent change)



Source: World Economic Outlook; and Commodity Price Database (IMF).

Figure A1. Uruguay: Real Revenues and Selected Commodity Prices, 1970-2008
(annual percent change)



Source: Uruguayan authorities and Commodity Price Database (IMF).

Figure A2. Commodity Price Indices (Uruguay specific and IMF)

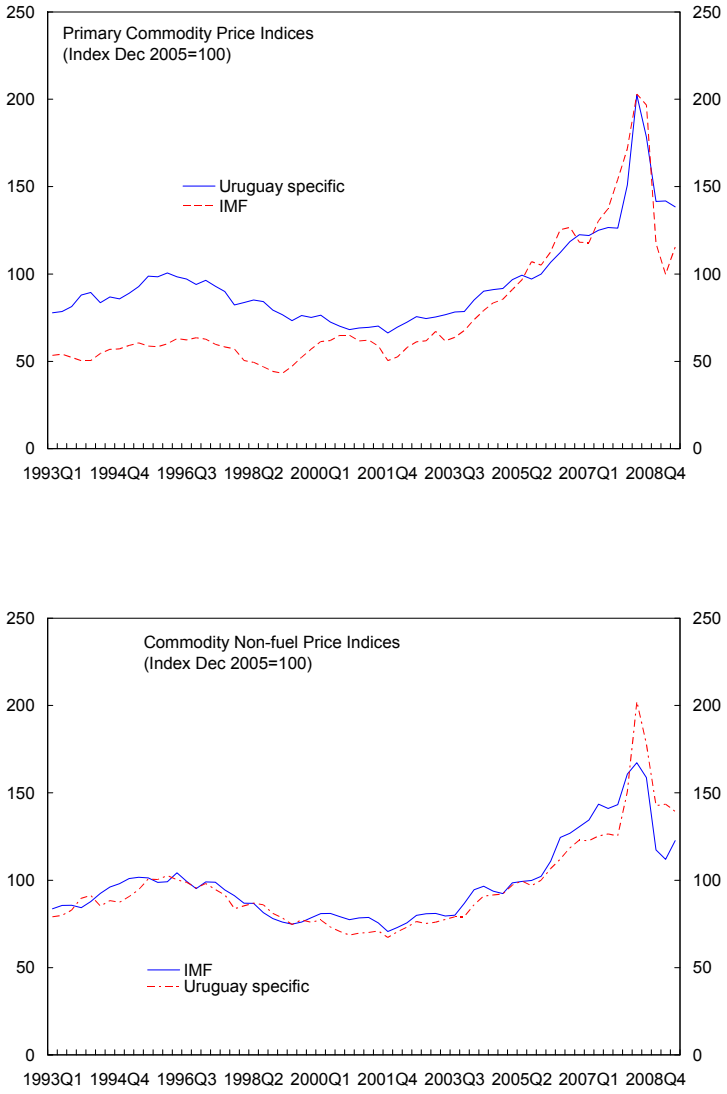
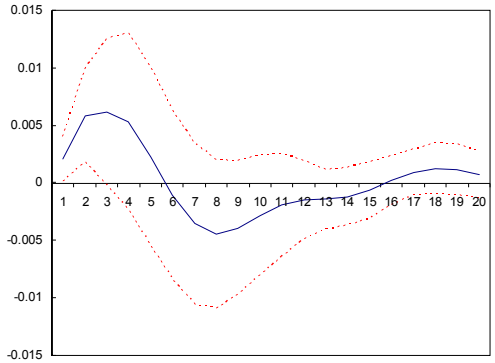
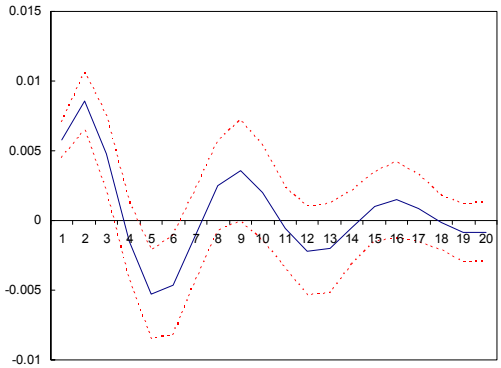


Figure A3. Response of GDP to Commodity Price Shocks (Medina, 2009)

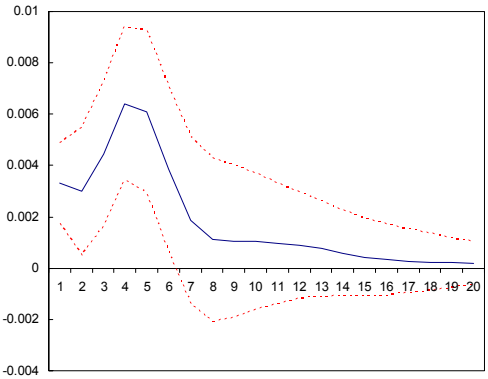
Argentina



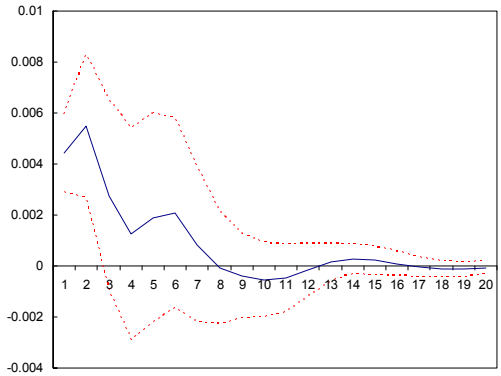
Brazil



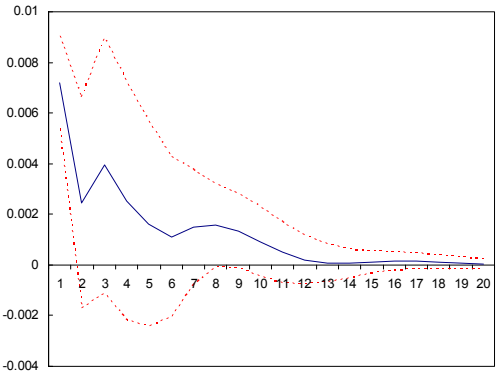
Chile



Colombia



Ecuador



Mexico

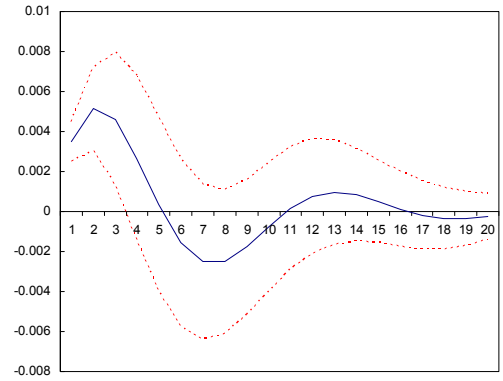
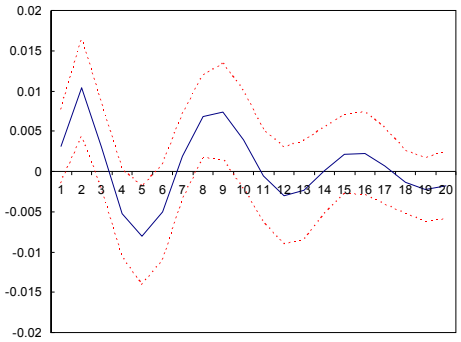
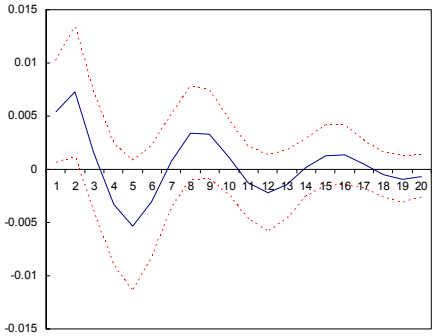


Figure A4. Response of Revenues to Commodity Price Shocks (Medina, 2009)

Argentina



Brazil



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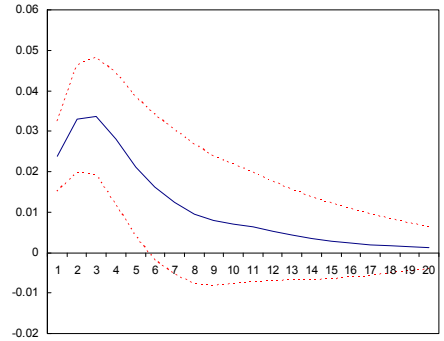

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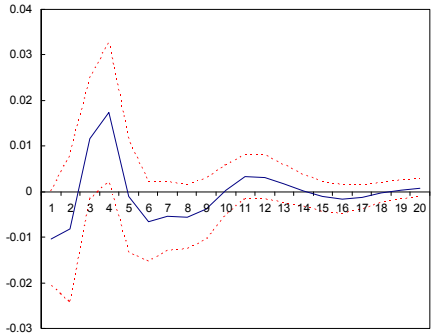

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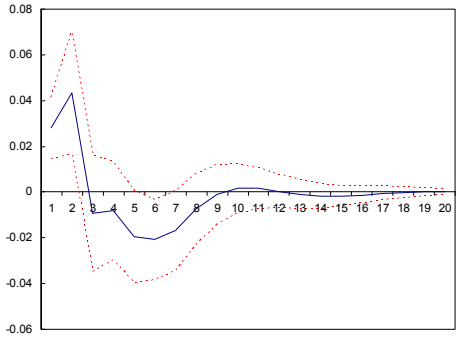

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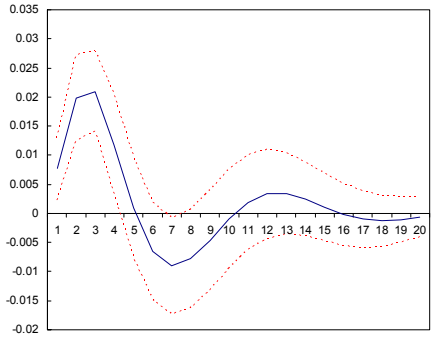
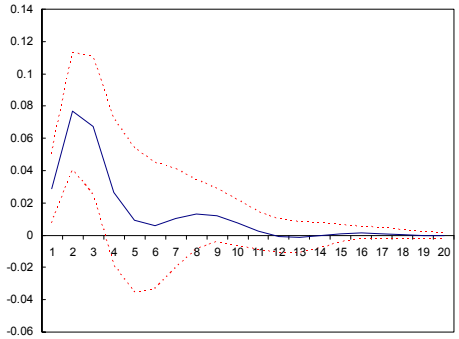


Peru



Venezuela

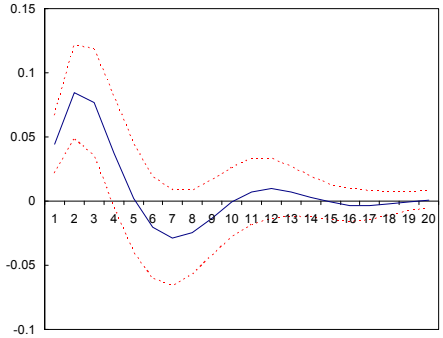
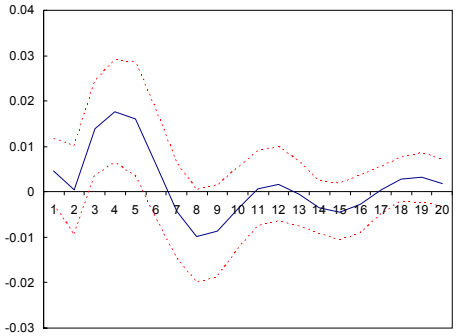
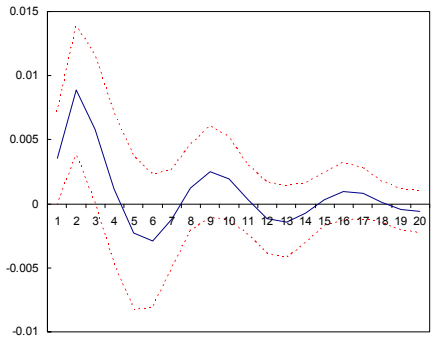


Figure A5. Response of Expenditures to Commodity Price Shocks (Medina, 2009)

Argentina



Brazil



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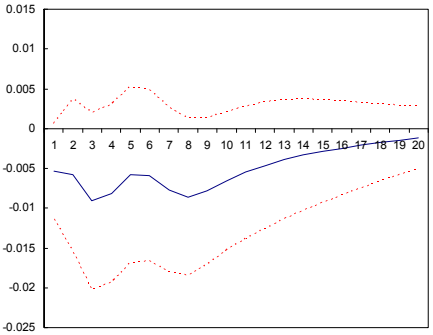

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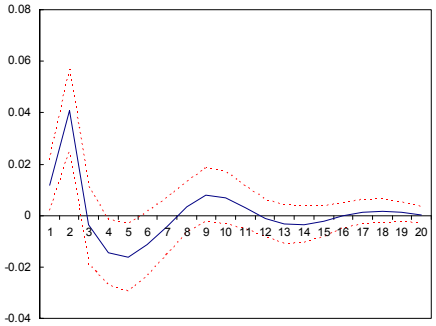

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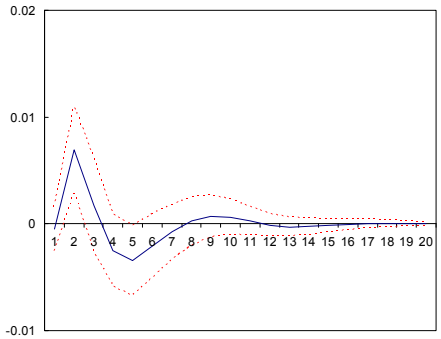

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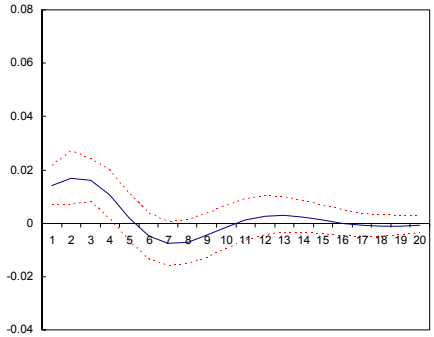
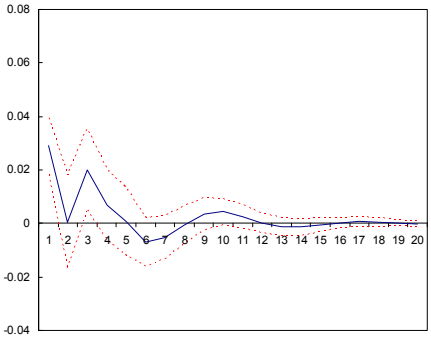
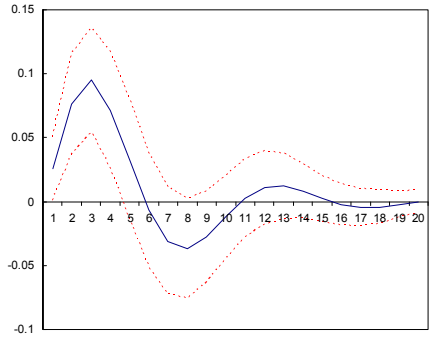


Peru



Venezuela



REFERENCES

Boccara B., 1994, "Why Fiscal Spending Persists When a Boom in Primary Commodities Ends" (Washington: The World Bank).

Bower, U., A. Geis and A. Winkler, 2007, "Commodity Price Fluctuations and Their Impact on Monetary and Fiscal Policies in Western and Central Africa," ECB Occasional Paper, April.

Calderon C. and K. Schmidt-Hebbel; "Macroeconomic Policies and Performance in Latin America"; Journal of International Money and Finance; Vol. 22; pp. 895-923; 2003.

_____, and P. Fajnzylber, 2009, "How Much Room Does Latin America And The Caribbean Have For Implementing Counter-Cyclical Fiscal Policies?" April.

Clements B., N. Eyzaguirre and J. Canales-Kriljenko, 2009, "Latin America: When Is Fiscal Stimulus Right?" IMF, Finance & Development (Washington: International Monetary Fund).

Collier P. and B. Goderis, 2007, "Commodity Prices, Growth and the Natural Resource Curse: Reconciling a Conundrum," University of Oxfords.

Deaton A. and R. Miller, 1995, "International Commodity Prices, Macroeconomic Performance, and Politics in Sub-Saharan Africa," Princeton Studies in International Finance 79.

International Monetary Fund, 2009, Western Hemisphere: Regional Economic Outlook; "Saving for a Rainy Day? Sensitivity of LAC Fiscal Positions to Commodity Prices" Di Bella G., H. Kamil and L. Medina.

_____, 2008: International Monetary Fund: "Western Hemisphere: Regional Economic Outlook" April.

_____, 2007a: "Norway: Selected Issues," Rossi M., Jafarov E. and Leigh D.; May.

_____, 2007b: "Uruguay: Selected Issues," Adler, Gustavo and M. Mansilla. April.

Medina, L., 2009, "A Commodity Curse? The Dynamic Effects of Commodity Prices on Fiscal Performance in Latin America" Draft Working Paper (Washington: International Monetary Fund).

III. How Important are Regional Factors for Uruguay?[1]

A. Introduction

1. **The Uruguayan economy has historically been very sensitive to changes in regional economic conditions.** In addition to the typical external disturbances faced by small open economies, such as shocks to terms of trade, to capital flows, or to the rest of the world's demand, it is subject to a number of idiosyncratic shocks stemming from its relative big neighbors Brazil and Argentina.

2. **The aim of this paper is to examine the role played by regional factors and to determine how vulnerable Uruguay is to potential turmoil in the region.**[2] To this end, the paper quantifies the extent of regional spillovers to the Uruguayan economy, and identifies some idiosyncratic financial and real linkages with Argentina that explain the high comovement of business cycles in these two countries. The paper also examines past crisis episodes in the region, trying to shed some light on the repercussions of potential financial turbulence in either one of the neighbor countries.

3. **The main results of the paper confirm the key role played by regional influences, especially from Argentina.** Shocks stemming from this neighbor explain about 20 percent of Uruguay's output fluctuations. Moreover, a typical Argentine shock has large and rapid effects on Uruguay's GDP growth. On other hand, shocks from Brazil do not appear to account for a significant fraction of Uruguay's GDP fluctuations—despite the larger importance of Brazil as a destination for Uruguay's exports. This is mainly due—in addition to a similar commodity export base and similar exchange rate policies in certain periods—to the existence of idiosyncratic real and financial linkages between Uruguay and Argentina.

4. **However, Uruguay is now clearly less vulnerable to financial contagion from the region.** Despite the importance of the strong idiosyncratic linkages, and despite the fact that the two largest financial and economic crises in recent Uruguayan history followed deep crises in Argentina, one cannot conclude that the potential occurrence of a new crisis in the region would necessarily cause a financial crisis in Uruguay. For once, the occurrence of simultaneous crises in Uruguay and Argentina can at least partially be explained by common external shocks affecting the region. In fact, not every past crisis episode in Argentina triggered a crisis in Uruguay, as evidenced by the 1989–90 hyperinflation crisis in Argentina. Regarding Brazil, past episodes of financial turbulence in Brazil did not cause major

[1] Prepared by Sebastián Sosa.

[2] The literature on Uruguay's regional linkages has focused mainly on real shocks. In spite of their importance, the key financial linkages with Argentina have not been analyzed deeply. See Favaro and Sapelli (1986), Talvi (1994), Bergara, Dominioni and Licandro (1994), Masoller (1998), Bevilaqua, Catena and Talvi (1998), Kamil and Lorenzo (1998), Voelker (2004), and Eble (2006), among others.

financial turmoil in Uruguay. Finally, the Uruguayan economy has reduced vulnerabilities to regional financial shocks, with sounder macroeconomic fundamentals, a more robust and better regulated banking system with lower exposure to Argentina, and a significantly reduced regional concentration of exports.

5. **The rest of the chapter is organized as follows.** Section B illustrates the high comovement of business cycles in the region, and describes the idiosyncratic and strong linkages that explain the particularly high correlations between Uruguay and Argentina. Section C examines the role played by regional influences as sources of output fluctuations in Uruguay, and how GDP growth has tended to react to shocks stemming from Argentina, Brazil, and the rest of the world. Section D looks at past crisis episodes in the region, trying to shed some light on Uruguay's vulnerability to a potential new crisis in the region. Finally, section E ends with some concluding remarks.

B. Regional Linkages: The Influence of "Big Brother"

Regional business cycle comovements

6. **Uruguay's business cycle is highly correlated with that of its regional neighbors, especially Argentina** (Figures 1 and 2). For the whole sample (1980Q1–2009Q2), the contemporaneous correlation between Uruguay's and Argentina's cyclical components of GDP is 0.61, with Argentina's business cycle leading Uruguay's one by one quarter (Table 1). In fact, the highest correlation in the cross-correlogram is the one between Uruguay's GDP in quarter *t* and Argentina's GDP in quarter *t-1*, with a coefficient equal to 0.67. The correlation between Uruguay's and Brazil's business cycles is positive but smaller than the one with Argentina (with a contemporaneous coefficient equal to 0.41); and there is evidence that the Brazilian business cycle leads the Uruguayan one by three quarters (Table 2).

Figure 1. Business Cycle in Argentina and Uruguay

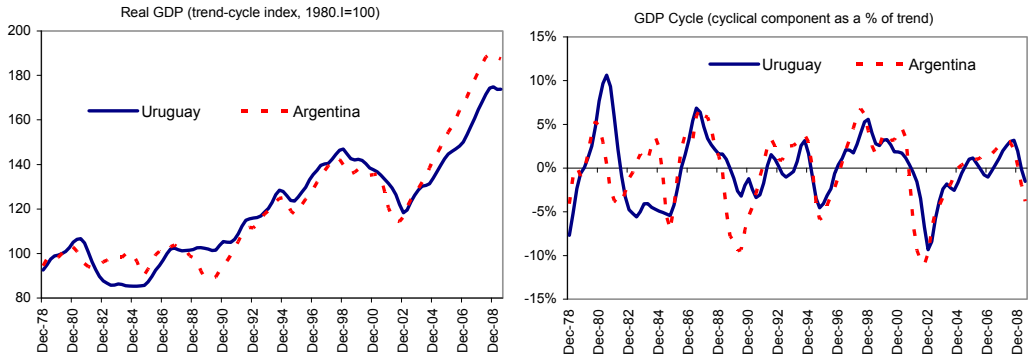


Table 1. Cross Correlations of Uruguayan and Argentine Business Cycles (1980.IV-2009.I)

Cross correlations of Uruguay's GDP in period t and Argentina's GDP in period								
t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
0.452	0.580	0.642	**0.670**	0.606	0.472	0.311	0.162	0.041

1/ Cyclical components of the GDP series obtained using the Hodrick-Prescott filter

Figure 2. Business Cycle in Brazil and Uruguay

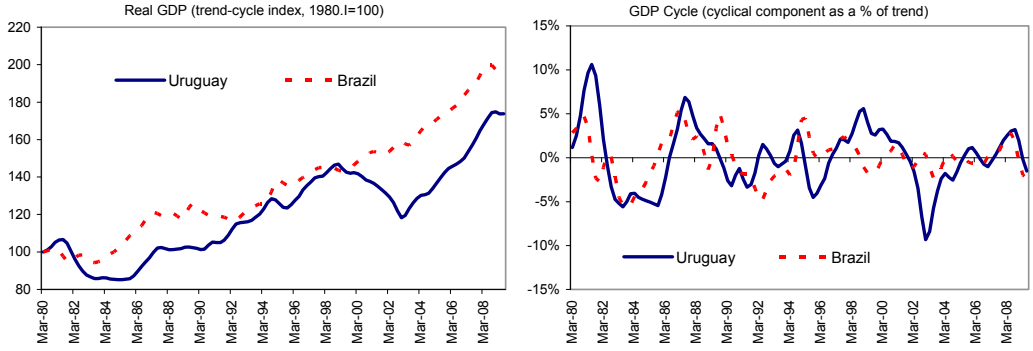


Table 2. Cross Correlations of Uruguayan and Brazilian Business Cycles
(1978.IV-2009.I)

Cross correlations of Uruguay's GDP in period t and Argentina's GDP in period								
t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
0.452	**0.471**	0.465	0.444	0.415	0.371	0.308	0.220	0.110

1/ Cyclical components of the GDP series obtained using the Hodrick-Prescott filter

7. **The correlation with the regional neighbors' business cycles has changed over time.** For instance, the correlation between Uruguay's and Argentina's cyclical components of GDP is much larger in 1990–2009 than in the whole sample—with the correlation coefficient reaching 0.86 (Table 3). Against this background, Figure 3 illustrates the rolling correlations between Uruguay's GDP cycle and those of Argentina and Brazil.[3] While correlations with Argentina have remained high since the early 1990s, they have declined somewhat in the most recent years. However, it is worth noting that the correlation with Argentina in recent years is partly explained by the fact that both economies experienced a simultaneous strong recovery following the 2001 and 2002 crises, likely overstating the importance of linkages in the recent period. Correlations with Brazil, in turn, seem to have increased in the last years.[4]

Figure 3. Business Cycles in Mercosur: Rolling Correlations
(16-quarters windows)

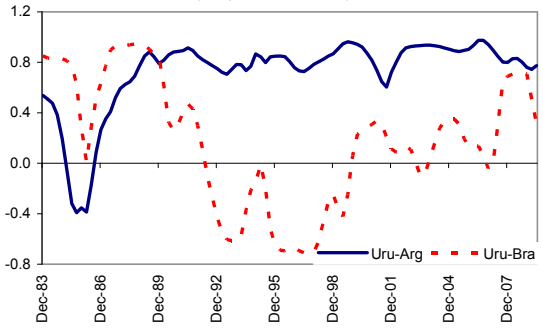


Table 3. Cross Correlations of Uruguayan and Argentine Business Cycles
(1990.IV-2009.I)

Cross correlations of Uruguay's GDP in period t and Argentina's GDP in period								
t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4
0.537	0.688	0.804	**0.865**	0.833	0.688	0.506	0.342	0.209

1/ Cyclical components of the GDP series obtained using the Hodrick-Prescott filter

[3] Rolling correlations were computed using 16-quarter windows, considering lags of one quarter for Argentina's GDP cycle and three quarters for Brazil's, based on the cross-correlogram for the whole period.

[4] This could reflect either a higher influence of Brazil or a more similar reaction to global shocks.

Idiosyncratic Linkages Between Uruguay and Argentina

8. **Strong trade and financial linkages help explaining the high sensitivity of the Uruguayan economy to regional influences, in particular from Argentina.** These linkages—in addition to a similar commodity export base, and similar exchange rate policies during some periods—are key determinants of the high comovement of business cycles.

9. **Although it has diversified in recent years, Uruguay's external trade has historically been largely dependent on the region.** The trade openness process initiated in the 1970s was accompanied by a high concentration of trade with both Argentina and Brazil. This regional concentration was due not only to geographic reasons but also to institutional considerations: the preferential trade agreements signed with Argentina and Brazil in the 1970s and the creation of Mercosur in the 1990s.[5] The share of Brazil and Argentina in Uruguayan trade increased significantly through the 1990s, with these two countries becoming the most important trading partners (Table 4). In particular, Brazil has been the largest single destination of Uruguay's exports of goods, accounting for a share of total exports twice as large as that of Argentina in recent years. In the last decade, however, there has been a diversification of export destinations, with the regional share declining from about 45 percent in 1996–2000 to 25 percent in 2006–08.

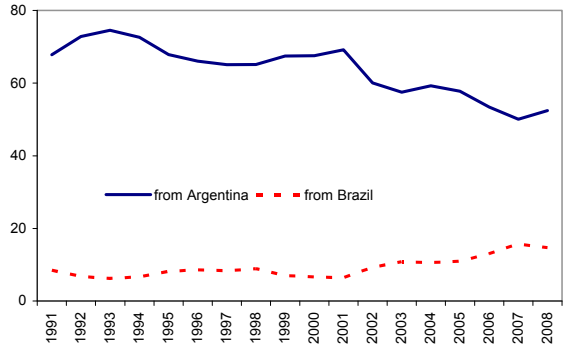
Table 4. Concentration of Uruguayan External Trade in Goods
(percent of total exports and imports)

	Argentina		Brazil		Rest of the World	
Period	Exports	Imports	Exports	Imports	Exports	Imports
1961-65	1.3	6.0	2.6	8.8	96.1	85.2
1966-70	2.3	9.3	4.8	12.7	92.9	78.0
1971-75	4.6	14.4	12.6	15.3	82.8	70.3
1976-80	8.3	12.1	17.7	14.3	74.0	73.6
1981-85	9.2	9.4	13.7	16.4	77.1	74.3
1986-90	6.6	14.5	24.0	26.2	69.3	59.2
1991-95	16.7	20.4	24.3	25.1	59.0	54.5
1996-00	15.2	22.2	30.4	20.9	54.4	56.8
2001-05	8.8	24.0	19.2	20.9	72.0	55.0
2006-08	8.7	23.4	15.8	21.3	75.5	55.4

Source: Banco Central del Uruguay

10. **The shares of goods exports underestimate Uruguay's trade dependency on the region—especially on Argentina, given the importance of exports of services.** Services accounted for about 30 percent of total exports on average over the last decade. This is mainly due to a large increase in receipts from tourism, which reached values comparable to those from the main traditional exports—such as beef and wool, with

Figure 4. Uruguay's Tourism: the Importance of the Region
(number of tourists, in percent of total)



[5] Uruguay signed two preferential trade agreements with its regional neighbors. The first one was signed with Argentina (CAUCE) in 1974; the second one was signed with Brazil (PEC) in 1975.

Argentina being by far the most important source of tourism in Uruguay (Figure 4). As in the case of goods, the relative importance of Argentina has declined in recent years as the geographical sources of tourism also diversified. In fact, the number of tourists from Argentina as a fraction of total tourists—which reached 70 percent on average during the 1990s—has declined to about 50 percent.[6] The share of Brazil as a source of tourism in Uruguay has been substantially smaller than that of Argentina (although it has increased in recent years), accounting for less than 10 percent of total tourists on average over the past two decades (Figure 4).

11. **Uruguay's vulnerability to regional disturbances has been exacerbated by the importance of "regional" goods and services.** While the concentration of trade within the region makes Uruguay vulnerable to shocks stemming from it, the impact of these shocks has been amplified by the existence of regional goods and services—which are traded within the region but are largely non-tradable with the rest of the world. In the absence of a regional demand for them, they would be non-tradables. In fact, they can be traded within the region either because of the low transportation costs or because of the preferential treatment under which they are traded in the region. An obvious example of the first group is given by the tourism sector, whereas an example of the second group are exports of car parts to Argentina.

12. **The vulnerability to the regional trade partners depends on the composition of trade.** As noted by Bevilaqua, Catena and Talvi (2001), the vulnerability to shocks stemming from Argentina and Brazil is higher the higher the proportion of regional goods and services in total trade. A decline in aggregate demand or a large real devaluation in one of the neighbors would differently affect the tradable and regional sectors. On the one hand, exports of tradable goods—for example commodities such as beef, wool or rice—can be relocated in other markets, probably after an adjustment period, perhaps at somewhat lower prices and with possibly higher transportation costs. Thus, a substantial effect in output is not expected in those sectors. On the other hand, exports of regional goods and services cannot be relocated in the rest of the world. Hence, the negative regional shock would result in a large decline in output and employment in those sectors.

13. **The share of exports of regional goods in total exports to Argentina has been much larger than the corresponding share for Brazil.** This may partially explain the higher vulnerability of Uruguay to shocks originated in Argentina. While tourism and car parts represent the most important export items to Argentina, exports to Brazil consist mainly of agricultural commodities such as cereals—mainly rice—and other grains.[7] Hence, while the pattern of trade with Argentina is to some extent idiosyncratic given the importance of regional goods, the one with Brazil is more similar to that with the rest of the world.

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[6] Similarly, the share of Argentina in Uruguay's total receipts from tourism reached almost 70 percent in the 1990s, and has declined to less than 45 percent in recent year.

[7] See Bevilaqua, Catena, and Talvi (2001).

14. **The strong trade linkages between Argentina and Uruguay are shown in Figure 5.** The panel illustrates the high correlation of Argentina's total imports with Uruguay's GDP and with Uruguay's total exports, and the high correlation of Argentina's GDP with the number of tourists and with the foreign exchange receipts from tourism in Uruguay.[8] The correlations of Brazil's imports with Uruguay's GDP and exports are illustrated in Figure 6.

Figure 5. Trade Linkages Between Argentina and Uruguay

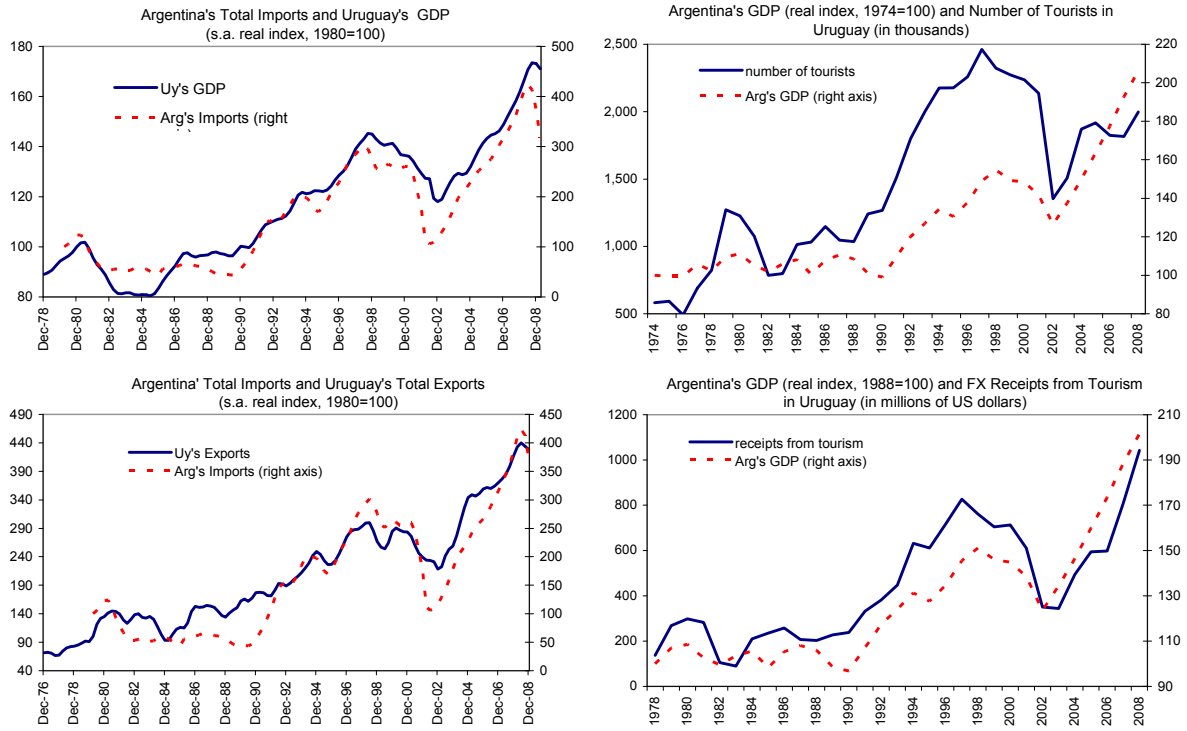
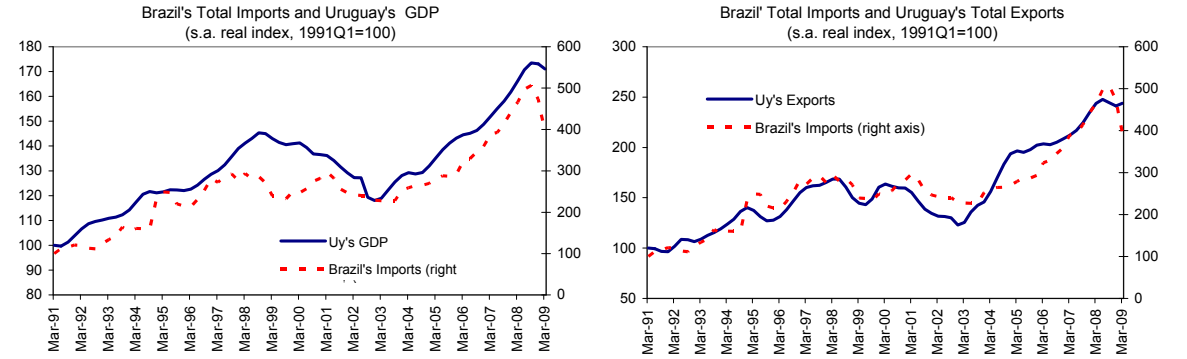


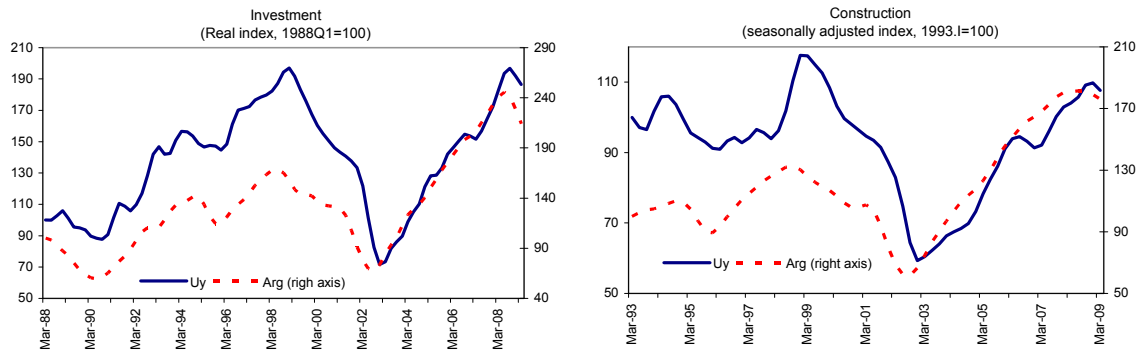
Figure 6. Trade Linkages Between Brazil and Uruguay



[8] Previous studies have also emphasized the correlation between Uruguay's output and Argentina's consumption. See, for instance, Masoller (1998) and Eble (2006).

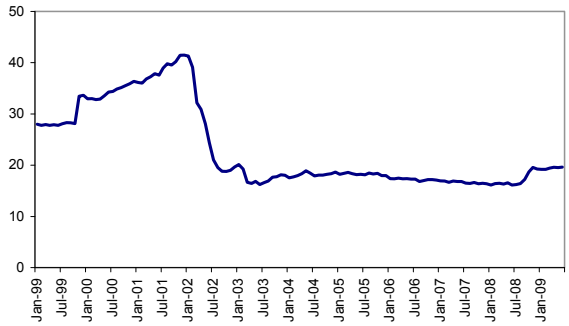
15. **Other idiosyncratic real linkages with Argentina are also important.** In addition to the large flows of trade in goods and services and the high share of trade in regional goods, there are other non-conventional channels through which shocks from Argentina are propagated into Uruguay. These include large flows of FDI from Argentina, including flows of real estate investment, mainly through the purchase and construction of houses and buildings in tourism centers and through the purchase of large pieces of land in Uruguayan territory. In recent years, there has also been a substantial inflow of FDI from Argentina to the agricultural sector. Figure 7 shows the co-movements of the investment cycle and the construction cycle on both sides of the Rio de la Plata.

Figure 7. Real Linkages Between Argentina and Uruguay



16. **The potential vulnerabilities to shocks from Argentina are not limited to real linkages.** Financial channels also play a role. The most tight and direct financial linkage is due to the fact that the Uruguayan banking system has been host to Argentine depositors for many years. By the end of 2001—just before the bank-run of 2002—deposits of non-residents (mostly Argentines) accounted for 45 percent of foreign exchange deposits in the Uruguayan banking system, and for 60 percent of foreign exchange deposits in private banks. Although they have recovered somewhat since September 2008, these figures are much lower today than in the pre-2002 crisis period, at 25 percent and 35 percent respectively. Moreover, non-resident deposits accounted for more than 40 percent of total deposits—in foreign and domestic currency—by end-2001, and that fraction has declined to 20 percent in 2009. (Figure 8).[9]

Figure 8. Uruguay: Non-Residents Bank Deposits
(in percent of total deposits)



[9] Uruguayan banks had been exposed to Argentina from the assets side as well. Argentina accounted for about 20 percent of total bank credit before the 2002 crisis. However, that figure is negligible today.

17. **In sum, we have identified some idiosyncratic linkages between the Uruguayan and the Argentine economies.** These include: the large flows of trade of goods and services; the large share of trade in regional goods; the large flows of FDI in real estate and the agricultural sector, and the large amount of Argentine deposits in Uruguay's banking system. The existence of this number of real and financial channels through which shocks from Argentina propagate into Uruguay explains why Uruguay's business cycle is highly correlated with Argentina's one, and—notably—more correlated than with that of Brazil, despite the larger importance of the Brazilian market as a destination for Uruguay's exports.

C. How Important are Regional Factors? An Econometric Approach

18. **A standard VAR model with block exogeneity restrictions is estimated to quantify the extent of spillovers from external shocks into Uruguay.** This empirical approach allows one to determine the relative importance of different regions as sources of disturbances affecting the Uruguayan economy, and to identify the dynamic responses of Uruguay's output to shocks to foreign GDP growth. A key feature of the model is that external variables are assumed to be completely exogenous to the Uruguayan economy.

19. **The VAR includes real GDP in Uruguay, in the region (Argentina and Brazil), and in the rest of the world.** It may be argued that the importance of the regional neighbors in driving output fluctuations in Uruguay could be explained by common external shocks not captured by global GDP growth. Hence, the VAR includes some external factors such as world real interest rates,[10] oil prices, and non-fuel commodity prices. The model is estimated using quarterly data from 1980Q1 through 2009Q2. All the variables—except the world real interest rate—are expressed in log levels, and the model is estimated in first differences,[11, 12]

Table 5. Block Exogeneity Restrictions of the VAR Model

		Independent Block		
		Global	Regional	Uruguay
Dependent Block	Global	✓		
	Regional	✓	✓	
	Uruguay	✓	✓	✓

20. **In order to identify the structural parameters of the model, a set of restrictions must be specified**. To assume full exogeneity of the external factors, block exogeneity restrictions are imposed, with the model separated in three blocks of equations: two external blocks—one including global factors and the other including regional variables—and one

[10] Changes in international real interest rates constitute an important factor driving portfolio capital inflows to Latin America, thus influencing business cycles across the region (Calvo, Leiderman, and Reinhart, 1993, and Calvo, Fernandez Arias, Reinhart, and Talvi, 2001).

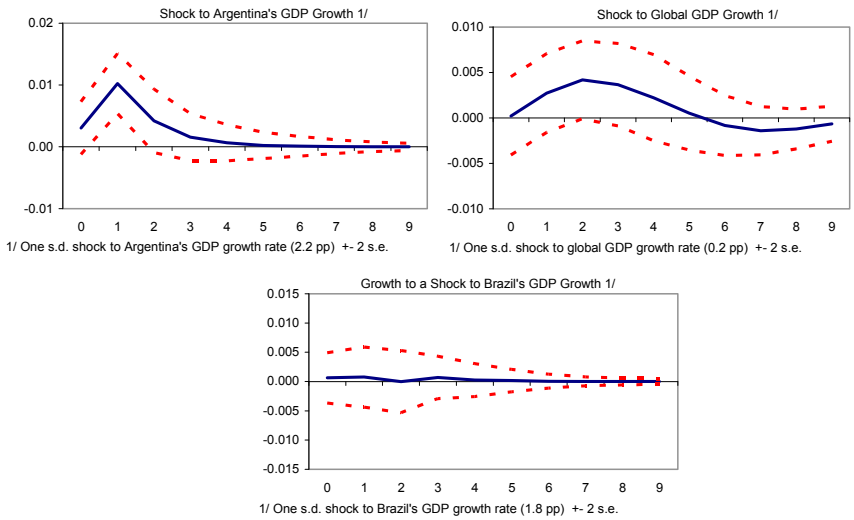
[11] Standard unit root tests (augmented Dickey-Fuller) show that all variables are stationary in first differences. In addition, most cointegration tests suggest that the variables in the model are not cointegrated.

[12] The lag length—one quarter—was selected according to the Schwarz information criterion.

block with Uruguay's GDP (Table 5). Each row indicates whether dependent variables of equations in a certain block are affected by dependent variables of other blocks. Each column indicates whether dependent variables of equations of a particular block appear as regressors in any equation corresponding to another block. [13]

21. **Shocks to Argentina's GDP growth appear to have quite large and rapid effects on Uruguayan GDP.** Figure 9 shows the dynamic response of Uruguay's GDP growth to a one standard deviation positive shock to Argentina's growth: output increases on impact, with a lasting effect of about four quarters, and the largest response occurs only one quarter after the shock. A "rule of thumb" elasticity can be derived from the impulse response, which indicates that a 1 percentage point increase in Argentina's GDP growth leads to an increase in Uruguay's GDP growth of ½ percentage points after one quarter. A positive shock to global GDP growth is also expansionary, with the largest impact felt two to three quarters after the shock. In contrast, a one-standard deviation shock to GDP growth in Brazil has a negligible and statistically insignificant impact on Uruguay. This is very interesting, given the large share of Brazil in Uruguay's trade. As discussed in the previous section, this may be partly explained by the composition of trade.

Figure 9. Dynamic Response of Uruguay's GDP Growth



22. **Variance decomposition analysis also underscores the key role played by Argentina (Table 6)**. Spillovers from Argentina account for more than 20 percent of Uruguay's output fluctuations.[14] While shocks to global GDP growth explain about 8 percent of GDP fluctuations, spillovers from Brazil appear to be insignificant.

[13] Standard VAR models may be estimated by Ordinary Least Squares (OLS). However, when some of the equations present regressors not included in others, Seemingly Unrelated Regressions (SUR) appear to provide more efficient estimates of the coefficients than OLS. Thus, the system is here estimated using SUR.

[14] For a horizon of eight quarters, which is when the percentages stabilize.

Table 6. Variance Decomposition of Uruguay's Real GDP Growth
(in percent)

Horizon (quarters)	Standard Error	Global GDP	World Real Int.Rates	Oil Prices	Non-fuel Comm. Prices	Brazil's GDP	Argentina's GDP	Uruguay's GDP
1	0.0200	0.01	0.16	0.11	0.63	0.10	2.30	96.69
4	0.0244	6.44	3.90	1.73	0.55	0.25	22.47	64.67
8	0.0249	7.48	4.60	2.07	1.57	0.25	21.73	62.31

23. **The residuals from the VAR model illustrate the volatility of output shocks, and the degree to which they are correlated with disturbances in other regions (Table 7).** The most striking fact is the high volatility of regional output shocks, which are about 10 times more volatile than shocks to global GDP growth. This may reflect the high degree of domestic macroeconomic volatility, especially in Argentina and Uruguay—which both suffered severe crises during the period of analysis, with real output declining dramatically. In addition, the correlation and covariance of Uruguayan domestic shocks with impulses in Argentina is approximately four times as large as with those in Brazil.

Table 7. Correlations, Covariances and Standard Deviations of VAR Residuals

		Global	Brazil	Argentina	Uruguay	Stand. dev. of domestic shock
			Covariance			
Global			0.000002	0.000001	0.000000	0.002
Brazil	Correlation	0.060		0.000013	0.00001	0.019
Argentina	Correlation	0.020	0.030		0.00006	0.023
Uruguay	Correlation	0.011	0.027	0.126		0.020

D. How Vulnerable is Uruguay to a Crisis in the Region? A Case Study Approach

Crisis Episodes in the Region: A Closer Look

The 1981–82 and 2001 crises in Argentina

24. **The linkages documented above contribute to the common belief that Uruguay remains particularly vulnerable to turmoil in Argentina.** Moreover, this belief seems to be true if we observe what happened after the early 1980s and the 2001 crises in Argentina. These Argentine crises were followed by the two largest crises in recent Uruguayan economic history: the "Tablita" crisis in 1982 and the more recent one in 2002. Each of these episodes entailed a "triple" crisis in both borders of the Rio de la Plata: currency, banking and debt crises. In the 1982 crisis, GDP fell by a cumulative 10 percent in Argentina and by 20 percent in Uruguay; during the 2002 crisis, those numbers were 20 percent and 23 percent respectively (Figure 10). The large real exchange rate depreciations in Uruguay in these two episodes (100 percent in 1982 and 75 percent in 2002) followed even larger depreciations in Argentina (Figure 11). In both crises, the Uruguayan banking system suffered a dramatic bank run, and in both cases Argentina was facing a simultaneous banking crisis of its own. The bank runs in Uruguay were characterized by sudden and abrupt withdrawals of deposits by both residents and non-residents (mainly Argentines). Foreign exchange deposits from non-residents fell by about 50 percent whereas those from residents fell by 40 percent in the

"Tablita" crisis; during the 2002 crisis the declines amounted to 65 percent and 30 percent respectively (Figure 12).

Figure 10. Crisis Episodes in the Rio de la Plata: Economic Activity

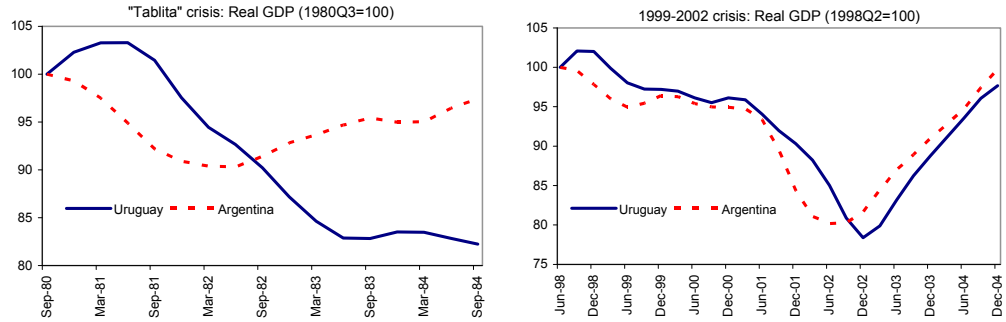


Figure 11. Crisis Episodes in the Rio de la Plata: the Real Exchange Rate

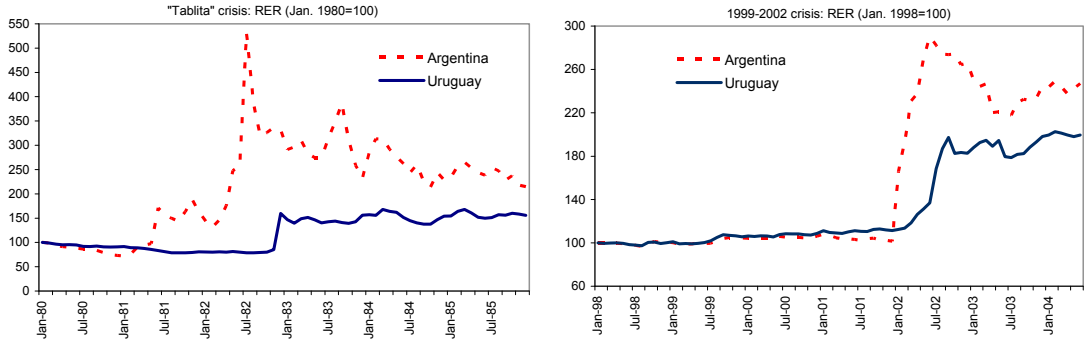
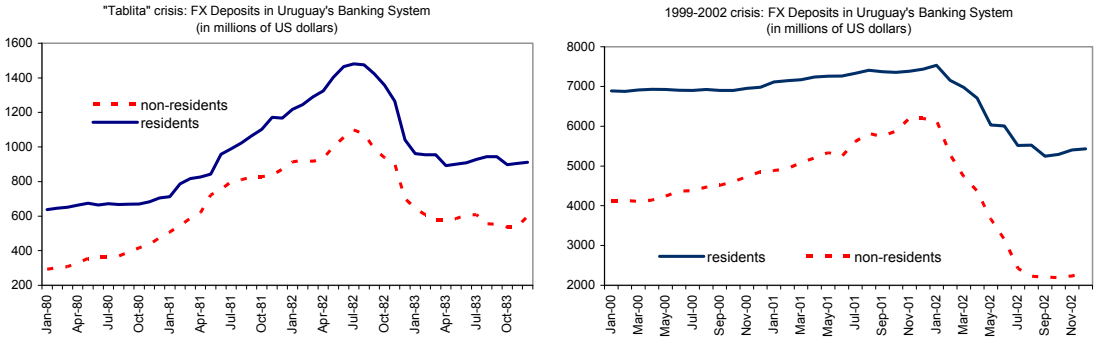


Figure 12. Crisis Episodes in the Rio de la Plata: Bank Deposits



25. **However, these facts do not imply that any financial crisis in Argentina would inevitably cause a financial crisis in Uruguay.** The occurrence of simultaneous crises in both sides of the Rio de la Plata might have been explained, at least partially, by some common external shock. In fact, during those crisis episodes in Argentina and Uruguay, most Latin American countries were actually affected by systemic shocks. These were associated with disruptions in international financial markets that occurred in 1982 after the Mexican default and after the Russian crisis in August 1998. These disruptions brought large synchronized increases in the cost of external financing for Latin America and large reversals in capital inflows to the region. The tightening of international financial conditions led to sharp current account adjustments and large real exchange rate depreciations in Latin

America, accompanied by severe contractions of investment and sharp reductions of economic growth (see Appendix).

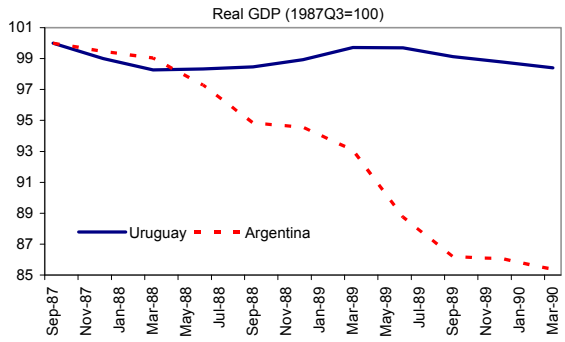
26. **Argentina not only suffered a similar pattern of macroeconomic adjustment but also experienced major financial crises and economic collapses.** This is partially due to the fact that the external shock was compounded by domestic financial vulnerabilities, in particular the high level of currency mismatches in both the private and public sector. As noted by Calvo, Izquierdo and Talvi (2003), the large required adjustment in the real exchange rate caused huge balance sheet problems in the non-tradable sector, which affected the asset side of banks and led to fiscal sustainability problems. The final consequence of this sequence of events was a deep triple crisis: banking, currency and debt crises.

27. **The economic disruptions in Uruguay were especially strong because of the additional contagion effect caused by the financial crisis in Argentina.** That is, the effects of the external financial shock—which affected most countries in Latin America—were exacerbated by the specific negative shock stemming from Argentina and transmitted through the idiosyncratic linkages analyzed before. Financial linkages—mainly due to the large amount of deposits from Argentines in Uruguayan banks—constituted a key channel of transmission, as was evident in the 2002 crisis. Initially, as the crisis deepened in Argentina, capital outflows from this country sought refuge in the Uruguayan banking system. But later on, when the Argentine authorities declared a freeze on bank deposits (the "Corralito") in December 2001, Argentine firms and households—facing strong liquidity constraints—began to withdraw their deposits kept at Uruguayan banks. The withdrawals escalated and became a run on deposits amid fears that the Uruguayan central bank could either run out of reserves or (like Argentina) confiscate the deposits and also concerns about the health of some large private banks with large exposure to Argentine assets. The abandonment of the peg and the default in Argentina also contributed to the contagion effects given fears of similar measures in Uruguay.

The 1989–90 hyperinflation and financial crisis in Argentina

28. **A case of a pure idiosyncratic Argentine shock is the hyperinflation episode in Argentina, in 1989–90.** During this crisis Argentina suffered a large decline in economic activity, a sharp real currency devaluation, hyperinflation and a banking crisis that ended in a freezing of deposits. This is an interesting case study because even though Argentina experienced a major financial crisis and economic collapse, the Uruguayan economy did not face any major disruption: economic activity declined only slightly, the real exchange rate did not depreciate and there were no withdrawals of deposits from the Uruguayan

Figure 13. Hyperinflation Episode in Argentina (1989-90): Economic Activity



banking sector—in fact deposits increased due to a large inflow of Argentine deposits seeking safety (Figures 13 to 15). This all is the more remarkable as Uruguayan economic fundamentals were much more fragile than before the 1999–2002 crisis.

Figure 14. Hyperinflation Episode in Argentina (1989-90): the Real Exchange Rate

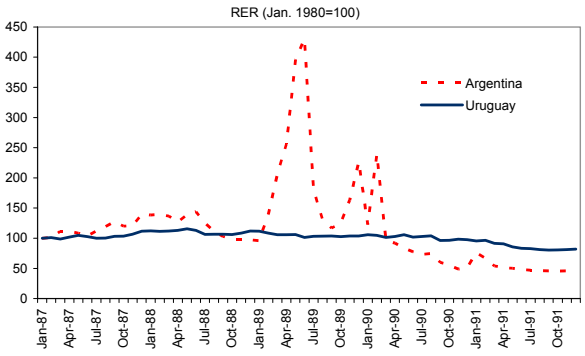
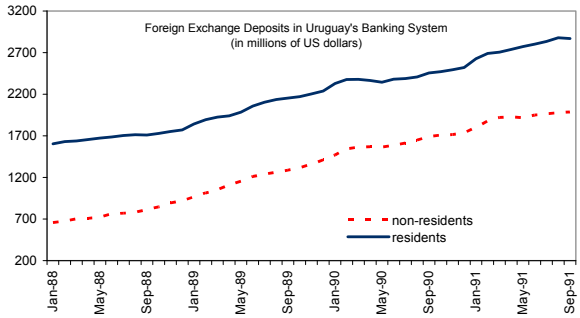


Figure 15. Hyperinflation Episode in Argentina (1989-90): Bank Deposits in Uruguay



Crisis Episodes in Brazil

29. **Episodes of economic and financial turbulence in Brazil may have also been a source of turmoil in Uruguay.** Two major episodes can be identified in Brazil: the 1981–82 crisis, and the 1999 currency crisis. Although the early 1980s crisis was accompanied by a simultaneous crisis in Uruguay (Figure 16), it is hard to argue that Uruguay's crisis was largely a consequence of Brazil's one. As discussed before, this was mainly a systemic crisis affecting most Latin American countries following the Mexican default. In fact, the large real exchange rate devaluation in Uruguay actually preceded the one in Brazil (Figure 17).

Figure 16. Crisis Episodes in Brazil: Economic Activity

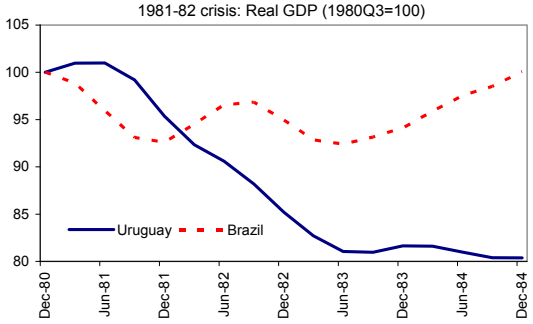
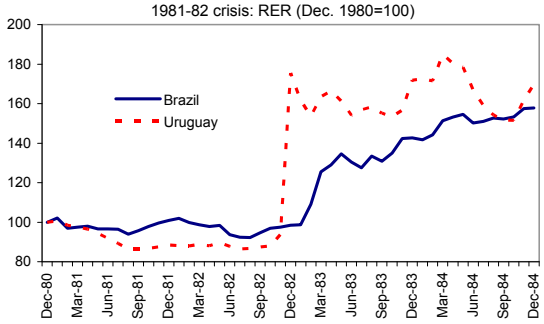


Figure 17. Crisis Episodes in Brazil: Real Exchange Rate



30. **The large devaluation of the real in 1999 is another case of a negative shock stemming from Brazil.** As noted earlier, this hardly constitutes a Brazilian idiosyncratic shock, as most countries in Latin America were actually affected by a common negative external shock. In any case, the sharp real exchange rate depreciation in Brazil was not followed by a depreciation in Uruguay (Figure 18), and—although it negatively affected economic activity and exports in Uruguay—did not cause a collapse of output, as did the contagion effects from the Argentine crisis a few years later (Figure 19).

Figure 18. Crisis Episodes in Brazil: Real Exchange Rate

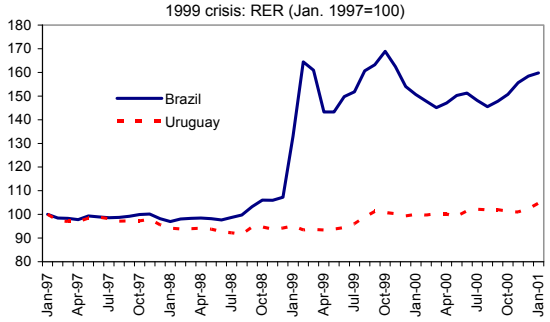
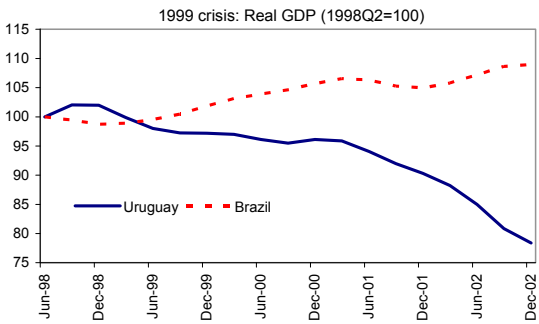


Figure 19. Crisis Episodes in Brazil: Economic Activity



How Vulnerable is Uruguay Today to Disruptions in the Region?

31. **Uruguay is now clearly less vulnerable to financial contagion from the region than in the past.** Given the strong influence of regional developments, the question of the vulnerability of the Uruguayan economy to disruptions in the region remains. However, while adverse effects on Uruguay—mainly through real channels—would be unavoidable, a crisis in Uruguay is unlikely:

- **The Uruguayan economy entered the current global crisis better prepared.** Improved macroeconomic fundamentals include single digit inflation, substantial international reserves, external current account deficits more than financed by record-high FDI levels, skillful debt management, and a more flexible exchange rate regime.

- **The exposure of Uruguayan banks to Argentina is significantly lower.** Since the 2002 crisis, the regulation and supervision of the financial system have improved significantly and the authorities have taken measures to internalize credit risks from dollarization and cross-border activities. Non-resident deposits (mainly Argentine), which accounted for more than 40 percent of total deposits by end-2001, represent only 20 percent today. Moreover, while major banks used to be heavily exposed to Argentine assets in the past, this type of exposure is currently relatively small.

- **Uruguay's banks are substantially healthier than during past episodes of crisis in Argentina.** Banks are very liquid and well-capitalized, and the level of non-performing loans is quite low. This partly reflects the significant downsizing of the banking system after the 2002 crisis, a consolidation process that reduced the number of banks in the system. Moreover, credit and deposit dollarization have declined significantly, and currency mismatches in households and corporates' balance sheets have also declined substantially.[15]

[15] The implicit exchange rate risk index, measured as foreign currency credit to the non-tradable sector as a percentage of total credit, has declined from 55 percent in 2003 to below 35 percent in 2009.

- **A significant diversification of export destinations has occurred in recent years.** This has also helped reducing the vulnerability to the region, especially to Argentina. In fact, the concentration of Uruguayan trade (not only in goods but also in services) in Argentina has declined substantially. While exports to Argentina represented more than 15 percent of total exports of goods in the 1990s, they accounted for only 8 percent on average since 2001. Moreover, tourism receipts from Argentines—which explained almost 70 percent of Uruguay's total receipts from tourism in the 1990s have declined to less than 45 percent. The share of Brazil in Uruguay's exports has also fallen, with non-regional destinations becoming increasingly relevant.

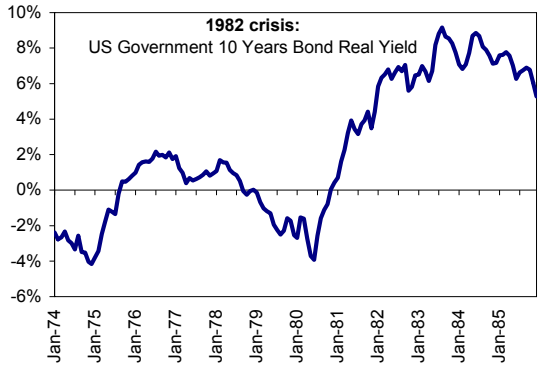
E. Final Remarks

32. **How important are regional factors?** This paper shows that Uruguay has been very sensitive to changes in regional conditions, especially to developments in Argentina. Shocks stemming from Argentina—which account for about 20 percent of output fluctuations in Uruguay—tend to have large and rapid effects on Uruguay's GDP growth. This is mainly due to the existence of some idiosyncratic real and financial linkages between Uruguay and Argentina that also explain the very high correlation between business cycles in these two countries. Thus, it may be argued that—to some extent—Argentina constitutes a second "rest of the world" for Uruguay; a source of shocks that are of different nature, and are transmitted through different channels than traditional external shocks.

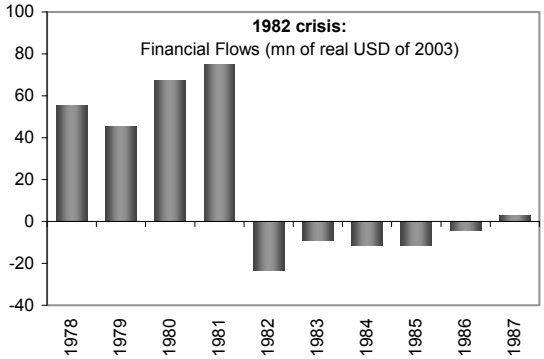
33. **How vulnerable is Uruguay today to a potential crisis in one of its neighbor countries?** The analysis of previous crisis episodes in the region suggests that despite the importance of the strong linkages, and even observing that the two largest financial and economic crises in recent Uruguayan history followed deep crises in Argentina, a potential new crisis in the region—although it would negatively affect Uruguay through real channels—is not likely to trigger a corresponding crisis in Uruguay this time around.

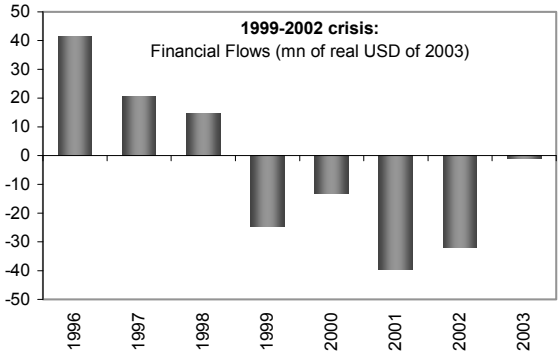
Figure A1. External Shocks and Macroeconomic Adjustment in Latin America

Cost of External Financing for Emerging Markets

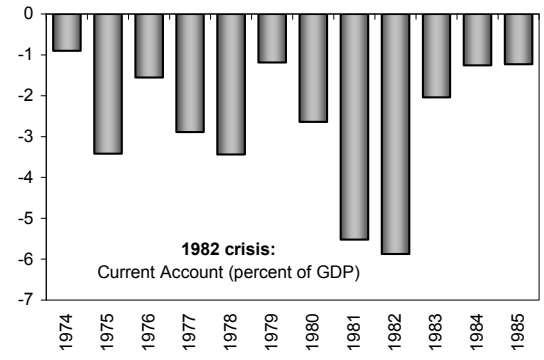


External Financial Flows to Latin America





Current Account Adjustment in Latin America



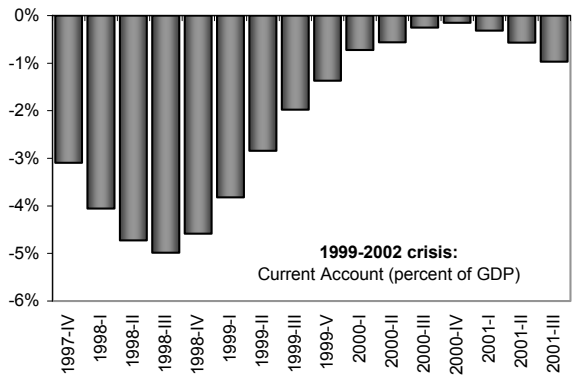
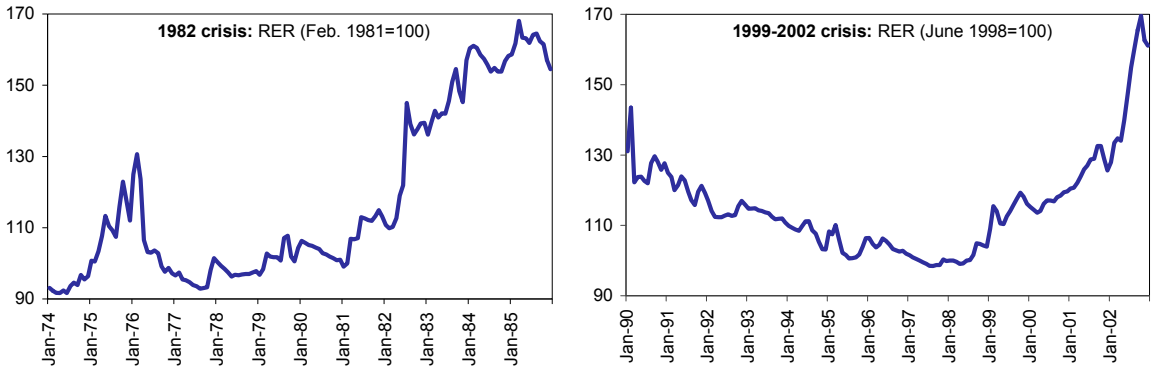
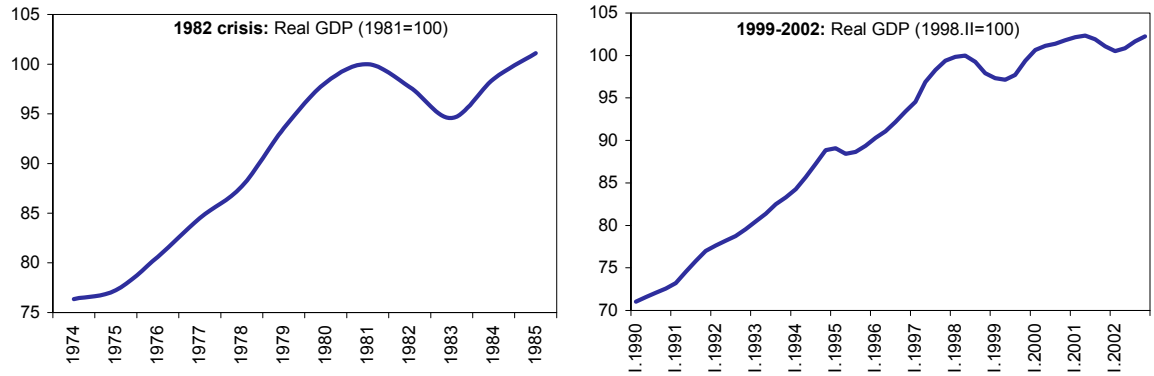


Figure A1. External Shocks and Macroeconomic Adjustment in Latin America (cont.)

Real Exchange Rate Adjustment in Latin America



Economic Activity in Latin America



REFERENCES

Bergara, Mario, Daniel Dominioni, and Jose A. Licandro, 1995, "Un Modelo Para Comprender la Enfermedad Uruguaya", *Revista de Economia*, Banco Central del Uruguay, Vol. II, Number 2, pp. 39–76, November 1995.

Bevilaqua, A., M. Catena, and E. Talvi, 2001, "Integration, Interdependence, and Regional Goods: An Application to Mercosur," *Economia*, Vol. 2, Number 1 (Fall 2001).

_____ and E. Talvi, 1999, "Macroeconomic Interdependence in Mercosur," World Bank Project Report. World Bank, Washington, D.C.

Calvo, G., and L. Leiderman, and C. Reinhart, 1993, "Capital Inflows and the Real Exchange Rate in Latin America: the Role of External Factors," *Staff Papers,* International Monetary Fund, Vol. 40, pp. 108–50.

_____, E. Fernandez Arias, C. Reinhart, and E. Talvi, 2001, "The Growth-Interest-Rate Cycle in the United States and its Consequences for Emerging Markets," *Inter-American Development Bank Working Paper* No. 458.

_____, and E. Talvi, 2003, "Sudden Stops, the Real Exchange Rate and Fiscal Sustainability: Argentina's Lessons," *NBER Working Paper* No. 9828.

_____, and E. Talvi, 2005, "Sudden Stop, Financial Factors and Economic Collapse in Latin America: Learning from Argentina and Chile," *NBER Working Paper* No. 9828.

Eble, Stephanie, 2006, "Uruguay's Growth Story," in *IMF Selected Issues Paper*, Country Report No. 06/427.

Favaro, E. and C. Sapelli, 1989, "Shocks externos, grado de apertura y política doméstica," Banco Central del Uruguay, Montevideo, Uruguay.

Kamil, H. and F. Lorenzo, 1998, "Caracterización de las Fluctuaciones Cíclicas en la Economía Uruguaya," *Revista de Economía*, Banco Central del Uruguay, Vol. 5(1).

Masoller, Andrés, 1998, "Shocks Regionales y el Comportamiento de la Economía Uruguaya entre 1974 y 1997," *Revista de Economía,* Banco Central del Uruguay, Vol. V, Number 1, pp. 141–214 May 2008.

Talvi, Ernesto, 1995, "A 'Big Brother' Model of a Small Open Economy: The Impact of Argentina on Uruguay's Business Cycle", Ph.D. dissertation, University of Chicago.

Voelker, Juan, 2004, "Shocks Regionales, Dependencia Comercial y Desempeño Sectorial de la Economía Uruguaya," *Revista de Economia*, Banco Central del Uruguay, Vol. XI,

IV. Dynamic Loan Loss Provisioning in Uruguay[1]

A. Background

1. **The fallout from the global financial crisis has raised concerns about procyclicality in banking.** Procyclicality includes backward-looking loan loss provisioning rules that do not recognize the buildup of credit risks in boom phases and thus fail to provide incentives against excessive risk-taking. Procyclical lending and provisioning occurs when a period of high credit demand and lax lending standards is followed by a downturn triggering a rise in non-performing loans and specific loan loss provisions. Empirical evidence shows that credit risks build up during an upswing (Jiménez and Saurina, 2006) and that banks postpone provisioning during upswings until lending conditions deteriorate (Cavallo, Majnoni, 2001; Laeven and Majnoni, 2003). This belated recognition of loan losses coupled with tightened lending policies may then lead to a credit crunch (Bikker and Metzemakers, 2005). Financial institutions and their regulators alike have come to realize that backward-looking provisioning rules do not adequately recognize the build-up of credit risks during expansionary phases and thus fail to provide the right incentives for prudent loan origination.

2. **Dynamic loan loss provisioning is an instrument to mitigate procyclicality in lending and provisioning.** The basic idea is to require banks to make provisions against loans outstanding in each period in line with the estimate of long-run expected loan loss rather than actual loss (Mann and Michael, 2002). During an economic upswing, the stock of dynamic provisions grows rapidly as loan origination is high and loan losses are typically low. The reverse is true during economic slowdowns, and additional provisions for loan losses are covered by drawing on the stock of dynamic provisions. Once the stock of dynamic provisions has reached a sufficiently high level, the monthly charges for provisions should become effectively independent of actual loan losses, with the dynamic provisioning rate equaling the expected average loss rate of the loan portfolio.[2] Hence, dynamic provisioning has a profit smoothing property.

3. **Reaping the merits of dynamic provisioning requires careful calibration.** While it gives incentives for banks to extend loans more carefully due to higher reserves on performing loans, dynamic provisioning is not able to prevent credit bubbles by itself (Brunnermeier et al., 2009), as this might require prohibitively high provisioning rates. Generally, provisioning rates need to be set according to the loan default history spanning a full credit cycle in an attempt to avoid over- or underprovisioning of eventual loan losses. Miscalibration of dynamic provisioning rates either causes an excessive burden on banks or leads to an insufficient cushion in a crisis.

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[1] Prepared by Torsten Wezel.

[2] For numerical examples see Mann and Michael (2002).

4. **This study assesses the size of dynamic provisions in Uruguay and compares the Uruguayan system to that of Spain and Peru.** The paper first seeks to determine the magnitude of macroeconomic shocks necessary to exhaust Uruguayan banks' stock of dynamic provisions, using the credit risk model of the *Banco Central del Uruguay* (BCU). Second, it simulates how the buildup of dynamic provisions would have evolved, had the Spanish and the Peruvian provisioning formulas been applied to the Uruguayan dataset of dynamic provisions.

5. **The main results of the simulations can be summarized as follows.** The present stock of dynamic provisions would suffice to fully absorb a medium-sized shock, obviating the need to make additional loan loss provisions. Moreover, the alternative dynamic provisioning formulas result in distinct accumulation paths that in part correspond better to the idea of having dynamic provisions vary throughout the credit cycle.

B. Uruguay's System of Dynamic Provisioning

6. **Uruguay introduced dynamic loan loss provisioning in September 2001, following the Spanish model launched one year earlier.**[3] The regulation[4] specifies that banks contribute to their individual provisioning funds the difference between the monthly statistical losses on loans to the non-financial private sector and the realized net loan loss in that month. The statistical losses are calculated by multiplying 1/12 of the expected rate of loss for five loan categories,[5] $ß_i$, ranging from 0.1 percent for low-risk loans to 1.8 percent for credit card loans by the respective loan volumes, C_i. Formally,

$$Dyn.P_t = \sum_{i=1}^{5} \frac{1}{12} \beta_i C_{it} - LL_t ,$$

where $Dyn.P_t$ represents the contribution to the dynamic provisions fund and LL_t is the net loan loss[6] incurred in the current month. The dynamic provisions fund of each bank is bounded between 0 and 3 percent of total provisionable loans.

7. **The countercyclical system took effect toward the end of the previous credit cycle.** As a result, when the financial crisis of 2002/03 hit, the small cushion of dynamic provisions could only absorb a fraction of the staggering loan losses (see Chart 1). During the

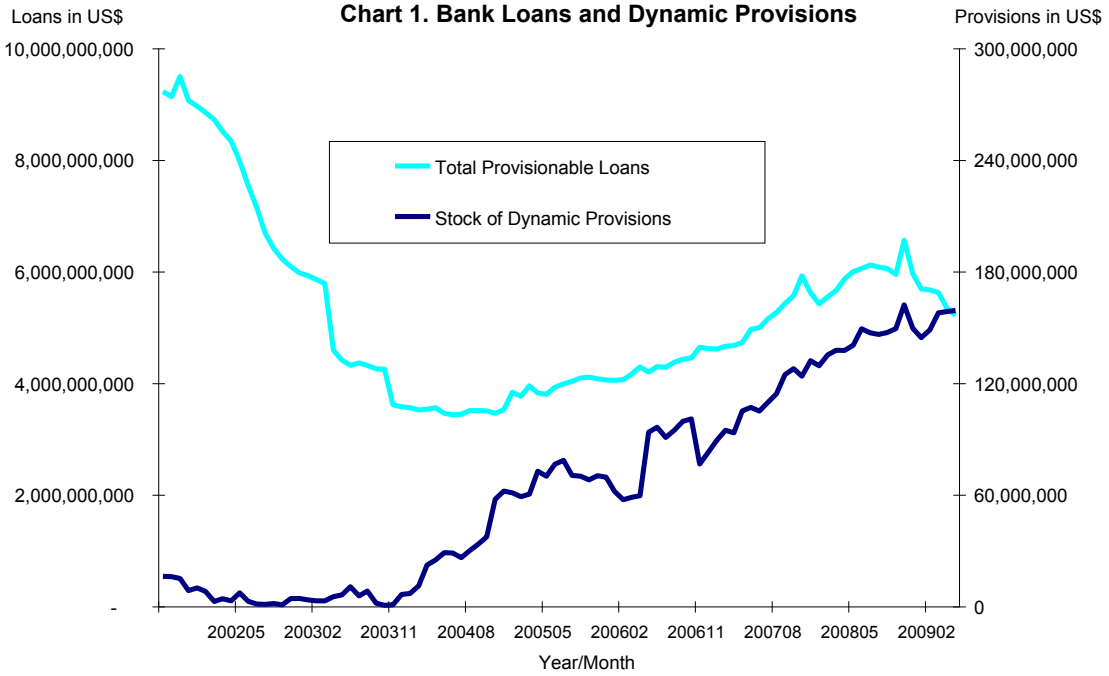
[3] Dynamic provisioning systems were subsequently adopted by Colombia in 2007, and by Bolivia and Peru in 2008.

[4] For details on the current provisioning system see Banco Central del Uruguay (2008).

[5] The five loan categories and the corresponding provisioning rates are: A. loans with public sector guarantees (0.1 percent), B. loans with other guarantees (0.5 percent), C. other loans (1.1 percent), D. consumer loans (1.4 percent), and E. credit card loans (1.8 percent).

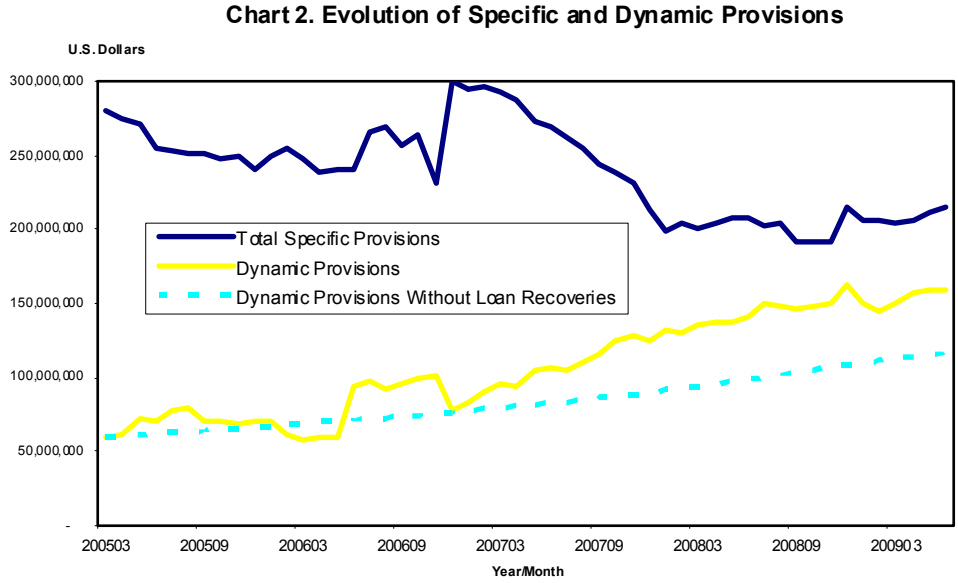
[6] The net loan loss is calculated as loan losses net of deactivations of specific provisions and recoveries of written off loans.

crisis, the dynamic provisions funds remained more or less depleted. With the subsequent recovery, however, the overall stock of dynamic provisions quickly approached the 3 percent limit, reaching it in June 2009 at the system level.



Note: All graphs exclude Banco Hipotecario del Uruguay (BHU).

8. **During the post-crisis period, the accumulation of dynamic provisions was made possible by the decline in loan delinquencies.** Lower loan losses, including recovery of loans already written off, and reclassification of loans toward better categories contributed to the drop in specific provisions. Chart 2 depicts the evolution of specific and dynamic provisions since early 2005, after the catching-up in dynamic provisions had abated. Dynamic provisions rose faster that they would have if net loan recoveries had been zero throughout (dotted line).



C. The Sufficiency of Dynamic Provisions under Macroeconomic Shocks

9. **Using the credit risk model of the BCU, the loan portfolios of the 13 Uruguayan banks are subjected to a set of macroeconomic shocks.** These shocks are set to produce default rates and consequently loan losses (assuming a fixed loss given default) that will exhaust the individual stocks of dynamic provisions in place. The credit risk model has the following main input variables:[7] (i) the rate of GDP growth, (ii) the Uruguayan Peso-US Dollar exchange rate, and (iii) the Uruguayan Bond Index (UBI).[8] Different credit risk models are in place for peso and for dollar loans, and the BCU routinely applies an adverse scenario and a crisis scenario. Here, the level of additional loan losses is set such that it depletes each bank's stock of dynamic provisions. The target level of loan losses determined this way, the model is then solved backward for the set of shocks that will produce exactly such losses.

10. **In the exercise, the three variables are assumed to co-move in line with historic evidence.** For every additional percentage point in negative GDP growth relative to the adverse (baseline) scenario of the BCU, the exchange rate is set to depreciate by 0.6 percentage point and the bond spread to rise by 30 basis points. This variation in the exchange rate is based on its correlation with GDP growth during the 2002–09 period, while for the Uruguayan Bond Index the implied correlation of the two variables between the adverse and crisis scenario of the BCU is used.[9]

11. **The simulation outcome shows that the banks could withstand a relatively severe shock without having to make additional provisions impairing capitalization (Table 1).** On average, the set of shocks that will deplete the stock of dynamic provisions consists of a 5 percent drop in economic activity, an exchange rate depreciation of about 15 percent, and a rise in the UBI to slightly above 800 basis points (250 b.p. higher than in June 2009). Having generally attained the maximum level of their dynamic provisions funds, it is reassuring that 85 percent of banks are within one standard deviation of the size of the average shock.

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[7] In addition, the BCU credit risk model includes the unemployment rate, the level of foreign interest rates, as well as the inflation rate. For ease of optimization, these variables were kept constant in the optimization process.

[8] The UBI measures the spread of a portfolio containing several US denominated Uruguayan international bonds of different maturities with respect to comparable US Treasury bond yields.

[9] Basing the variation on the correlation between GDP and the Bond Index for 2002–09 (-0.6) would introduce extreme dynamics in the model. The assumed rate of correlation of -0.3 corresponds to the historic correlation found for the post-crisis period (2004–09).

Table 1. Set of Shocks Depleting the Stocks of Dynamic Provisions

Scenario/Shock	Change in GDP in percent	Exchange Rate Depreciation in percent	Uruguayan Bond Index (basis points)	*Memorandum Item:* Dynamic Provisions in percent of Loans*
Average	-4.93	15.78	811	2.97
(Standard Deviation)	(2.33)	(5.01)	(141)	(0.81)

* as of July 2009. For technical reasons, the stock of provisions may temporarily exceed the 3 percent limit.

12. **Using the BCU's standard stress test scenarios illustrates that full coverage is ensured under the weaker set of shocks (Table 2).** While banks' dynamic provisions would fully cover the additional loan losses predicted by the adverse scenario, the rate of coverage in the crisis scenario and under a shock corresponding to the 2002-03 financial crisis is only 41 and 13 percent, respectively.

Table 2. Coverage of Expected Loan Losses under Different Stress Test Scenarios

Scenario/Shocks	Δ GDP	Δ Exchange Rate*	Bond Spread**	Dynamic Provisions†	Expected Loan Losses†	Coverage of Losses
BCU adverse scenario	-3.64%	+13.02%	733	158.8	100.0	100.0%
BCU crisis scenario	-8.00%	+31.70%	1000	158.8	383.6	41.4%
Crisis of 2002/03	-11.00%	+50.00%	2000	158.8	1,246.6	12.7%

* Increase = depreciation of the local currency.
** Uruguayan Bond Index; † millions of US dollars

Nonetheless, in view of Uruguay's relatively favorable performance during the current global economic crisis (only one quarter of moderately negative GDP growth), the cushion afforded by the stock of dynamic provisions can be regarded as comfortable, and possibly on the high side in view of the consistently low loan losses.

D. A Comparison with the Spanish and Peruvian Systems

13. **The size of the dynamic provisions funds has for years converged toward the limit of 3 percent, reaching it at the system level in June 2009 (Chart 1).** However, the basic idea of dynamic provisioning is that the stock of dynamic provisions should diminish during an economic slowdown associated with stagnant or falling credit. In early 2009, when both GDP and credit growth in Uruguay temporarily turned negative, dynamic provisions did not fall significantly. In the end, Uruguay avoided a recession, with the economy starting to grow again in the second quarter, and consequently the credit cycle did not fully come to a close, with nonperforming loans barely rising. This said, to ascertain whether a different formula or parameters would have produced a different evolution in the buildup of these provisions (and a possible drawdown on them), we apply to the Uruguayan data the dynamic provisioning formulas used in Spain and in Peru.

14. **The Spanish formula[10]—in place since July 2000—is conceptually similar in that it nets required provisions and impaired loans, but it has two diverging elements.** First, specific provisions rather than net loan losses are subtracted from the required contribution to the dynamic provisions fund. Second, as the formula computes overall general provisions,[11] it features a component requiring banks to provision between 0 and 2.5 percent (depending on the loan risk) of the monthly increment in provisionable loans (the "alpha" part) in addition to the countercyclical component (the "beta" part, with contribution rates ranging from 0 to 1.64 percent):

$$Gen.P_t = \sum_{i=1}^{6} \alpha_i \Delta C_{it} + \left(\sum_{i=1}^{6} \beta_i C_{it} - Spec.P_t \right),$$

where α_i is the latent loss rate expected in a cyclically neutral year for loans in risk category i; ΔC_{it} is the change in the stock of loans in risk category i in the current period t; $ß_i$ is the average rate specific provision for loans of category i, ideally based on a full lending cycle; and $Spec.P_t$ is the specific provision made in the current period. The additional alpha component leads to a quicker buildup of dynamic provisions during an upswing but also to stronger downward pressure on such provisions whenever credit growth turns negative. The Spanish fund is capped at 1.5 percent of provisionable loans—half the Uruguayan limit.

15. **To apply the Spanish formula, the magnitude of the expected losses during a cyclically neutral period has to be calibrated.** In the simulation, the alpha parameters are set to be 0.1 percentage points higher than the Uruguayan beta parameters, which at their inception were calibrated based on the average annual loan loss of 1 percent during 1990–2000. The increment is predicated on the average loan loss rate of 1.1 percent recorded over the credit cycle of 2001-2008.[12] To make the two formulas operationally comparable, the specific provisions include changes in defaulted loans to correct for declines in provisions caused by write-offs and thus unrelated to upward reclassifications of loans.

16. **Introduced in November 2008, the Peruvian formula differs substantially from the other two concepts.** It does not feature a cumulative fund (i.e. one that is built gradually over time). Further, the "procyclical" element only enters into effect if GDP growth rises

[10] For a detailed description of the Spanish system see Fernández de Lis et al. (2000) and Saurina (2009).

[11] With Spain's adoption of International Financial Reporting Standards in 2005, the formulas for computing general and dynamic provisions was merged into one (Saurina, 2009).

[12] The Spanish formula prescribes to take the rate of loan loss in a cyclically neutral year, which would be 2007 when the output gap closed. However, due to high loan recoveries the loss rate in that year was actually negative (-0.5%). Thus, we deviate from the Spanish methodology and take the average loss rate over the cycle.

above a certain threshold.[13] In the non-activation period, banks maintain a stock of general provisions of between 0.7 and 1.0 percent of loans (again, depending on the risk category of loans), to which during the activation period between 0.3 and 1.5 percent of loans is added. Once the procyclical component has been deactivated during an economic slowdown, banks are allowed to offset rising specific provisions against the stock of general provisions until the prescribed level of provisions during the non-activation period is reached again. In the simulation, the activation period begins in October 2003, after a 2.8 percent increase in GDP over the previous four quarters.[14] The surcharges applied to the Uruguayan beta parameters are 1 percent for consumer loans, 1.5 percent for credit card loans, and 0.5 percent for other non-guaranteed loans.

17. **Imposing the properties of the two alternative formulas yields different paths for the stock of Uruguay's dynamic provisions.**

- The *Spanish* formula, while tracing the buildup of dynamic provisions closely, exhibits greater swings due to abrupt changes in specific provisions (strong increase from early 2005 through early 2006, and temporary drops in mid-2006 and late 2008). Thanks to the inclusion of the alpha component linked to the change in credit volume, the increment in the stock during 2007-08 when credit growth accelerated is noticeably higher under the Spanish formula.

- The *Peruvian* formula yields a smoother path than the other two methods since it abstains from subtracting loan losses or specific provisions. The stock of provisions jumps in October 2003 when the procyclical component is activated, and thereafter traces the actual Uruguayan provisions closely. The latter is a coincidence because the additional contribution due to the higher beta parameters is offset by the absence of a fall in specific provisions from 2005 (which is not incorporated in the Peruvian formula).

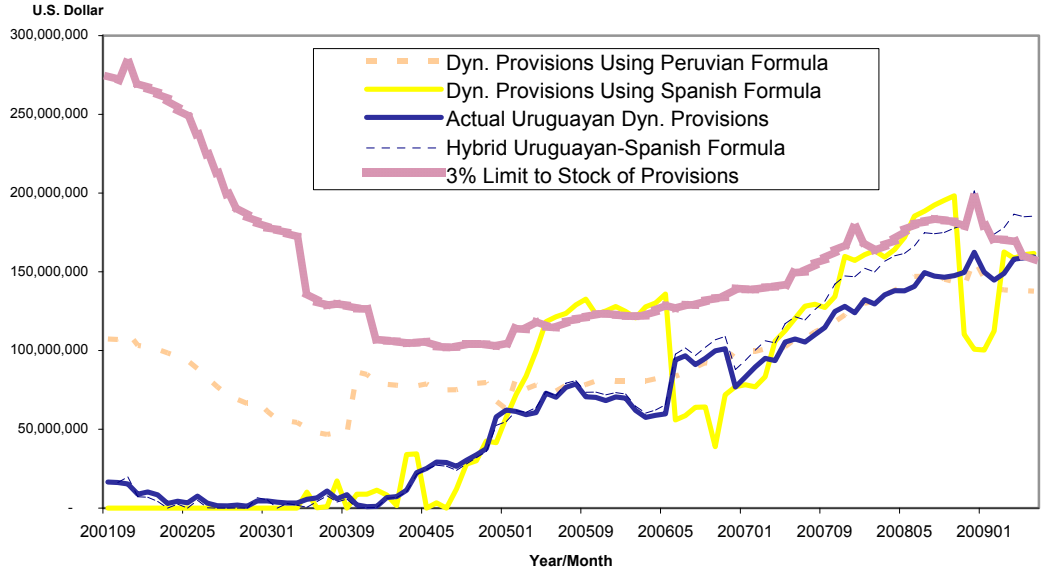
- Additionally, a *hybrid version* of the Uruguayan and Spanish formulas is constructed, which joins the additional alpha component to the Uruguayan methodology (fine dotted line). The stock of dynamic provisions reconstituted accordingly, the hybrid system makes the stock of provisions rise faster in times of high credit growth (as does the Spanish formula), while the stock also falls more quickly when credit

[13] The procyclical component is activated [deactivated], if either the average annualized rate of GDP growth has been above [below] 5 percent in the past 30 months or the change in GDP growth has been greater than 2 percent [-4 percent] in the past 12 months. For more details, see Superintendencia de Banca, Seguros y AFP Peru (2008).

[14] The procyclical phase would likely come to an end in the third quarter of 2009 given that the average GDP growth rate has fallen by 3.8 percent during the 12 months ending in June 2009.

shrinks, as was the case in early 2009 (this can be seen from a slightly declining distance between the two graphs after the peak in December 2008).

Chart 3. Stock of Dynamic Provisions Under Different Formulas



18. **The simulation outcome allows to draw a number of conclusions.** The Uruguayan formula yields a path that is less volatile than Spanish formula (at least when applying the Spanish formula in the post-crisis period) and produces smaller stocks than under Peruvian formula which prescribes a minimum level of general provisions at all times. However, to the extent that high credit growth is a precursor of emerging loan impairment, the additional alpha component of the Spanish formula does have a place, as is illustrated by the hybrid system. The alpha part also helps lower the stock of dynamic provisions during a downturn and thus align them with the credit cycle, even if loan delinquencies do not rise markedly.

E. Conclusions

19. **This paper finds that the current stock of Uruguay's dynamic provisions is capable of cushioning a medium-sized shock.** As the stocks of most banks are at their regulatory limit, it would take a veritable crisis situation for banks to experience loan losses that can no longer be covered by their dynamic provisions. Thus, in terms of safeguarding financial stability the cushion afforded by Uruguay's dynamic provisions is arguably large enough.

20. **In addition, the paper shows that alternative formulas used in Spain and Peru produce diverging accumulation paths.** In part, the results implied by these formulas conform better with the credit cycle, not least due to featuring properties that are more directly linked to credit growth. Adding such an element to the Uruguayan formula would provide greater variability of dynamic provisions over the credit cycle.

21. **The exercises are unable to answer the question whether the stocks produced by any of the formulas are adequate.** Obviously, there is a tradeoff between safeguarding financial stability at all times, suggesting ample provisions, and the efficiency of the banking system that hinges on reasonable loan loss provisions. In the case of Uruguay, the jury is still out since the credit cycle either has not fully come to a close yet in view of only slightly rising loan delinquencies. This said, the question arises whether the magnitude of loan losses during the 2002–2003 may reoccur or whether milder shocks are to be expected thanks to Uruguay's strides in modernizing bank regulation (see Adler et al., 2009).

22. **To the extent that future downturns in the banking sector are less severe than past crises, the system may be overprovisioned.** For example, arbitrarily cutting the rate of loan losses during the 2002-03 crisis in half would yield an average loan loss over the cycle of 0.4 percent—below the assumed loss rate of 1 percent. This ties in with the finding that the stock of dynamic provisions could withstand a sizable shock before having to allow additional losses. However, it seems too early to reach a firm conclusion on this, and the authorities should continue to reassess their system to ensure that the stock of provisions is in line with potential credit risks looking forward.

REFERENCES

Adler, G., M. Mansilla and T. Wezel, 2009, "Modernizing Bank Regulation in Support of Financial Deepening: The Case of Uruguay," IMF Working Paper 09/199 (Washington: International Monetary Fund).

Banco Central del Uruguay, 2008, "Comunicación 2008/023 – Instituciones de Intermediación Financiera – Actualización N^{o} 177 a las Normas Contables y Plan de Cuentas", Montevideo.

Bikker, J.A. and P.A.J. Metzemakers, 2005, "Bank provisioning behaviour and procyclicality," *International Financial Markets, Institutions and Money* (15), 141-157.

Brunnermeier, M., A. Crockett, C. Goodhart, A. Persaud, and H. Shin, 2009, "The Fundamental Principles of Financial Regulation," London: Centre for Economic Policy Research.

Cavallo, M. and G. Majnoni, 2001, "Do Banks Provision for Bad Loans in Good Times? Empirical Evidence and Policy Implications," World Bank Policy Research Working Paper No. 2619 (Washington: The World Bank Group).

Fernández de Lis, S., J. Martínez Pagés and J. Saurina, 2000, "Credit Growth, Problem Loans and Credit Risk Provisioning in Spain," Banco de España Working Paper No. 18.

Jiménez, G. and J. Saurina, 2006, "Credit cycles, credit risk, and prudential regulation" *International Journal of Central Banking* (2), 65-98.

Laeven, L. and G. Majnoni, 2003, "Loan Loss Provisioning and Economic Slowdowns: Too Much, Too Late?" *Journal of Financial Intermediation* (12): 178–197.

Mann, F. and I. Michael, 2002, "Dynamic Provisioning: issues and application", Bank of England Financial Stability Review, December 2002.

Saurina, J., 2009, "Dynamic Provisioning – The Experience of Spain," World Bank Crisis Response Note No. 7 (Washington: The World Bank Group).

Superintendencia de Banca, Seguros y AFP Peru, 2008, "Resolución 11356 – 2008."