URUGUAY

SELECTED ISSUES

February 2017

This Selected Issues paper on 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 December 22, 2016.

INTERNATIONAL MONETARY FUND

URUGUAY

SELECTED ISSUES

December 22, 2016

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CONTENTS

BALANCE SHEET ANALYSIS IN URUGUAY—HIGH DOLLARIZATION BUT LIMITED RISKS[1]

This chapter presents an overview of inter-sectoral exposures in Uruguay. It divides the Uruguayan economy into five sectors—non-financial public sector (NFPS), central bank (Banco Central de Uruguay or BCU), banks (other depository corporations or ODC), non-bank financial sector (other financial corporations or OFC) and private non-financial sector (including both households and corporates)—and discusses inter-sectoral linkages, as well as exposures to the rest of the world based on a comprehensive sectoral balance sheet at end-2015. In line with the definition used by the Uruguayan authorities, the consolidated public sector is defined as the NFPS plus the BCU. The full sectoral balance sheet matrix is presented in the appendix.[2]

A.   Introduction

1.   The Uruguayan financial system has been characterized by solid balance sheets, a low level of credit and continued high dollarization since the crisis in 2002.[3] Balance sheets throughout the system appear generally well hedged, with dollar exposures covered and ample liquidity. Banks, for example, have enough liquid assets to more than cover all non-resident FX deposits.

2.   There are pockets of vulnerability, however, especially after the recent slowdown in economic growth. NFPS gross debt is fairly high at 48 percent of GDP and the NFPS as well as the public sector as a whole have a net open foreign currency position. At the same time, the non-bank financial system (essentially pension funds) has a large exposure to government debt. Corporates, also those in non-tradable sectors, borrow heavily in dollars. While most keep ample FX liquidity, those who do not are exposed to currency risk. Recently, dollarization of government debt (50 percent) and bank deposits (80 percent) as well as the rate of non-performing loans (2.7 percent) have edged up slightly. Lastly, international reserves have fallen, albeit from high levels. Gross international reserves are 29 percent of GDP and gross reserves excluding ODC FX deposits at the BCU stand at 17 percent of GDP.

3.   Low levels (and a low growth rate) of credit, while limiting financial risks, might be hampering economic growth. At 30 percent of GDP, credit to GDP is unusually low in Uruguay. This is particularly true for household credit, with the ratio of household to corporate credit the lowest in Uruguay among its peers in Latin America (LA), but corporate credit also lags far behind more developed financial markets such as Brazil and Chile. The segmented nature of the banking system, with public

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[1] Prepared by Frederik Toscani.

[2] The balance sheet data is constructed drawing on standardized reporting forms (IFS data), debt data provided by the BCU, the international investment position as well as bank and pension fund balance sheets. All ratios are calculated by dividing the nominal dollar amount by GDP in dollars (GDP in peso, converted into dollar using the average yearly exchange rate). Given valuation effects, ratios can differ from those calculated using peso amounts. This is the case notably for public debt. A number of inter-sectoral exposures (or their currency/maturity split) were not available or different data sources showed minor inconsistencies. The methodological appendix spells out the assumptions used in such cases and provides details of data construction more generally.

[3] See Kamil (2006) for a similar stock taking exercise of balance sheets in 2005.

banks capturing a large share of the peso market targeted at households and private banks operating mainly in USD and lending to corporates, is likely contributing to this.[4]

4.   A number of challenges for policy makers emerge from the analysis. Among the key ones are the need for (i) continued careful management of government debt and debt composition, (ii) continued attention to net USD exposures given the high level of dollarization throughout the financial system, (iii) particular attention to FX mismatches in the corporate sector, (iv) the development of local capital markets to allow for peso saving and financial hedging of risks and (v) an effort to stimulate credit growth to support economic growth while at the same time not weakening bank's currently solid balance sheets.

B.   Uruguay's External Position

5.   Uruguay's net international liabilities have been gradually increasing since 2006 (figure 1a). After the crisis in 2002, the international investment position improved from about -15 percent to -5 percent of GDP in 2006, before slowly deteriorating to about -20 percent of GDP in 2015.

6.   Foreign direct investment accounted for the bulk in growth in gross external liabilities, however. For the past years, current account deficits were fully financed with FDI. Inward portfolio investments also increased, mostly in the form of holdings of NFPS debt (95 percent). Non-resident deposits never picked up to the levels seen before 2002 and have not been an important source of liability growth—while they accounted for 41 percent of total deposits in 2001, they now only account for roughly 15 percent. Overall, the share of equity financing in total external liabilities stands at 41 percent, relative to 14 percent in 2001.

7.   On the asset side, the central bank accumulated substantial (gross) international reserves over the past years which peaked at 31 percent of GDP in 2014. ODC and non-financial private sector deposits abroad constitute the second important source of international assets. Outward FDI and other portfolio investments are minimal.

8.   On aggregate, the balance sheet of the economy as a whole seems solid and external liquidity risks are limited. BCU reserves make up the bulk of external assets while external liabilities are mostly in the form of equity and long-term government debt.

9.   The non-financial public sector is the only sector with a negative net external foreign currency position (figure 1b).[5] Non-residents held around 58 percent of the consolidated public sector debt at end-2015 with much of it in dollars, leading to a negative net external foreign currency position of 24 percent of GDP for the NFPS. Banks, pensions funds and the non-financial private sector all have

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[4] See Lambert and Singh (2015).

[5] Note that we assume that all FDI liabilities are in Peso, given that the book value of the investment is likely to be in Peso.

long external FX positions, mainly in the form of highly liquid assets such as deposits and high quality paper, and the BCU has a large positive net external FX position due to its large reserves.

C. Sectoral Balance Sheets

Overview of net positions by sector

10.   The financial system in Uruguay is small. Table 1 presents total assets and liabilities as well as the net position by sector, currency and maturity.[6] The banking sector is small, with total assets of 66 percent of GDP. Liabilities are mainly short-term deposits in foreign currency. The non-bank financial sector has assets of around 30 percent of GDP, over ⅔ accounted for by pension funds.

11.   Overall, while currency and maturity mismatches exist at the sectoral level, risks appear limited. All sectors have net long foreign currency positions except for the NFPS (-22 percent of GDP). The open FX position of the NFPS also causes an open foreign currency position of 12 percent of GDP for the public sector as a whole. Foreign currency liabilities of the NFPS are overwhelmingly long-term (average maturity of over 14 years), however, limiting the risks arising from this open position. Banks have a net long foreign currency position and large liquid foreign currency assets to manage funding shocks. The non-financial private sector as a whole has a large net long FX position (30 percent of GDP), largely due to households saving in dollar

Overview of key inter-sectoral linkages

12.   No one sector is at the heart of all linkages, thus limiting the risk of second-round effects of shocks to some degree. Figures 2 and 3 summarize the structure of the financial system in Uruguay, as well as the main inter-sectoral exposures.[7] Figure 2 illustrates gross exposures between sectors, with blue arrows indicating peso exposures and green arrows indicating FX exposures. The arrows point from creditor to debtor and the size of the arrows is proportional to the nominal amounts. As can be seen, banks have little exposure to the NFPS. On the other hand, pension funds have invested close to 50 percent of their assets in (mostly local currency) NFPS debt. The non-financial private sector has large FX deposits in banks (35 percent of GDP) and abroad. The main liability of the non-financial private sector is the counterpart to the stock of FDI, which we assume to be a peso liability.

13.   The largest net FX positions in the system are the net long position of the BCU vis-à-vis the rest of the world (30 percent of GDP), as well as the net open position of the NFPS vis-à-vis the rest of the world (24 percent of GDP). Figure 3a shows all net inter-sectoral FX assets larger than 5 percent of GDP while figure 3b does the same for net short-term assets. Banks have an open FX position of 19 percent of GDP vis-à-vis the non-financial private sector due to the high dollarization of deposits but this is covered by the net long FX position vis-a-vis the BCU (12 percent of GDP) and vis-a-vis the

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[6] See methodological appendix for details of why assets and liabilities do not sum to zero for the central bank and some other sectors. Part of the reason is that intra-sectoral exposures are not captured.

[7] Detailed numbers for all inter-sectoral exposures are shown in the full balance sheet matrix in the appendix.

rest of the world (9 percent of GDP). In terms of maturity, banks have (as is normal) an open short-term position of 31 percent of GDP vis-à-vis the non-financial private sector.

Figure 1. External Position of Uruguay

(a)   International investment position 2001–2015
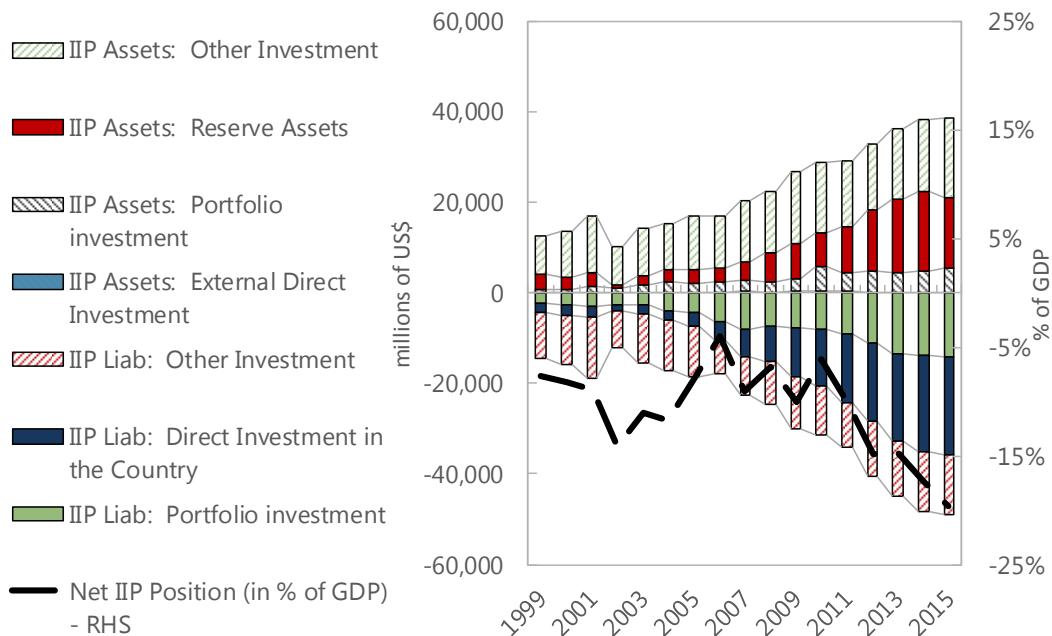
Source: IMF Staff Calculations based on international investment position (IIP).

(b)   Net external position by sector and currency at end-2015
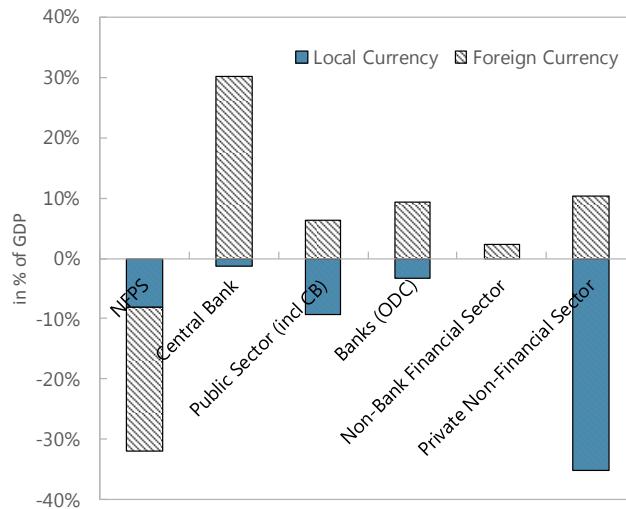
Source: IMF Staff Calculations based on authorities' data, standardized reporting forms and IIP

Table 1. Total Assets and Liabilities by Sector

% of GDP	Assets	Liabilities	Net
NFPS	**11%**	**57%**	**-46%**
In local currency	5%	28%	-23%
In foreign currency	7%	29%	-22%
Short-Term	9%	3%	6%
Medium- and Long-Term	2%	55%	-52%
Central Bank	**41%**	**34%**	**7%**
In local currency	8%	12%	-3%
In foreign currency	32%	22%	11%
Short-Term	29%	29%	1%
Medium- and Long-Term	11%	5%	6%
Public Sector (incl CB)	**36%**	**75%**	**-39%**
In local currency	3%	30%	-27%
In foreign currency	33%	45%	-12%
Short-Term	31%	25%	7%
Medium- and Long-Term	5%	50%	-46%
Banks (ODC)	**66%**	**66%**	**0%**
In local currency	16%	19%	-3%
In foreign currency	50%	47%	3%
Short-Term	40%	53%	-13%
Medium- and Long-Term	26%	13%	13%
Non-Bank Financial Sector	**30%**	**21%**	**9%**
In local currency	21%	20%	1%
In foreign currency	8%	1%	7%
Short-Term	9%	0%	9%
Medium- and Long-Term	21%	21%	0%
Private Non-Financial Sector	**85%**	**74%**	**10%**
In local currency	32%	51%	-19%
In foreign currency	53%	23%	30%
Short-Term	58%	15%	44%
Medium- and Long-Term	26%	60%	-33%
External	**93%**	**73%**	**20%**
In local currency	48%	0%	48%
In foreign currency	45%	73%	-28%
Short-Term	12%	60%	-48%
Medium- and Long-Term	81%	13%	68%

Source: IMF Staff Calculations based on authorities' data, standardized reporting forms and IIP.

Figure 2. Structure of the Financial System in Uruguay

Note: Arrows are proportional to the size of the exposure at end-2015. Exposures below USD 100 million are not represented.
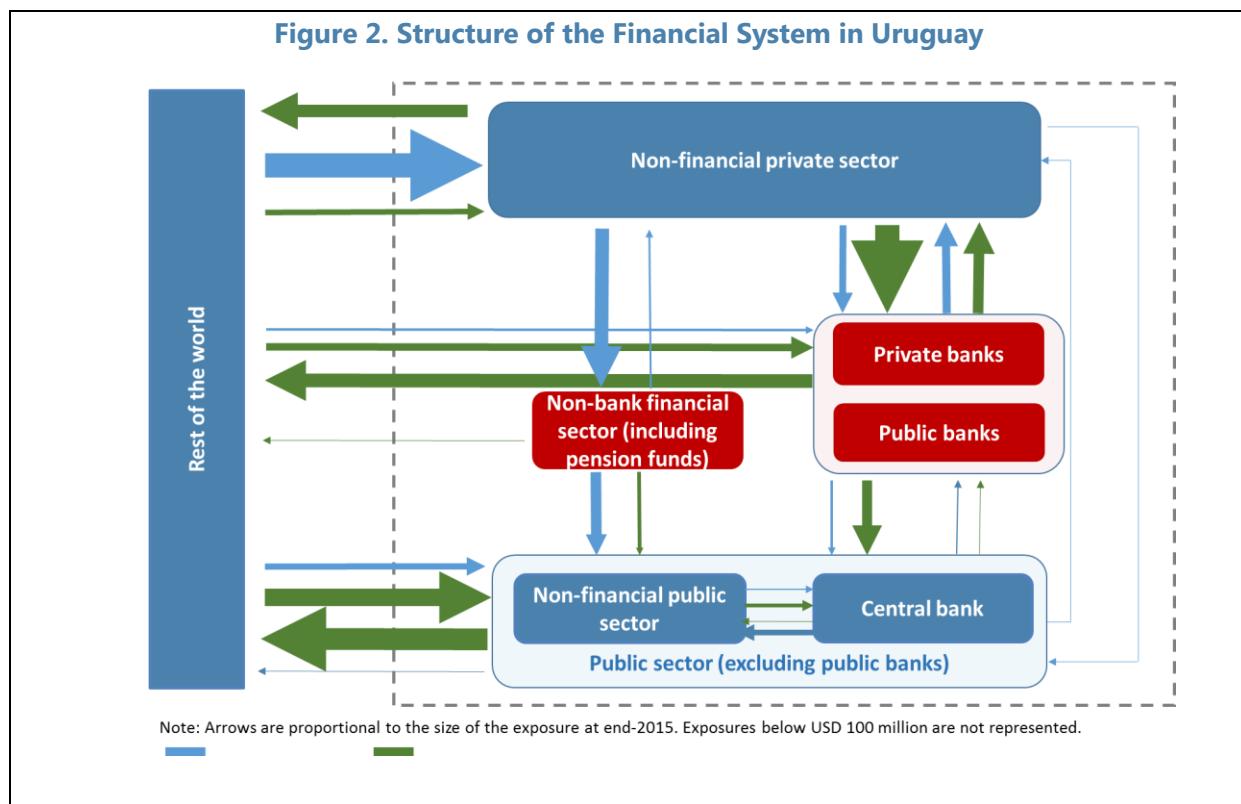
Figure 3. Network Maps of Inter-Sectoral Linkages

(a) Net US$ assets
(% of GDP)
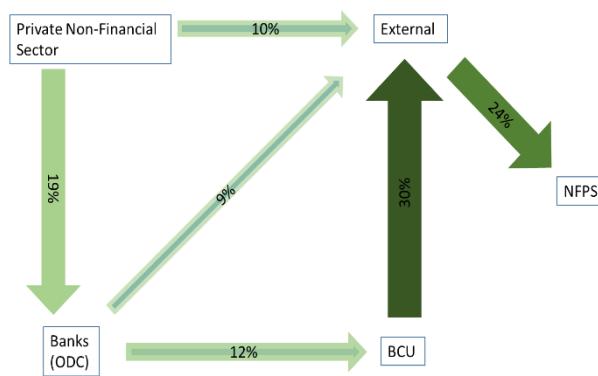
(b) Net short-term sssets
(% of GDP)
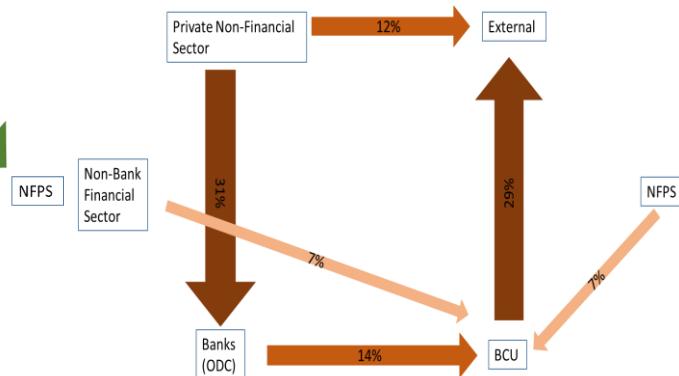
Source: IMF Staff Calculations based on authorities' data, standardized reporting forms and IIP data.
Notes: Net assets under 5 percent of GDP are not shown.

Public sector

14.   Net debt of the consolidated public sector has fluctuated between 30 and 40 percent of GDP since the global financial crisis but trended up slightly over the last two years (figure 4). Net debt of the public sector here is defined as gross debt net of liquid assets (where liquid assets of the BCU are international reserves net of FX liabilities vis-à-vis the banking system- *encajes*). Net debt of the NFPS increased due to an accumulation of gross debt but this increase was partly offset by reserve accumulation at the BCU until 2014 and by a shrinking BCU balance sheet in 2015 (figure 5).

15.   Relative to other LA6 countries, Uruguayan government debt has one of the longest average maturities but still a relatively high FX share (figure 6). At around 14 years, Uruguay's government debt has the longest average outstanding maturity in LA6 together with Peru. In fact, relative to most countries in the world, Uruguay's debt stands out as having a particularly long maturity (figure 7). The long maturity comes with a relatively high share of foreign currency debt, however, which after falling for many years, has inched back up over 50 percent over the last three years.[8]

Figure 4. Consolidated Public Sector Gross and Net Debt

Source: IMF Staff Calculations based on authorities' data.
Notes: Ratios presented here are in dollar amounts divided by dollar GDP and thus slightly differ from those used in the IMF DSA (nominal peso amounts divided by nominal peso GDP) due to valuation effects. Liquid assets are defined as all NFPS assets (a large fraction are deposits) plus BCU assets less the part of central bank reserves held as a counterpart to required reserves on foreign currency deposits.

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[8] Local currency debt of the NFPS is mainly in CPI-linked instruments (unidades indexadas) with only a relatively small fraction in nominal peso.

Figure 5. NFPS Gross Debt and Assets

Source: IMF Staff Calculations based on authorities' data.
Notes: All data here come directly from the BCU debt tables and are pre-consolidated, i.e. exclude exposures between different entities within the public sector. Ratios presented here are in dollar amounts divided by dollar GDP and thus slightly differ from those used in the IMF DSA (nominal peso amounts divided by nominal peso GDP) due to valuation effects.

16.   The central government keeps roughly 18 months of debt service in liquid assets. As part of its pre-funding strategy, the government keeps ample liquidity reserves—around 5.5 percent of GDP. The NFPS as a whole has short-term assets of 9 percent of GDP (recall table 1). Since a large part of those is held in deposits at the central bank they do not show in pre-consolidated data but can be seen in the full balance sheet matrix (see arrow between BCU and NFPS in Figure 3b). Additionally, the government has access to liquidity via contingent credit lines, notably with the Inter-American Development Bank and World Bank.

17.   A number of state-owned enterprises (SOEs) have currency mismatches that the authorities are seeking to address. The public oil company (ANCAP), for example, is exposed to USD risk, given that it buys oil in the international market but sells at controlled domestic prices. The authorities are encouraging the use of financial instruments by SOEs, by streamlining and coordinating the process, in order to hedge these risks.[9]

18.   At 29 percent of GDP, gross international reserves of the BCU are largely sufficient by standard metrics (figure 8). Reserves remain well above the upper bound of the IMF reserve adequacy

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[9] The state-owned insurance company (BSE) which provides pension annuities faces a particular mismatch—its assets are largely invested in CPI-linked instruments but the constitution requires pensions to increase in line with wage growth. The authorities are considering modalities to address the mismatch.

metric range, and various other prudential benchmarks. Furthermore, gross reserves excluding commercial banks' reserves held at the BCU (*encajes*) amount to US$ 9.8 billion, still at the upper bound of the adequacy range for total gross reserves and the BCU's 'own reserves'—reserves net of all short-term FX liabilities—stand at a healthy level of 9 percent of GDP (see below liquidity stress test).

Figure 6. Government Debt Currency Composition and Average Maturity in LA6

(a) Share of GG gross debt in foreign currency

(b) Average maturity

Source: IMF Staff Calculations based on WEO data for (a) and Bloomberg L.P. for (b).

Figure 7. Average Maturity of Outstanding Debt Across Countries in the World
(Number of years as of August 2016)

Uruguay

Source: Bloomberg L.P.
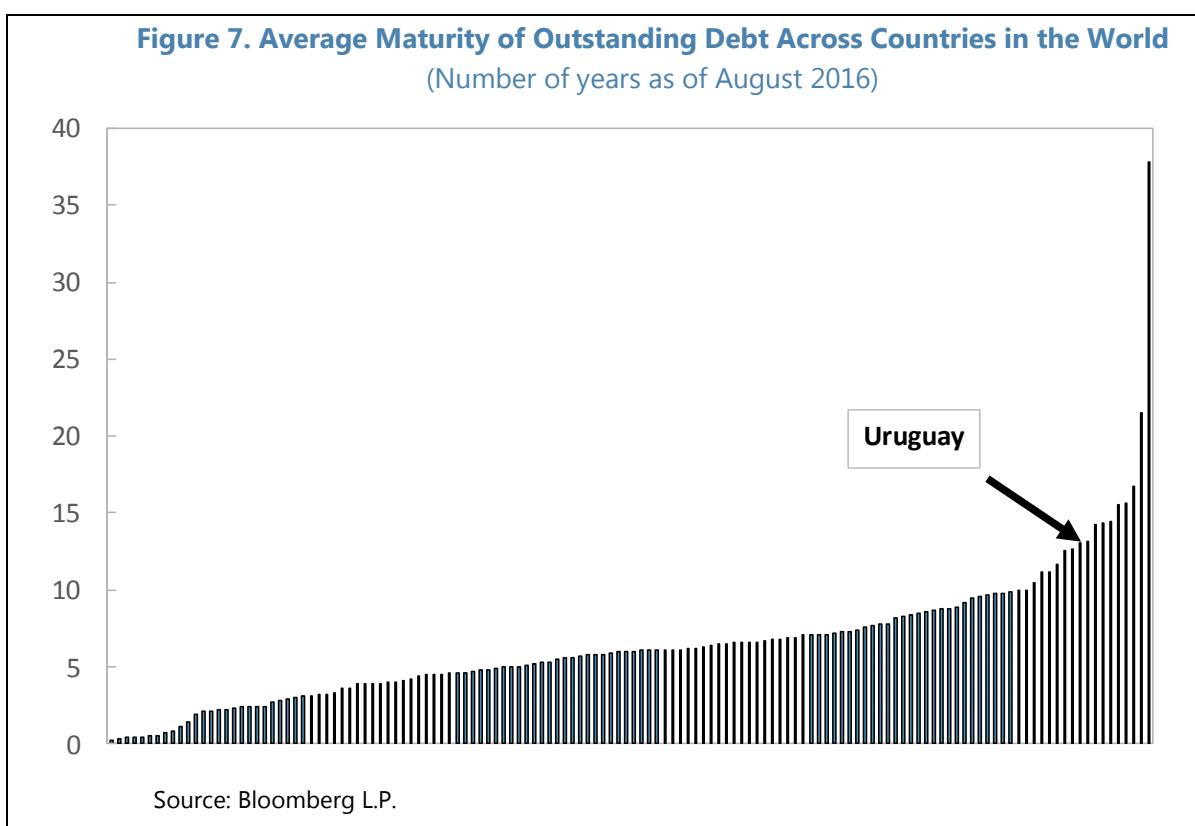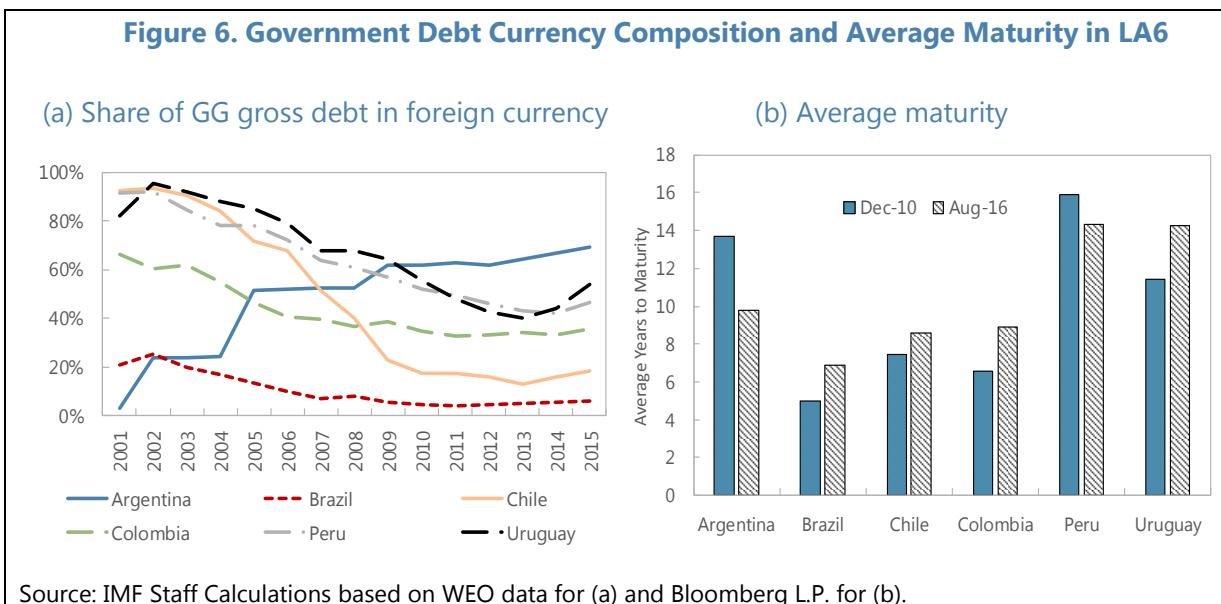
Figure 8. Gross International Reserves and Short-Term BCU FX Liabilities
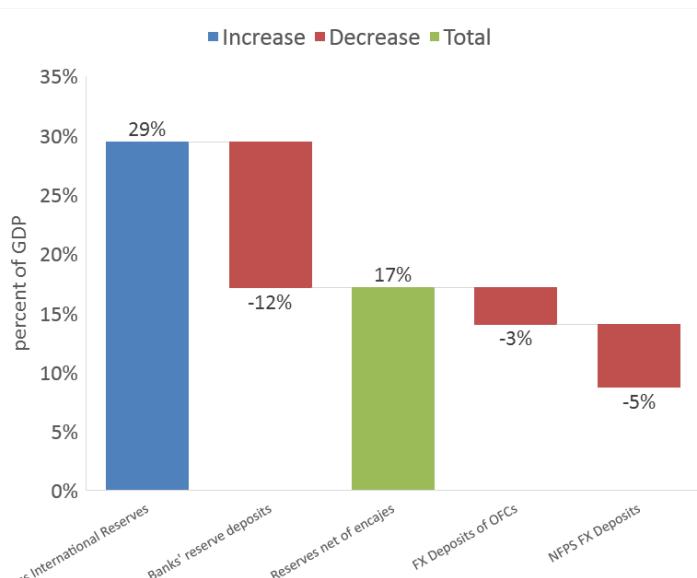
Source: IMF Staff calculations based on standardized reporting forms.

Banking sector

19.   The banking sector continues to be highly dollarized (figure 9). Deposit dollarization is 77 percent if non-resident deposits are excluded, and 81 percent overall.[10] Credit dollarization is 56 percent due to corporate borrowing since households nearly exclusively borrow in pesos (table 2).[11] Banks are highly liquid and could absorb a complete withdrawal of non-resident deposits as well as a withdrawal of 46 percent of resident FX deposits by drawing on their FX reserve deposits at the BCU and their liquid external FX assets.

20.   The banking sector is segmented between public and private banks which focus on the peso and FX markets, respectively (table 2). The system is made up of 2 public and 9 private banks. The two public banks (BROU and BHU) are focused on the domestic peso market, with the latter focusing nearly exclusively on mortgages and the former the largest banking player with a dominant position in peso deposits. On the other hand, the key business for private banks are dollar loans to corporates. Stress tests indicate that direct FX exposure and liquidity are generally well managed at the individual bank level (see next chapter).

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[10] Dollarization has increased again over the past 4 years but to a large extent due to movements in the exchange rate. Using a fixed exchange rate, deposit dollarization of resident deposits has been roughly constant since 2012 after falling for a 10 years. This suggests that preferences for dollar saving have been fairly constant for a number of years now.

[11] Dollarization levels throughout the system have been similar to current levels since the mid-1970s (see Sander et al., 2008).

21. **Partly due to the segmented nature of the market, Uruguay's credit-to-GDP is among the lowest for emerging markets, even following a number of years of strong growth (figure 10).[12]** This ratio increased from 23 percent of GDP in 2011 to 30 percent in 2015.[13] Figure 11 shows that in the mid-2000s, the main reason for Uruguay's low credit to GDP ratio was household credit, with the ratio of household credit to corporate credit (around 25 percent) significantly below other LA countries. Since then household credit has grown (from 8 percent of private consumption to 16 percent) while the ratio of corporate credit to gross fixed capital formation has fallen from 135 percent in 2004 to 98 percent in 2015.[14] Over the last 4 years, as the exchange rate depreciated and deposit dollarization increased, these trends partly reversed though, with the ratio of household credit to corporate credit falling again, possibly conditioned by funding shortages in the peso market. Overall, compared with LA peers both corporate and household credit are low.

Figure 9. Credit and Deposit Dollarization

Source: IMF Staff Calculation based on SSF data.

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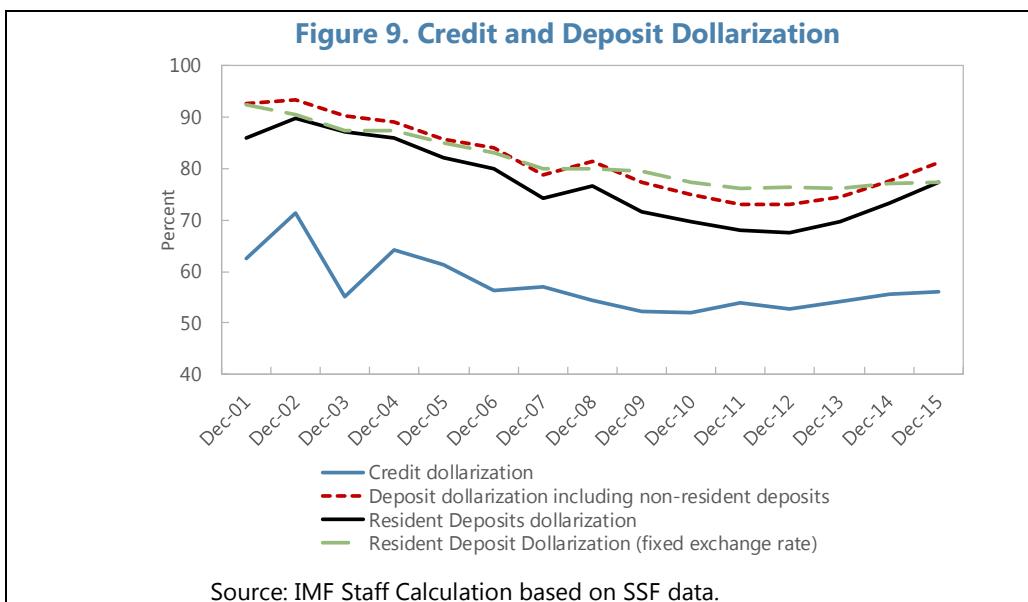
[12] See Lambert and Singh (2015) for a detailed discussion of bank lending in Uruguay.

[13] Low credit to GDP was already an issue in 2006 (Canales-Kriljenko and Gelos). A number of recommendations such as encouraging dedollarization and improving the credit culture are still valid. Low credit, however, seems to have become more of a structural issue now while it could be seen as a temporary post-crisis phenomenon in 2006. Also see Gelos and Pinon (2008), Podpiera and Wezel (2011) and Lambert and Singh (2015) for further work on the topic and recommendations linked to reducing the segmentation of the market and encouraging competition.

[14] See Podpiera and Wezel (2011) for a brief discussion of corporate and household credit in the 2000s.

Table 2. Distribution of Bank Credit

% of total bank credit	Any currency	Credit in Pesos	Credit in US$
Public Banks	44%	28%	16%
Corporates	18%	3%	15%
Households	23%	22%	0%
Public Sector	4%	2%	1%
Private Banks	56%	17%	39%
Corporates	43%	7%	37%
Households	11%	9%	1%
Public Sector	2%	1%	1%
Total	100%	45%	55%

Source: IMF Staff Calculation based on SSF (BCU) data.

Figure 10. Credit to GDP in Emerging Markets at End-2015

Source: World Bank (World Development Indicators).
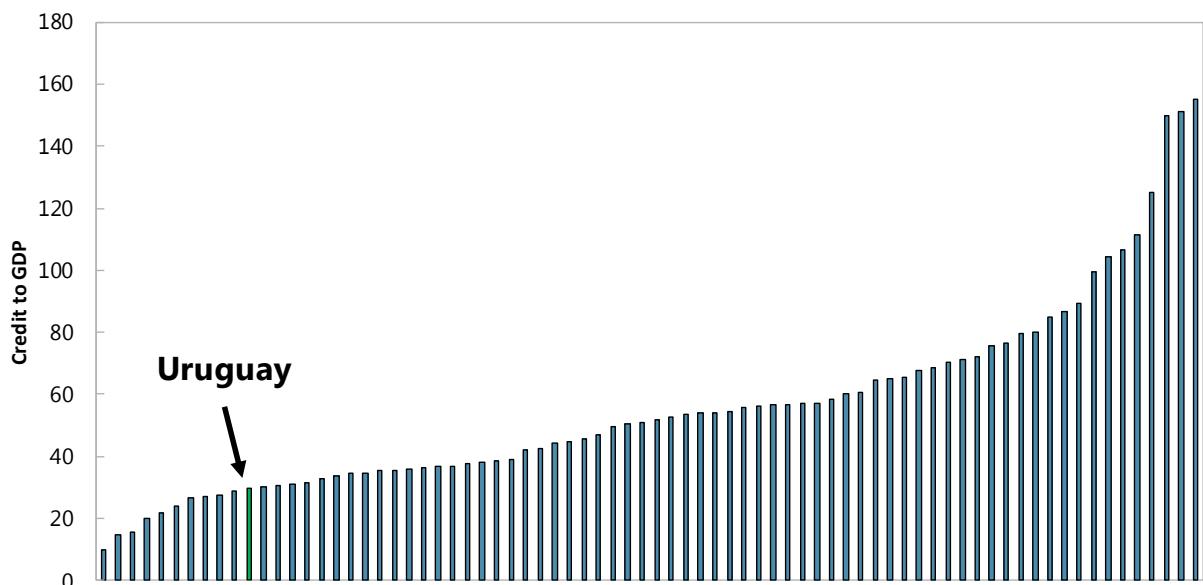
Figure 11. Credit in Selected LA Countries (2004–2015)

Credito to the private sector to GDP

Brazil — Chile - - - Colombia — Mexico — Uruguay

Ratio of Household Credit to Corporate Credit

Brazil — Chile - - - Colombia — Mexico — Uruguay

Corporate Credit to Gross Fixed Capital Formation

Brazil — Chile - - - Colombia — Mexico — Uruguay

Household Credit to Private Consumption

Brazil — Chile - - - Colombia — ·Mexico — ·Uruguay
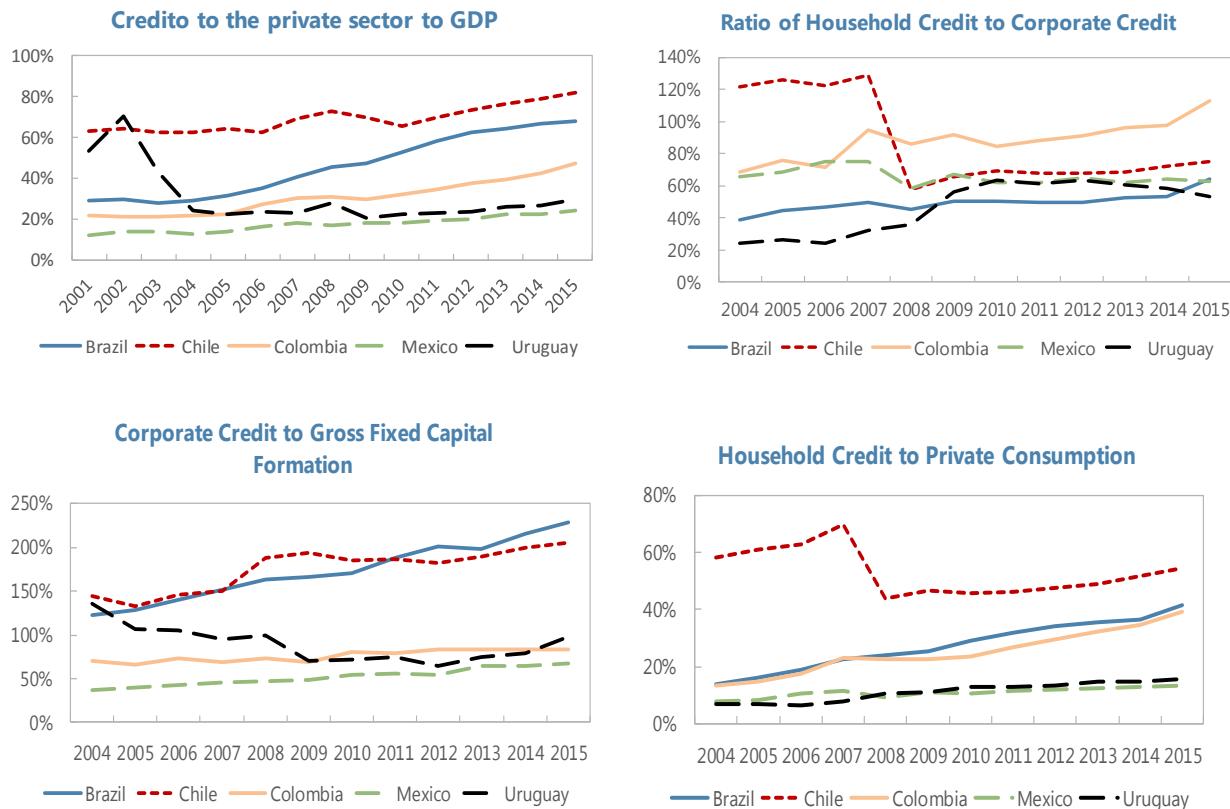
Source: IFS.

Non-bank financial sector

22.   Pension funds are the dominant player in the non-bank financial sector.[15] Private pensions funds (introduced in 1996 in Uruguay)[16] invest a large fraction of their portfolio in domestic, local currency public sector debt, for which they dominate the market. About 45 percent of their portfolio (close to 9 percent of GDP) is invested in NFPS debt and another 15 percent in BCU paper (see non-bank financial sector in Figure 2). The remainder is split roughly equally between bank deposits, trusts, stocks and corporate debt and external assets. There exists a limit on the pensions funds FX exposure (35 percent for so called accumulation funds and 15 percent for retirement funds) and the industry hit those limits in early 2016, following a switch into FX as the peso depreciated.

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[15] Other actors are offshore financial entities as well as credit agencies which specialize in micro-loans but they are very small from a systemic perspective.

[16] See chapter on pensions in 2016 SIPs for an overview and appraisal of the pension system in Uruguay.

Non-financial private sector

Corporates:

23.   The corporate sector has large liabilities to the rest of the world but the share of equity financing is very high. Around 20 percent of foreign financing is in the form of debt (9 percent of GDP), and less than 7 percent is in the form of short-term FX debt, making the sector relatively resilient against sudden reversals in international funding.

Figure 12. Share of FX Loans to Nontradable Sector

Source: BCU
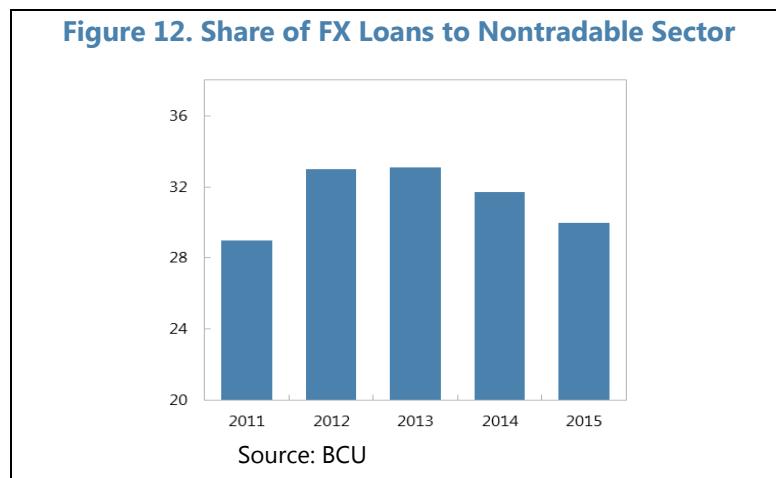
**24.   Corporates borrow mostly from domestic banks in dollars.[17]** Detailed information for the manufacturing sector shows that bond issuances account for only 4 percent of debt, and bank loans consistently accounted for around 96 percent of corporate debt over the past 10 years.[18] The ratio of FX bank credit to peso credit for the corporate sector as a whole is roughly 5:1, suggesting that at least a number of firms are likely to be vulnerable to Peso depreciations.

25.   Dollar borrowing creates currency mismatches which corporates hedge by keeping large dollar liquidity rather than by using financial instruments. Using the methodology of classifying sectors as tradable and non-tradable developed by Sander and others (2008) suggests that around 30 percent of FX bank loans are going to firms in non-tradable sectors (see figure 12).[19] [20] Using detailed microdata, Buscio and others (2011), find that only 17 percent of firms in that year had a significant net exposure to a peso depreciation[21], with firm size not a strong predictor for exposure but certain sectors such as manufacturing and commerce more exposed. Licandro and others (2014) find that on average

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[17] Equity markets are very small in Uruguay, with total market capitalization below 1 percent of GDP.

[18] See CIU "Endeudamiento del sector industrial" (2016).

[19] These numbers fell strongly as new prudential legislation was introduced after the crisis in the early 2000s but has been fairly constant since the mid-2000s (Sanders and others, 2008). See stress testing chapter on FX related prudential regulation introduced since 2005 in Uruguay.

[20] Using the universe of corporate loans in Uruguay from 1999-2009, Cabrera and Bazerque (2010) show that a higher level of dollarization of credits is associated with a somewhat higher probability of default of the borrower.

[21] Defined as (Short-Term US$ liabilities – Short-Term US$ Assets)/ Total Assets > 20%.

firms have a small net long dollar position (both total and short-term). They keep large amounts of dollar liquidity to protect against peso depreciations and are thus essentially exposing themselves to a peso appreciation. While the mean is positive, the distribution has long tails, however, with some firms having a large open dollar position. Lastly, Mello (2016) uses the economic survey of 2012 which covers close to 5,000 companies of all sizes to analyze the determinants of debt dollarization of Uruguayan firms. He finds that firms with a higher degree of debt dollarization also have a higher level of asset dollarization, are more likely to be exporters and are larger on average. These relationships point towards an adequate exchange rate management of corporates on aggregate. However, the use of financial instruments could be a more efficient way than simply keeping dollar liquidity for corporates to hedge their currency risks. Government attempts to deepen local markets are a step in the right direction in that sense.

26.   Low (measured) corporate credit levels might understate access to credit somewhat, with small enterprises relying on (unmeasured) supplier credit as much as they rely on bank credit to finance investments. Small and medium-enterprises SMEs (<100 employees) account for ⅔ of employment in Uruguay but only ⅓ of the volume of bank lending operations. The World Bank (2015), based on data from the 2010 enterprise survey, observes that "In Uruguay small enterprises finance only 6.6 percent of their investments with bank loans, with 8.1 percent financed from supplier credit". The ratio of bank to supplier credit for small enterprises correlates strongly with the ratio of corporate credit to GCFC in LA countries (figure 13), indicating that the total credit provision in countries with low corporate credit to GFCF ratios might be understated.[22] Mello (2016) also highlights the role of non-bank credit in Uruguay, with small firms accessing mainly supplier credit, medium-sized firms accessing bank credit and large firms getting credit from several sources.

Figure 13. Investment Behavior of Small Enterprises in LA in 2010
(<19 employees)
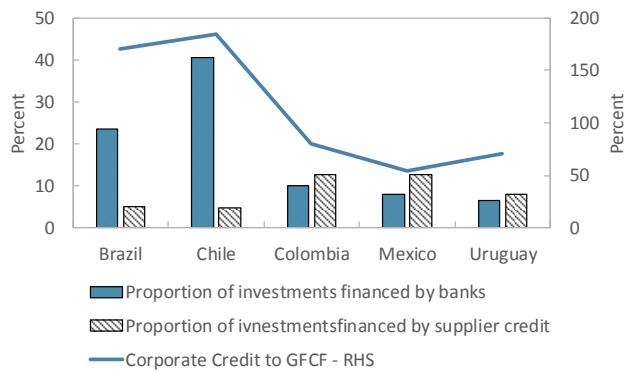
Source: World Bank Enterprise Survey and IFS.
Data are for 2010 or latest available year of WB enterprise survey.

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[22] Uruguay does have a particularly high share of small enterprises using own funds to finance investment, however.

Households:

27.   Households overwhelmingly save is U.S. dollars, potentially exposing them to a sharp dollar depreciation. Given households strong and long-standing preference for saving in dollars, dollar depreciations should thus create a negative wealth effect in Uruguay. However, certain goods (durable goods and real estate mainly) are priced in dollar (roughly 10 percent of the CPI basket) and since there is a high exchange rate pass-through (around 30 percent) for these goods, households are partially hedged against a dollar appreciation. In fact, the relationship between dollar appreciations and consumption seems to be negative in practice, perhaps due to the consumer's association of peso weakness with general economic weakness or due to the fact that dollar saving (and saving in general) in concentrated in the wealthier segments of society so that for lower income households a stronger dollar simply increases the cost of durables. Deposit dollarization decreased somewhat between 2002 and 2012 but increased again quite rapidly when the peso depreciated over the past years, suggesting an asymmetric reply to exchange rate movements.

28.   Households borrow nearly exclusively in pesos, a marked departure from the past and a success in terms of de-dollarization. Between 2005 and 2015 household credit dollarization fell from around 20 percent to below 5 percent, partly due to prudential policy implemented after the 2002 crisis.

Stylized stress tests to balance sheets

29.   A large peso depreciation of 30 percent, would lead to nominal losses of close to 7 percent of GDP for the NFPS but gains in most other sectors of the economy (table 3). Given gains on the BCU's assets, the public sector as a whole would incur valuation losses of only around 3.2 percent of GDP. ODCs, OFCs and the private non-financial sector would all make gains given their long FX positions but there is some heterogeneity between households and corporates (with some corporates short in dollars and households overwhelmingly long, as discussed above).

30.   The system could withstand an extreme FX funding shock (figure 14). Banks' are able to cover a complete withdrawal of non-resident deposits (8 percent of GDP) purely out of their liquid external FX assets (14 percent of GDP). They have 12 percent of GDP in reserves at the BCU, offering an additional cushion. Additionally, the BCU has international reserves (net of FX obligations to ODCs) of 17 percent of GDP. A dramatic FX funding shock similar to 2002 with 65 percent of non-resident deposits flowing out, 30 percent of resident FX deposits being withdrawn and 26 percent of short-term debt having to be paid off would correspond to an FX funding shock of roughly 20 percent of GDP but could be absorbed by the system. In fact, ODC and BCU short-term FX assets are nearly enough to cover all resident FX deposits (34 percent of GDP) as well as non-resident FX deposits and external FX short-term debt of the NFPS and of the non-financial private sector (around 3 percent each).

Table 3. Impact of FX Shock

Sector	Net FX Position at end 2015	Loss/Gain from 30% Depreciation
NFPS	-22%	-6.7%
Central Bank	11%	3.2%
Public Sector (incl CB)	-12%	-3.6%
Banks (ODC)	3%	1.0%
Non-Bank Financial Sector	7%	2.2%
Private Non-Financial Sector	30%	8.9%
URUGUAY vs Rest of the World	28%	8.4%

Source: IMF Staff Calculations based on authorities' data, standardized reporting forms and IIP data.

Figure 14. Short-Term FX Assets and Liabilities
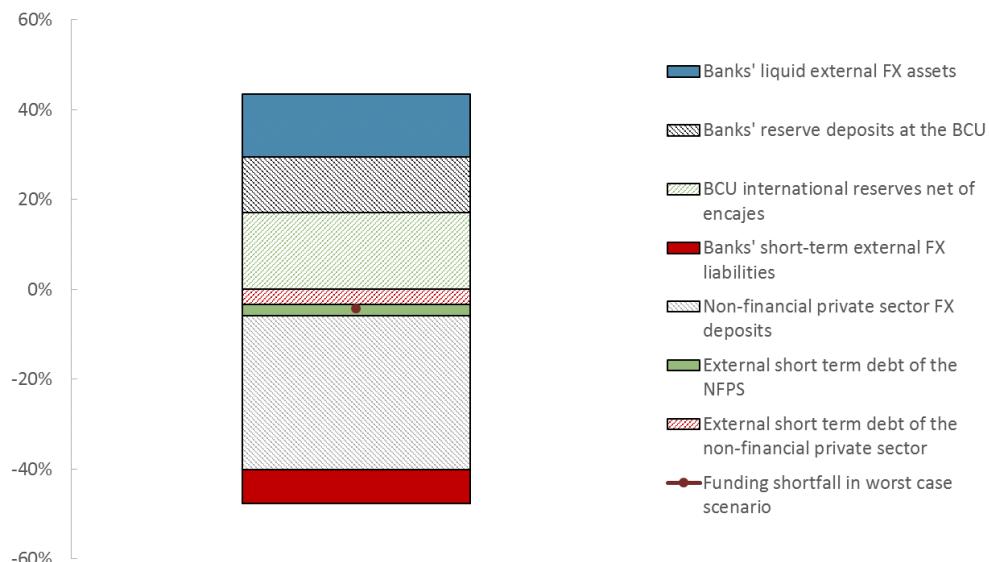
Source: IMF Staff Calculations based on authorities' data, standardized reporting forms and IIP data.

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Appendix I. Uruguay: Sectoral Balance Sheet at End-2015

In percent of GDP				Holder of Liability (Creditor)				
Issuer of Liability (Debtor)	**NFPS**	**Central Bank**	**Public Sector (incl CB)**	**Banks (ODC)**	**Non-bank financial sector**	**Private Non-Financial Sector**	**External**	**Total Liabilities**
NFPS								
Total Liabilities		**9%**		**4%**	**12%**	**1%**	**32%**	**57%**
In local currency		8%		2%	10%	1%	8%	28%
Short-Term								
Medium- and Long-Term		8%			10%	1%		
In foreign currency		1%		2%	2%	0%	24%	29%
Short-Term								
Medium- and Long-Term		1%			2%			
Central Bank								
Total Liabilities	**7%**			**15%**	**9%**	**1%**	**3%**	**34%**
In local currency	2%			2%	6%	1%	1%	12%
Short-Term	2%			2%	4%			8%
Medium- and Long-Term					2%		1%	4%
In foreign currency	5%			12%	3%	0%	1%	22%
Short-Term	5%			12%	3%			21%
Medium- and Long-Term							1%	1%
Public Sector (incl CB)								
Total Liabilities				**18%**	**20%**	**1%**	**35%**	**75%**
In local currency				4%	15%	1%	9%	30%
Short-Term								
Medium- and Long-Term								
In foreign currency				14%	5%	0%	25%	45%
Short-Term								
Medium- and Long-Term								
Banks (ODC)								
Total Liabilities	**3%**	**0%**	**3%**		**3%**	**45%**	**14%**	**66%**
In local currency	2%	0%	2%		3%	10%	3%	19%
Short-Term						9%	0%	
Medium- and Long-Term						2%	3%	
In foreign currency	1%	0%	1%		0%	35%	11%	47%
Short-Term						34%	8%	
Medium- and Long-Term						1%	3%	
Non-Bank Financial Sector								
Total Liabilities	**0%**	**0%**	**0%**	**0%**		**20%**	**1%**	**21%**
In local currency	0%	0%	0%	0%		20%	0%	20%
Short-Term								
Medium- and Long-Term						20%		
In foreign currency	0%	0%	0%	0%		0%	1%	1%
Short-Term								
Medium- and Long-Term							1%	
Private Non-Financial Sector								
Total Liabilities	**1%**	**0%**	**1%**	**28%**	**3%**		**43%**	**74%**
In local currency	1%	0%	1%	12%	3%		35%	51%
Short-Term				2%			0%	2%
Medium- and Long-Term	1%		1%	10%	3%		35%	49%
In foreign currency	0%	0%	0%	15%	0%		8%	23%
Short-Term				9%			3%	12%
Medium- and Long-Term				6%			5%	11%
External								
Total Liabilities	**0%**	**31%**	**32%**	**20%**	**3%**	**18%**		**73%**
In local currency	0%	0%	0%	0%	0%	0%		0%
Short-Term								
Medium- and Long-Term								
In foreign currency	0%	31%	31%	20%	3%	18%		73%
Short-Term		29%	30%	14%	2%			
Medium- and Long-Term		2%	2%	6%	1%			
Total Assets	**11%**	**41%**	**36%**	**66%**	**30%**	**85%**	**93%**	
In local currency	5%	8%	3%	16%	21%	32%	48%	
Short-Term		0%						
Medium- and Long-Term		8%						
In foreign currency	7%	32%	33%	50%	8%	53%	45%	
Short-Term		29%						
Medium- and Long-Term		3%						

Notes on data construction

NFPS:

- Total liabilities are obtained from BCU debt tables + debt vis-à-vis the BCU obtained from monetary data. Total assets are obtained from BCU debt tables + assets vis-à-vis the BCU obtained from monetary data.

- Exposure vis-à-vis the BCU and ODC: From standardized reporting forms (monetary statistics).

- Exposure vis-à-vis the non-financial private sector: On the asset side, found as a residual by subtracting external and ODC assets from BCU debt tables. On the liabilities side from BCU debt tables.

- Exposure vis-à-vis non-bank financial sector: Assumed to be 0 on the asset side and retrieved as a residual on the liability side by subtracting all other sectors for total liabilities of the NFPS. AFAPs with 4541 million US$ account for the bulk of the 6272 million US$ of liabilities. The difference between the two numbers could also be exposure to the private non-financial sector.

- Exposure vis-à-vis rest of the world: From BCU external debt tables (Note: contractual, rather than residual maturity).

- NFPS equity in BCU and public banks currently not included.

BCU:

- All headline data from standardized reporting forms. Some minor differences between monetary data and BCU external debt tables (roughly 300 on liabilities side and 200 on asset side). The difference is added to medium- and long-term maturity assets and liabilities.

- Total assets and liabilities obtained as the sum of all sub-items. Total assets and liabilities do not sum to 0 since currency in circulation and the capital account are omitted from the liability side.

Public sector:

- Obtained as the sum of NFPS and BCU, netting out cross-exposures.

Other depository corporations (banks):

- All headline data from standardized reporting forms except for liabilities vis-à-vis the non-bank financial sector which are taken from AFAP's balance sheets (sum of all term deposits). Do not have detailed information on these term deposits but assume that they are >1 year, i.e. long-term.

- We add private bank equity as a peso liability vis-à-vis the rest of the world.

- For split between short-term and long-term exposure to non-financial private sector and to the rest of the world, use detailed split on credit and deposit composition by currency and maturity from bank data and then apply the obtained percentages to the monetary headline data.

- Total assets and liabilities obtained as the sum of all sub-items. Total assets and liabilities do not sum to 0 since intra-sectoral exposures (and some potential small other items) are not captured in the sectoral balance sheet.

Non-bank financial sector:

- Exposure vis-à-vis private non-financial sector: Data is only for AFAPs, due to lack of comprehensive data. On the asset side use all corporate bonds and stocks, as well as consumer loans held by AFAPs. On the liabilities side use the total value of AFAP funds.

- Exposure vis-à-vis the rest of the world: Combine AFAP data with data from standardized reporting forms. However, OFC data for Uruguay only comprises offshore financial institutions. Therefore, it has limited institutional coverage.

- Total assets and liabilities obtained as the sum of all sub-items. Note that there is a discrepancy since only for a few inter-sectoral exposures was data available for a larger set than only the AFAPs.

Private non-financial sector:

- Exposure of private non-financial sector vis-à-vis the rest of the world comes from IIP. On liability side, assume that all direct equity investment to private non-financial sector. Assume all direct investment via debt instruments is in foreign currency. Additionally, assume that all 'other investments' is in foreign currency. Take out SOE external debt from 'other' sector in IIP. Rest (direct equity investments) assume in Pesos given book value in Pesos.

- On the asset side, take data from IIP for 'other sectors' and subtract AFAPs and other non-bank financial institutions.

General observations on use of standardized reporting forms:

- Currency in circulation is not included in BCU liabilities. Capital account is always excluded given difficulty of assigning counter-party.

- OFC data are only for offshore financial institutions therefore always use CB and ODC survey when possible.

- Classify transferable deposits as short-term. Assume that all loans are long-term unless more precise information is available. Assume that all other small items such as trade credits and derivatives are short-term unless more precise information is available.

Note: We define short-term to be anything with a (residual) maturity of less than 1 year. When residual maturity is not available, contractual maturity is used. BCU debt tables often give contractual maturities.

STRESS-TESTING THE BANKING SECTOR[1]

This paper looks at the stability of Uruguayan banking sector. After a brief description of the structure of the sector and its potential vulnerabilities, it presents the results of solvency and liquidity stress tests covering all public and private banks. These tests show banks have enough capital to withstand adverse credit, interest rate, sovereign, and exchange rate shocks. Banks' structurally low profitability, however, constrains their ability to absorb more severe shocks.

## A.   Banking Sector Structure and Recent Developments

1.   **The Uruguayan banking sector is relatively small**. The total assets of the 11 banks considered in this paper (2 public banks and 9 private, foreign-owned, banks) represent 80 percent of GDP. Credit is particularly low. Bank credit to the non-financial sector represents around 32 percent of GDP. This is well below the level observed in peer income-level countries and in other countries in the region. Credit to the non-financial sector also represents less than 41 percent of total banking assets. The average, however, masks significant variations across banks, with loans representing more than 88 percent of BHU's assets, but only 10 percent of the assets of the Uruguayan affiliate of Banco de la Nación Argentina.

2.   **Dollarization is high, with 55 percent of the loans and 78 percent of deposits at end-June 2016 denominated in foreign currency**. The dollarization of credit varies by borrowing sector. Nearly all loans to the mostly export-oriented agriculture sector and more than 90 percent of the loans to the manufacturing sector are denominated in dollar. On the contrary, less than 5 percent of the loans to households are in foreign currency (13 percent for private banks). About 30 percent of foreign-currency loans go to the non-tradable sector.

Figure 1. Uruguay: Dollarization of the Credit Market

Credit to the Non-Financial Sector, by Bank
(Percent of Total Assets)

Credit in Foreign Currency, by Sector
(Percent of Credit)

Sources: BCU; IMF staff calculations.

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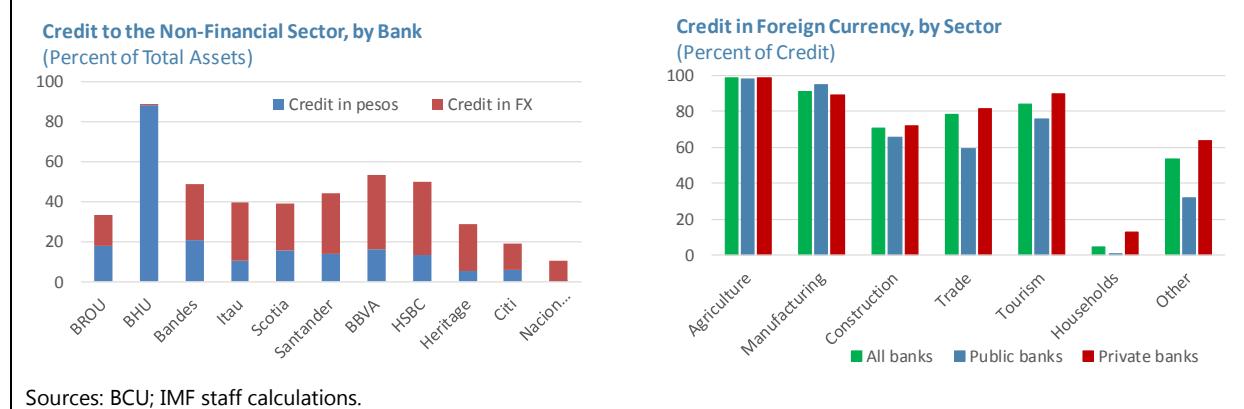
[1] Prepared by Frederic Lambert.

3.   **The sector is segmented between public banks and private banks**. On the one hand, public banks (BROU and BHU) dominate the peso market, with around 60 percent of peso deposits and loans. BROU itself receives 48 percent of all peso deposits and provides 40 percent of all peso loans. On the other hand, private banks hold more than 70 percent of the foreign-currency credit market and 60 percent of the deposits in foreign currency (mostly, if not exclusively, U.S. dollar).

Figure 2. Uruguay: Structure of the Banking Sector

Peso Credit to the Non-Financial Sector, by Bank
(Percent of Total)

FX Credit to the Non-Financial Sector, by Bank
(Percent of Total)

Peso Deposits, by Bank
(Percent of Total)

FX Deposits, by Bank
(Percent of Total)

Legend (all charts): BROU, BHU, Bandes, Itau, Scotia, Santander, BBVA, HSBC, Heritage, Citi, Nacion Argentina

Sources: BCU; IMF staff calculations.

4.   **Banking sector vulnerabilities have increased with the growth slowdown but remain limited**. The spidergram (Figure 3) plots the ranking of the z-score of six variables capturing different dimensions of banking sector soundness: capitalization level (assessed through the capital adequacy ratio), asset quality (ratio of non-performing loans to total loans), profitability (return on assets), liquidity (ratio of liquid assets to short-term liabilities), FX risk (share of foreign currency loans to the non-tradable sector), and credit growth prospects (bank credit growth). The further the value of each variable in a given period is from its historical mean, the higher the z-score and the numerical ranking assigned to it (see Cervantes and others, 2014). Based on 2016Q2 data, the chart points to increased vulnerabilities in terms of asset quality and profitability. The NPL ratio has been historically very low in Uruguay and has doubled over the past two years. This explains the ranking of 10 associated with that variable, even if the current level does not, at this stage, seem a cause for significant concern, and provisions for loan losses remain high. Similarly, the drop in the return on assets over the last year has pushed the numerical ranking for that variable to 7, a value typically indicative of medium-high risk.

5.   While the sector's capital adequacy ratio has stabilized after several years of decline, banks' structurally low profitability constrains their future loss-absorption capacity. Because of slowing loan growth, the system-wide CAR (14.7 percent at end-June 2016, including BHU) has slightly increased over the past year, ending several years of decline. Public banks continue to exhibit higher capitalization levels than their private counterparts. At the same time, the still low level of dollar interest rates combined with the slowdown in lending weighs on the profitability of banks' foreign exchange activity, given that banks keep their excess dollar assets in the form of deposits or invest them in sovereign (domestic or foreign) securities. The segmentation of the sector and the lack of competition on the peso deposit and credit markets—reflected by the large market share of the two public banks—are also sources of inefficiencies.

Figure 3. Uruguay: Banking Sector Vulnerabilities

Note: Away from center signifies higher risks, easier monetary and financial conditions, or higher risk appetite.

1/ Weighted average by total assets.

Note: Aggregates exclude BHU. Sources: BCU; IMF staff calculations.
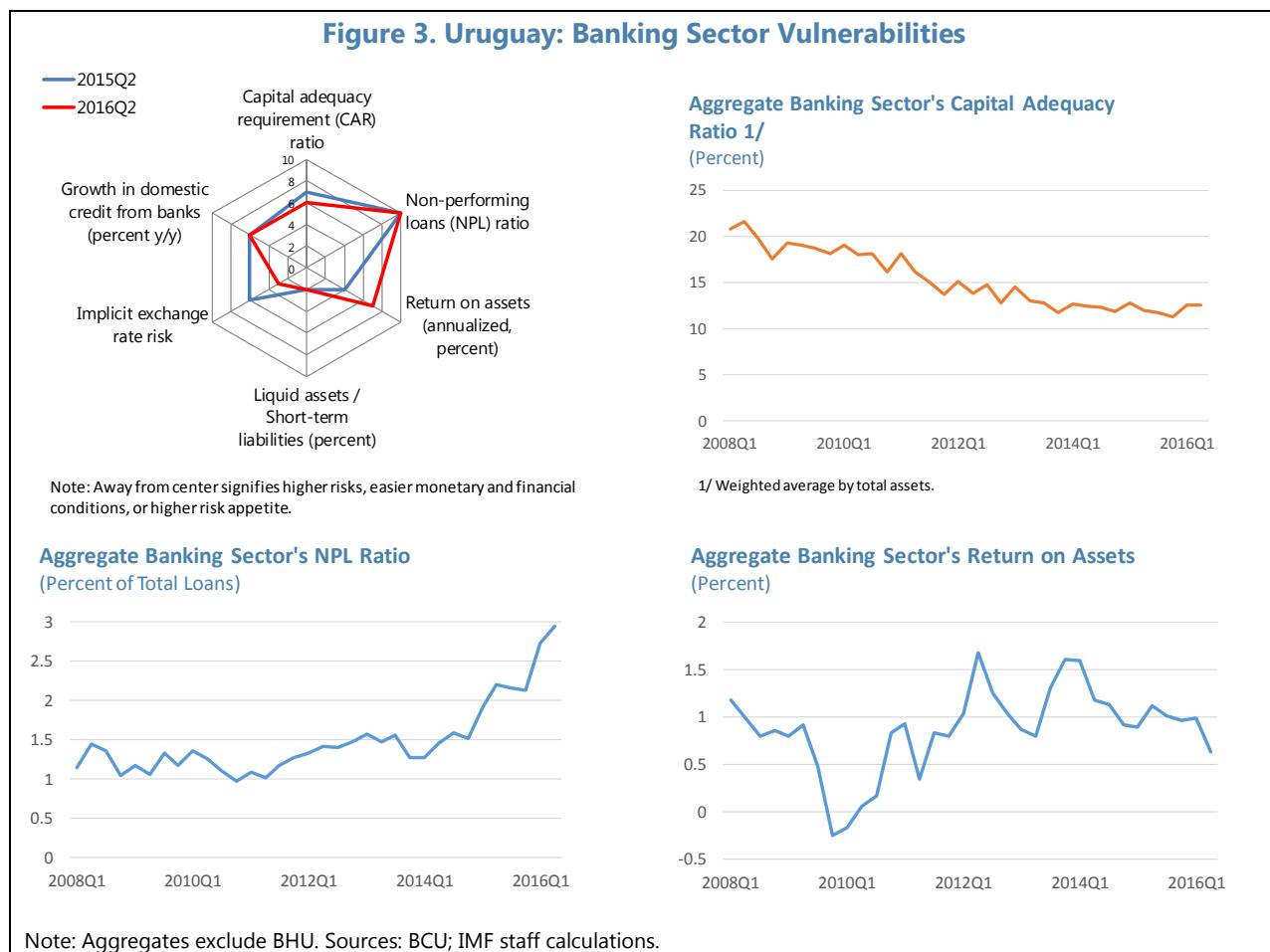
B.   Solvency Stress Tests

6.   Banks can withstand a range of adverse credit, interest rate, sovereign risk and exchange rate shocks. The stress tests consider the impact of different types of shocks on capital and risk-weighted assets in a static way. In particular, they do not include any feedback effect of the shocks on credit growth. The tests were performed on individual bank data at end-June 2016.

- Credit shocks include (i) an aggregate NPL shock equal to 5 percent of currently performing loans (which corresponds to a tripling of the current aggregate NPL ratio, whereas the current slowdown has so far resulted in a doubling of the NPL ratio), and (ii) sectoral increases of NPLs equal to respectively 7, 12, and 10 percent of currently performing loans in the more export-oriented agricultural, manufacturing and tourism sectors (a fourfold increase from current sectoral NPL ratios).[2]

- The interest rate shock considers the effect of a 208 bp increase in both dollar and peso interest rates across all maturities (parallel shift of the yield curves). This increase corresponds to the maximum rise in the federal funds target rate observed over a twelve-month period since 2000, and lies between the increases considered by the Superintendent for Financial Services (SSF) in the adverse and crisis scenarios of its May 2016 stress tests (+156bp and +275bp respectively). The shock affects banks' net interest income due to the maturity gap between assets and liabilities,[3] as well as the value of fixed-income securities on banks' balance sheets (repricing impact).

- The sovereign risk shock scenario shows the repricing effect of a 600bp increase in the risk premium on Uruguayan securities, corresponding to two standard-deviations of the monthly average EMBI spread over the period June 2001–June 2016. In its May 2016 stress tests, the SSF considered country risk shocks of +483bp and +1000bp in its adverse and crisis scenarios. A sovereign risk shock affects the value of both peso and dollar-denominated sovereign securities.

- The exchange rate shock assumes a 30 percent depreciation of the peso (equivalent to the depreciation of the peso observed in the last depreciation period, between end-2015 and end-March 2016). This is a bit less than the 35 percent depreciation assumed by the SSF in its crisis scenario (the adverse scenario assumed a 23 percent depreciation). The shock has both a direct effect on the value of banks' assets denominated in U.S. dollar (with a depreciation actually *increasing* the peso value of those assets, thereby depressing the capital-adequacy ratio) and an indirect effect on asset quality with 20 percent of the FX-denominated loans assumed to become non-performing following a 100 percent depreciation.[4] The latter assumption is based on estimates from 2011 indicating that roughly 17 percent of corporate borrowers have a significant net open short-term FX position (see the companion paper on balance sheet analysis).

7.   The low level of credit limits the effect of credit shocks. A proportional increase in NPLs across all sectors implies a reduction in the system-wide capital-adequacy ratio (CAR) by 0.7 percent.

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[2] A 25 percent provisioning rate on new NPLs is assumed. The effect of the shock on risk-weighted assets is assumed to be of the same magnitude as the effect on capital.

[3] The test considers the cumulative gap at a 12-month horizon. It assumes the increase in interest rate is passed through symmetrically to deposit and lending rates.

[4] This means that 6 percent of FX loans currently performing would become non-performing following the assumed 30 percent depreciation shock. The provisioning rate on new NPLs is set at 25 percent.

A more severe shock affecting export-oriented sectors results in an even smaller deterioration of 0.4 percent. Reverse stress testing indicates that NPLs would have to rise by 19 to 22 percent of currently performing loans for the CAR of either a third of the banks or banks representing a third of total assets to fall below the regulatory minimum of 8 percent—an extreme event.

8.   **Maturity mismatches imply a significant effect of a rise in interest rates on net interest income**. The impact on net interest income is sizable, reducing the CAR of one bank below the regulatory threshold.[5] The repricing effect is also significant, although the impact on the CAR is mitigated by a decrease in risk-weighted assets as FX-denominated bonds make up 92 percent of banks' bond portfolio, or 8 percent of total assets (peso-denominated sovereign bonds are zero risk-weighted). Taking both effects into account, two banks, representing close to 10 percent the system's assets and 7 percent of its capital, would register CARs below the regulatory minimum.

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[5] This effect is mechanic given the maturity gap between assets and liabilities and the assumed symmetric pass-through to deposit and lending rates in the model. In reality, banks expect a positive effect on their income from a rise in interest rates as the pass-through to deposit rates is projected to be much smaller than the increase in lending rates.

Figure 4. Uruguay: Solvency Stress Test Results

CREDIT RISK: NPLs
(Percent of Gross Loans)

Pre-shock ■ Proportional increase in NPLs ■ Sectoral shocks to NPLs
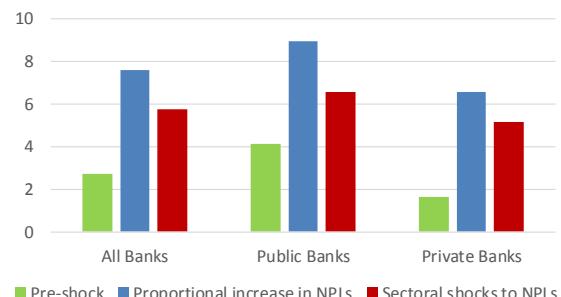
CREDIT RISK: Capital Adequacy Ratio
(Percent of Risk-Weighted-Assets)

Pre-shock ■ Proportional increase in NPLs ■ Sectoral shocks to NPLs
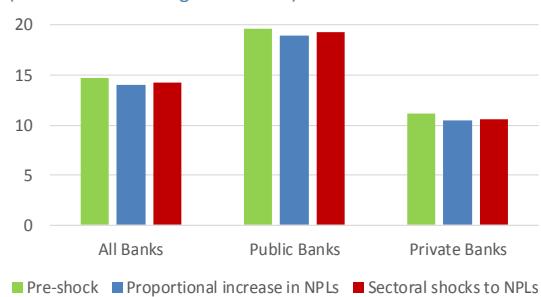
INTEREST RATE RISK: Capital Adequacy Ratio
(Percent of Risk-Weighted-Assets)

Pre-shock ■ Net interest income impact ■ NII + Repricing impact
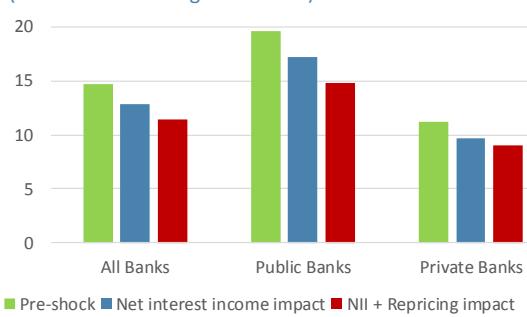
SOVEREIGN RISK SHOCK: Capital Adequacy Ratio
(Percent of Risk-Weighted-Assets)

Pre-shock ■ Repricing impact
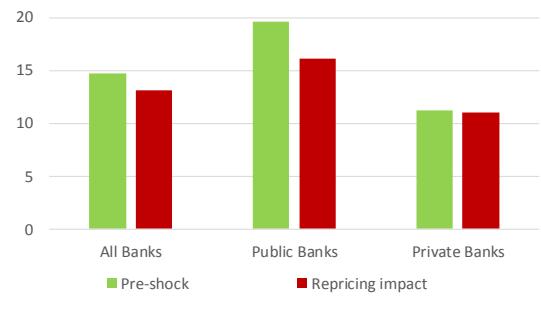
EXCHANGE RATE RISK: FX Net Open Positions
(Percent of Regulatory Capital)
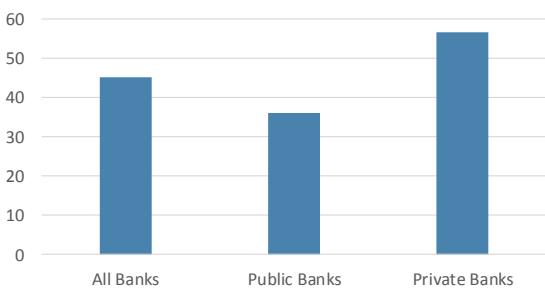
EXCHANGE RATE RISK: Capital Adequacy Ratio
(Percent of Risk-Weighted-Assets)

Pre-shock ■ Direct FX risk ■ Direct + indirect FX risk
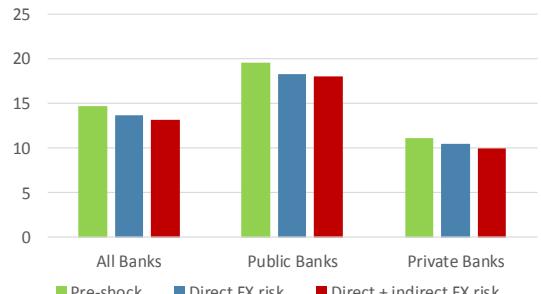
COMBINED SHOCK: Capital Adequacy Ratio
(Percent of Risk-Weighted-Assets)

Pre-shock ■ Post-shock ■ Post-shock, incl. countercyclical buffers
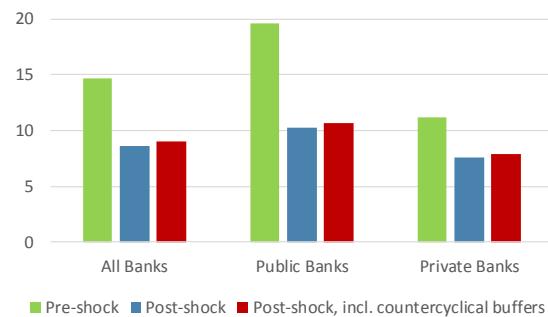
COMBINED SHOCK: Decomposition of the Changes in Capital
(Percent of Pre-Shock Risk-Weighted-Assets)

Credit shock (increase in NPLs) ■ Interest rate shock
Sovereign risk premium shock ■ Exchange rate shock
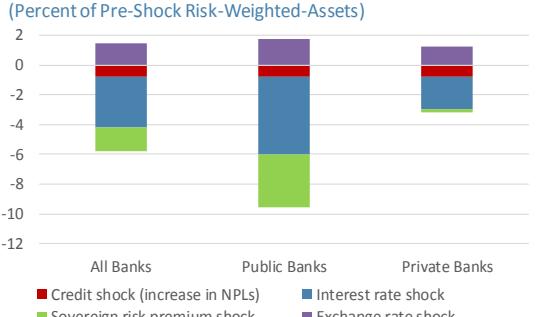
Sources: BCU; IMF staff calculations.

**9.   A sovereign risk premium shock would mostly affect public banks as private banks'
holdings of public debt securities is on average small**. The aggregate CAR would drop by
1.6 percent, but by 3.5 percent for public banks only.

**10.   Given banks' aggregate long position in foreign exchange, a depreciation of the peso
potentially creates large direct gains.** Those, however, do not translate into higher CARs as the
risk-weighted assets increase more than capital. In addition, a large depreciation implies an increase
in NPLs to non-hedged borrowers. Overall the system-wide CAR decreases moderately, by
1.4 percent, with no bank falling under 8 percent.

**11.   A combined credit risk, interest rate, sovereign risk and FX risk shock could have larger
effects, that could be cushioned by countercyclical buffers**.[6] The system-wide CAR would remain
close to 9 percent with however some large variations across banks. Five banks, representing half of
the capital of the whole system, would register CARs (not including countercyclical buffers) below
the 8 percent regulatory minimum. Countercyclical buffers could be used to support CARs but
would be insufficient to lift all of them above 8 percent. Yet, the combined shock would not trigger
any bank failure even if balance sheet adjustments would be required.

12.   Contagion effects are limited by the small interbank exposures. The interbank exposure
analysis in Figure 4 uses interbank exposure data on both the asset and liability sides to determine
potential second round effects of the previously described macro-shocks.[7] The results show very low
contagion and vulnerability levels, as banks mostly fund themselves through deposits and interbank
exposures represent less than one percent of total banking assets at end-June 2016.

Figure 5. Uruguay: Interbank Exposure Analysis
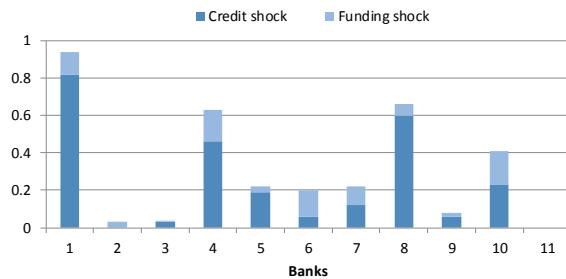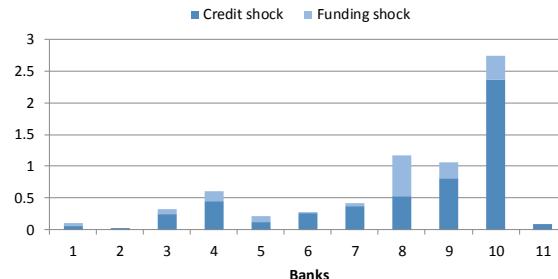
Sources: BCU; IMF staff calculations.

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[6] The combined shock scenario combines all the shocks that were previously examined separately. While somehow
extreme, it may represent a more realistic crisis scenario, in which a large exchange rate depreciation accompanied
by an increase in global interest rates would force an increase in domestic interest rates that would negatively affect
economic activity and trigger an increase in domestic credit risk.

[7] The exercise assumes a loss given default of 100 percent following a credit shock and that 35 percent of the
funding lost as a result of a bank failure is not replaceable, with a funding-shortfall induced loss factor of 1.

C.   Liquidity Stress Test

13.   Deposits represent more than 85 percent of banks' liabilities. Two-thirds of those deposits are in foreign currency and redeemable at demand. Public banks have a higher share of peso deposits in their total liabilities than private banks (24 percent versus 14 percent), in particular because BHU hardly holds any foreign currency deposit. Given banks' reliance on deposit funding and low level of credit, the aggregate FX loans-to-FX deposit ratio is relatively low, around one-third. However, the peso loans-to peso deposits ratio is close to 100 percent. Bank liquidity is further supported by high reserve requirements (increased to 28 percent of both peso and dollar deposits on April 1st). Liquid assets cover around 35 percent of demand deposits, with an even higher ratio for deposits in foreign currency.

14.   As a result, the system could withstand a severe liquidity drain both in peso and foreign currency for at least five days. The liquidity stress test considers a simple liquidity drain on all banks, with 10 and 5 percent of the demand deposits in respectively pesos and foreign currency, and 2 percent of the time deposits in either currency, withdrawn every day for five consecutive days. Assuming that 95 percent of the liquid assets and 5 percent of the other assets are available in a day, no bank is found illiquid after five days.

Figure 6. Uruguay: Bank Funding and Liquidity

Sources: BCU; IMF staff calculations.
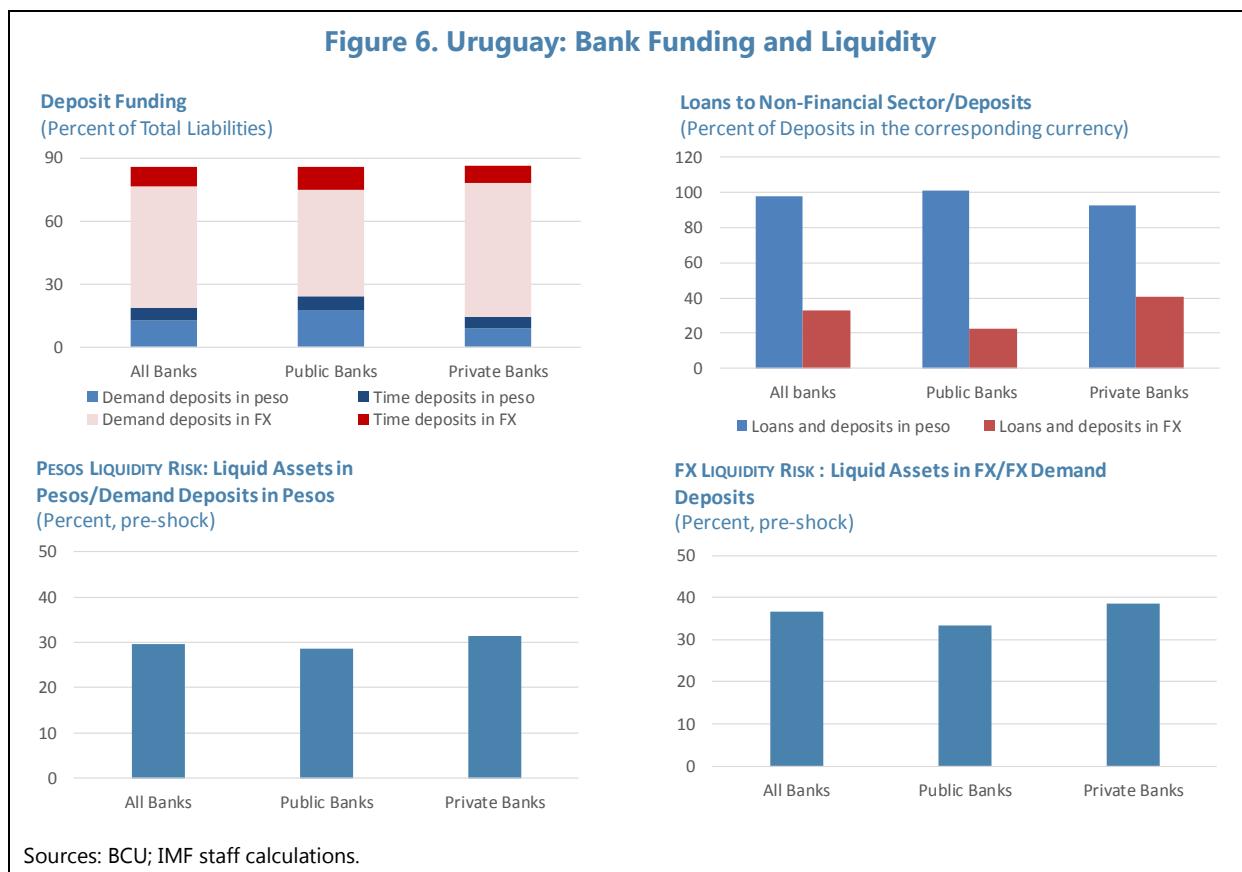
D.   Conclusions

15.   Banks in Uruguay appear sufficiently solid to withstand adverse solvency shocks. This paper considered simple stress tests, looking at the static effects on banks' CAR of credit, interest rate, sovereign, and exchange rate shocks, separately and in a combined way. While several banks would see their capital-adequacy ratio fall under the regulatory minimum in case of combined shocks, requiring balance sheet adjustments, the system-wide CAR would remain above 9 percent after including countercyclical capital buffers. Contagion effects would be limited by the very small interbank exposures. The implementation of Basel III requirements in 2017 will increase the capital of the five systematically important banks, thereby enhancing their resilience to shocks further.

16.   The liquidity of the system is high. The funding structure of banks and their low level of credit result in a high level of liquidity, supported by high reserve requirements. Banks' liquidity is higher in dollar than in peso, consistent with the higher dollarization of deposits than loans.

17.   The declining profitability of banks constrains their future loss absorption capacity. The low profitability likely reflects high labor costs, a lack of efficiency in some banks, and a conservative business model. As the 2014 financial inclusion law expands the potential client base for private banks, these could be encouraged to compete more aggressively in the peso lending market, without jeopardizing their capitalization levels.

Reference

Cervantes, Ricardo, Phakawa Jeasakul, Joseph Maloney and Li Lian Ong, 2014, Ms. Muffet, the Spider(gram) and the Web of Macro-Financial Linkages, *IMF Working Paper*, WP/14/99.

URUGUAY'S NEUTRAL INTEREST RATE[1]

This paper estimates the real neutral interest rate (RNIR) for Uruguay using a range of dynamic models. The estimation shows that the real neutral interest rate seems higher than previously thought. Uruguay's high level of dollarization and inflation persistence may explain this result.

A. Motivation

1.   The 2013 change in the central bank's operational framework, thus far, has not brought back inflation within the target range yet. In July 2013, the central bank of Uruguay (BCU) switched from using the overnight interest rate as a monetary policy instrument to announcing a reference range for the growth of M1+ within its monetary policy framework. This change resulted in an immediate increase in short-term interest rates and a tightening of domestic financial conditions (Figure 1). However, inflation has remained well above the 3 to 7 percent target range, peaking at 11 percent in May 2016, raising the question whether monetary policy has been tight enough (while acknowledging the critical role of complementary policies for lowering inflation).

Figure 1. Uruguay: Short-Term Interest Rates and Financial Conditions

Note: The financial condition index provides a summary measure of the effect of financial variables on economic activity.
The computation follows IMF Country Report 13/220.

Sources: BCU, BEVSA, INE, and IMF staff calculations.
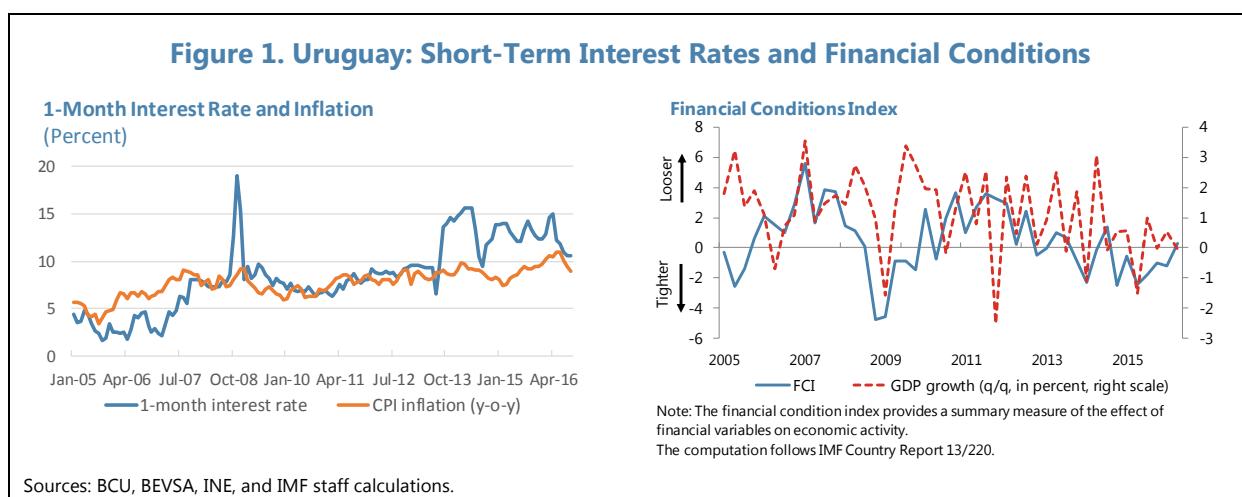
2.   The neutral interest rate provides a benchmark to assess the stance of monetary policy. The *neutral* interest rate differs from the *long-term equilibrium* interest rate (Bernhardsen and Gerdrup, 2007). The long-term equilibrium real interest rate is determined by structural factors such as domestic and global demographic trends, technology, and long-term saving preferences. The real neutral rate is affected, in addition, by medium-term disturbances, like changes in fiscal policy. Accordingly, we define the neutral real interest rate (RNIR) as the interest rate that is consistent with a closed output gap and stable inflation, for a given stance of other policies and market conditions. The gap between that neutral rate and the actual short-term real interest rate

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[1] Prepared by Frederic Lambert. I am grateful to Nicolas Magud and Rodrigo Mariscal Paredes for sharing their codes.

provides a measure of the degree to which monetary policy is stimulating or contracting the economy.

B. Neutral Interest Rate Estimates

3.   There is no single best method to estimate the neutral interest rate. As written by Alan Blinder (1998), the neutral interest rate is "difficult to estimate and impossible to know with precision." Because of this difficulty, this paper provides a range of estimates, using several dynamic models, following the approach of Magud and Tsounta (2012).

4.   Dynamic approaches allow looking at fluctuations of the neutral interest rate over time. The models usually take the form of state-space systems in which the real neutral interest rate (RNIR) is an unobserved state variable, estimated using a Kalman filter (see for instance Laubach and Williams, 2003).

5.   As a preliminary approximation the Hodrick-Prescott trend of the real one-month interest rate suggests an increase of the RNIR over the last ten years (Figure 2).[2] The end-of-period estimate is biased downward as the filter puts more weight on the most recent observations for which the real interest rate tended to decline. However, the overall trend remained upward, contrasting with the decline documented in the main advanced economies over the past 25 years (Holston, Laubach, and Williams, 2016). The rest of this section compares this pattern to that obtained with Kalman filter estimations.

Figure 2. Uruguay: HP-Filtered Real Interest Rate

Sources: BEVSA, INE, and IMF staff calculations.

Implicit common stochastic trend

6.   A first approach to the estimation of the RNIR is to assume the existence of a common stochastic trend that moves the short-term and long-term nominal interest rates jointly (Basdevant and others, 2004). In this model, a shift in the yield curve (i.e. an increase or decrease in both the short-term and long-term interest rates while the spread between the two remains constant) can be interpreted as a shift in the real neutral interest rate, whereas a steepening of the yield curve (i.e. an increase in the spread between the long-term and short-term interest rates) would be signaling that the real interest rate is below its neutral level. The model takes the form of the following system, with two signal and two state equations:

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[2] Because of the absence of a "true" policy rate in the current operational framework of the BCU, we use the one-month T-bill yield in peso as a proxy.

$$\begin{cases} r_t = r_t^* + \pi_t^e + \varepsilon_t^1 \\ R_t = r_t^* + \alpha_t + \pi_t^e + \varepsilon_t^2 \\ r_t^* = r_{t-1}^* + \vartheta_t^1 \\ \alpha_t = \mu_0 + \mu_1 \alpha_{t-1} + \vartheta_t^2 \end{cases}$$

where r_t, R_t, and r_t^* respectively denote the nominal short-term rate (one-month Treasury bill yield in peso), the nominal long-term rate (proxied by the 5-year Treasury bill in peso), and the *real* neutral interest rate, π_t^e is the expected inflation at time t, α_t is the term premium, and $\varepsilon_t^1, \varepsilon_t^2, \vartheta_t^1$, and ϑ_t^2 are i.i.d processes with zero means and constant variances. Inflation expectations are approximated by one-year ahead Consensus Forecasts.

7.   This approach produces an estimate for the real neutral interest rate of 4.1 percent in September 2016, with movements that closely follow the changes in the short-term (and long-term) interest rates over time. The reason partially lies in the relatively short-maturity of our proxy for the long-term rate and thinness of the market for medium-term peso-denominated government securities, which implies a lot of co-movement of interest rates along the yield curve, picked up by our estimate of the real neutral interest rate.

Dynamic Taylor rule

8.   Another approach is to use monetary policy rules to estimate the neutral real interest rate. The Taylor rule relates the nominal interest rate to the output gap and the deviation of actual inflation from the central bank's target. When both gaps are closed, the interest rate suggested by the rule should be equal to the neutral interest rate. The neutral interest rate corresponds to the intercept in the rule. The formal model can be written as follows:

$$\begin{cases} r_t = r_t^* + \bar{\pi}_t + \beta(\pi_t - \bar{\pi}_t) + \theta\tilde{y}_t + \varepsilon_t \\ r_t^* = r_{t-1}^* + g_{t-1} \\ g_t = g_{t-1} + \vartheta_t \end{cases}$$

where r_t is the nominal policy rate, $\bar{\pi}_t$ is the inflation target of the central bank and $\tilde{y}_t$ denotes the output gap in period t, measured as the percentage deviation of real GDP from its potential level estimated with an Hodrick-Prescott filter. The RNIR is assumed to follow a random walk with trend growth g_t.

9.   We consider two alternative specifications of the monetary policy rule which include a money growth target and an exchange rate target. The first alternative includes an additional term in the rule (first equation of the model above) capturing deviations of the growth rate for M1+ from the announced reference range, as suggested in Portillo and Ustyugova (2015), in order to capture the switch to a money targeting framework from July 2013. The second specification includes a term representing the change in the nominal exchange rate vis-à-vis the U.S. dollar. The inclusion of an exchange rate objective in the monetary policy rule is motivated by Florian and Montoro (2009) which describes a DSGE model for the partially dollarized Peruvian economy. In this model, some firms set prices in dollar, prices are rigid, and exchange rate fluctuations generate

changes in relative prices that are inefficient. The central bank can therefore improve welfare by reducing exchange rate volatility.

10.   The three rules produce estimates between 5 and 5½ percent (Figure 3). The estimates are highly correlated with each other and still strongly influenced by the movements of the short-term interest rate. The range of estimates lies above the HP-trend and the estimate derived from the common trend model. It is also higher than staff's estimates of real potential growth (around 3 percent), which can, in principle, be considered a good proxy for the long-term equilibrium interest rate.

Figure 3. Uruguay: Real Neutral Interest Rate Estimates

Method	NRIR Estimates (in percent)
Common stochastic trend	4.1
Standard Taylor rule	5.4
Augmented Taylor rule with stable exchange rate target	5.0
Augmented Taylor with money target	5.7

Sources: BCU, BEVSA, INE, and IMF staff calculations.
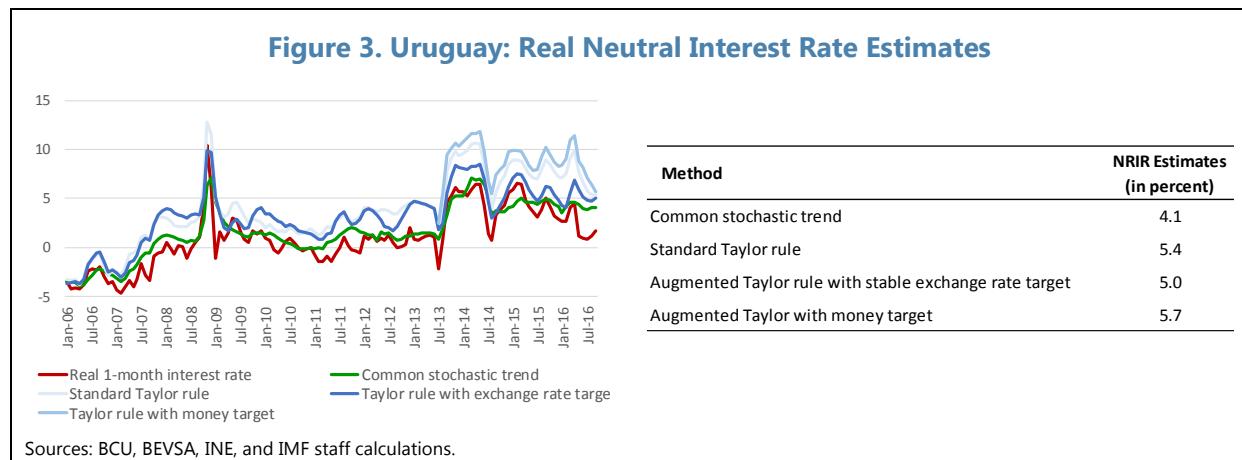
C.   Discussion

11.   The estimated level of the neutral real interest rate in Uruguay would imply a negative interest rate gap in 2016. This reflects the persistence of inflation well above the BCU's target range and may suggest the existence of a moderately accommodative monetary policy. The widening of the interest rate gap over the last 18 months seems to indicate a gradual loosening of the monetary stance.

Figure 4. Uruguay: Interest Rate Gap

Sources: BEVSA, INE, and IMF staff calculations.

12.   However, the results need to be considered with caution since they depend on the underlying model used in the estimation. There is uncertainty about the actual rule used by the BCU to conduct monetary policy. A Taylor rule, such as the ones considered in this paper, may also be a poor representation of the BCU's reaction function under the new money targeting framework. The uncertainty around the estimation results is reflected in the large range for the interest gap (Figure 4).
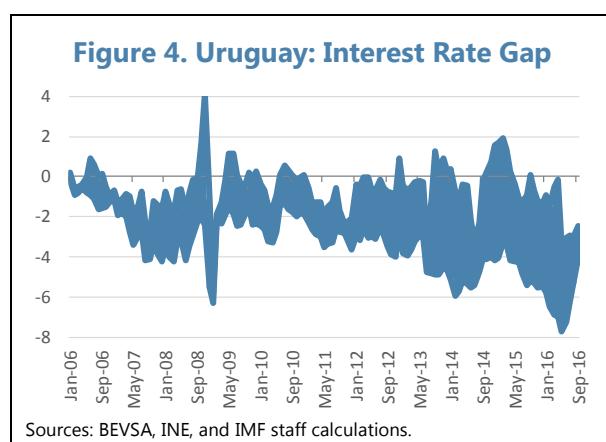
13.   The high level of dollarization and high inflation persistence in Uruguay can explain a higher level of the RNIR. The estimates presented in this paper are within the range of previous estimates found in the literature for earlier years (e.g. Brum, Carballo and España, 2010; Magud and Tsounta, 2012). However, they are relatively high compared to estimates found for other countries in the region, with the possible exception of Brazil. This can be explained by a greater degree of dollarization of the economy and lower level of financial development. The low level of savings in peso can account for a higher equilibrium real interest rate (the bank peso loans to peso deposits ratio is close to 100 percent, as 80 percent of deposits are in dollar). These frictions also limit the effectiveness of monetary policy and tend to increase the inflation risk premium.[3] Similarly, the high inflation persistence which results from the indexation of wages on past inflation makes inflation less responsive to interest rate changes and can result in a higher inflation risk premium and a structurally higher neutral interest rate.

Table 1. Uruguay: Comparison of NRIR Estimates		
In percent	**Brum, Carballo, and España (2010)**	**Magud and Tsounta (2012)**
Brazil	-	[4.5, 5.7]
Chile	-	[1.2, 2.9]
Colombia	-	[1.6,4.4]
Mexico	-	[1.3, 4.2]
Paraguay	-	[1.0, 3.8]
Peru	-	[1.0, 5.0]
Uruguay	**[3.8, 7 .0]**	**[1.3, 7.2]**

14.   The upward trend in the RNIR found above contrasts with the global decrease in real interest rates documented in the literature. Possible reasons for this rise include the high inflation volatility, resulting in an increase in the inflation risk premium, and the rise in public debt in the past five years not compensated by an increase in private savings. A successful fiscal adjustment and a durable decline in inflation within the BCU's target range could therefore bring the RNIR more in line with global trends.

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[3] The inflation risk premium reflects the additional return required by savers to compensate for the risk of uncertain future inflation.

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INCREASED SOCIAL INCLUSION—THE ROLE OF GOVERNMENT POLICIES[1]

This chapter analyzes the lowering of the Gini coefficient in Uruguay during the last six years. Social policies and transfers have played a significant role in reducing poverty and inequality. While income dispersion has decreased across Latin America over the last decade, Uruguay stands out as the country with the largest drop in the Gini coefficient between 2009 and 2014, and to the lowest level. This reflects both government guidelines to bolster low wages, and increased redistribution through income taxes and transfers. However, looking ahead, the positive effects of further redistributive policies may be weighed against their fiscal costs and by a possible trade-off between income compression and incentives for labor supply and education and training. Work incentives among women can be strengthened further via reforms of parental leave, to reduce the remaining gender wage gap, and would diminish future pressures on public finances due to population ageing.

A. Introduction

1. According to recent IMF studies[2], lower income net inequality is robustly correlated with faster and more durable economic growth. Up to a certain point[3], it increases the potential growth rate which is especially important given the long term challenges of an ageing population[4]. The main arguments behind these positive effects are that inequality can undermine progress in health and education, and cause investment-reducing political instability and economic instability. It can also undercut the social consensus required to adjust in the face of shocks. A higher potential output would also imply less pressure on public finances in the future, by increasing public income and dampening public expenditures.

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[1] Prepared by Bengt Petersson.

[2] "Redistribution, Inequality and Growth", IMF Staff Discussion Note, February 2014, and "Causes and Consequences of Income Inequality: A Global Perspective", IMF Staff Discussion Note, June 2015.

[3] Grigoli et al. (2016) show that the positive effects on growth from lowering the Gini coefficient are significant in the Middle East and Central Asia, the Western Hemisphere, and across emerging markets in general (regions characterized by high initial income inequality).

[4] See: OECD (2014).

2.   There has been a downward trend in the Gini coefficient across countries in Latin America during the 2000s. This decline was to a large extent due to high economic growth that lifted low-income earners wages[5], in many cases due to increased demand for low skilled workers during the commodity price boom[6]. For Uruguay as well, our calculations confirm that inequality has dropped since 2007, and especially since 2009 (see text chart)—based on microdata from the annual household survey. An important question is then: what are the main forces behind the decrease in the Gini coefficient in Uruguay? How much have government policies contributed?

Household Net Per Capita Gini
(From 0 to 1)

Legend: SEDLAC/World Bank, INE, IMF, LAC6
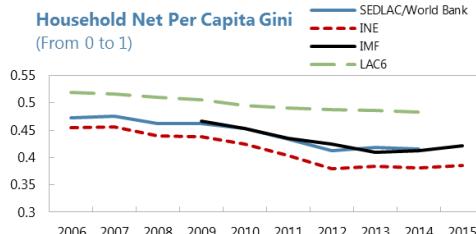
Source: SEDLAC/World Bank, Instituto Nacional de Estadística Uruguay (INE) and Fund staff calculations using data from yearly houshold survey data from "Encuesta Continua De Hogares, INE.
1) The difference between the level of Gini coefficient between the calculations done by SEDLAC/World Bank/IMF and INE (of Uruguay is mainly explained by adjustments by including the FONASA health care system in the latter example. This incorporation lowers the Gini coefficient.
2) The average of LAC6 countries (Argentina, Brazil, Chile, Colombia, Mexico and Peru) includes data inter- and extrapollations due to data qaps.

3.   Social welfare policies have long played an important role in Uruguay, and government involvement has intensified during the last six years. Uruguay has been described as South America's "first welfare state" as a result of its pioneering efforts in public education, health care, and social security. During the last six years the government has aimed to lower poverty and income inequalities further. The triparty wage negotiation policy[7] has, among other things, focused on increasing wages among low income earners, and there has also been an increase in government transfers to households as well as in income taxes for high-income earners.

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[5] See Azevedo, Inchaust and Sanfelice, (2013).

[6] See Gasparini et al (2011).

[7] The tripartite wage setting is a process between employers, trade unions and the government, and guided by official government guidelines.

Box 1. Two Approaches to Calculating Contributions to Changes in Income Inequality

This paper applies two alternative methods for determining the magnitudes of the factors behind the overall change in the Gini coefficient between two years:

A.) One fairly simple model is to start with the Gini coefficient based on gross market income (the sum of gross labor and gross capital income), and then to recalculate the Gini coefficient after incorporating, one by one, income taxes, social contributions, public transfers etc. For each consecutive step, the difference between these—before and after—coefficients can be viewed as the contribution from the additional variable for a specific year. The contribution effect can also be compared between years in order to evaluate changes in the redistributive effect. However, with this simple approach, the results can be dependent on the sequencing of the added variables.[1]

B.) An alternative approach is to apply a number of different paths for sequencing the additional variable, and take the average result. In the calculations using this approach in this paper, the average of 720 paths are used. This approach only calculates the contribution from different income sources and taxes between two years.

In this study, both methods are used, as the first one can be easier to follow and evaluate, and the second is more robust.

It has to be underlined that these results should be interpreted with some caution. They only include static effects, not dynamic effects, for instance that the need for public transfers might be smaller when economic growth is high, or that different instruments can have different impacts on labor market functioning.

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[1] See Essama-Nssah (2012), Fortin et al (2011) and Ferreira (2010).

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4.   More compressed labor income was the main factor behind the lower Gini coefficient in 2015 compared with 2009. The decline in the Gini coefficient amounted to about 5 percentage points for both the overall household net per capita income Gini and the "market per capita income" Gini, which indicates that pre-tax gross income played a significant role. This is also confirmed by the results of the calculations of the contributions to the lower Gini coefficient using the robust approach model B (see Box 1; and see text chart). According to this model, more compressed gross labor income actually contributed more (120 percent) than the measured change in the net per capita Gini coefficient. Accordingly, a clearly lower dispersion in gross market income appears to have been the

Contributions to Lower Household Net Per Capita Gini between 2009 and 2015
(Percentage of total change, negative numbers are decreasing effects)
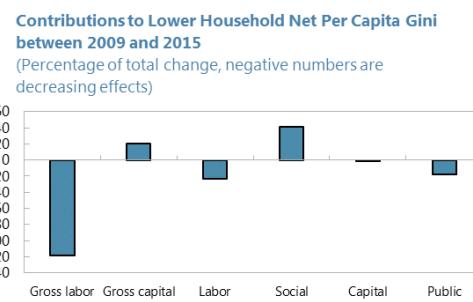
Source: Fund staff calculations using adecomp. adecomp implements the shapley decomposition of changes in a welfare indicator as proposed by Azevedo, Sanfelicce and Minh (2012). Following Barros et al (2006), this method takes advantage of the additivity property of a welfare aggregate to construct a counterfactual unconditional distribution of the welfare aggregate by changing each component at a time to calculate their contribution to the observed changes in poverty and inequality. Azevedo, Joao Pedro, Viviane Sanfelice and Minh Cong Nguyen (2012) Shapley Decomposition by Components of a Welfare Measure. World Bank. (mimeo).
Data from Instituto Nacional de Estadistica Uruguay (INE).

main driving factor.[8] Incomes policy seems to have played a major role in this. The government determines a national minimum wage, which sets a floor for the tripartite wage negotiation process. This national minimum wage increased by 40 percent in real terms during 2009–2015. In addition, the wage guidelines prepared by the authorities for the current wage round proposes a faster-than-average increase for wages at the lower end of the distribution. In this context, that data also show that hourly incomes for low-skilled labor[9] increased by almost 35 percent in real terms during 2009–2015, for medium-skilled labor by around 20 percent, but were more or less unchanged for high-skilled labor. The proportion of women and men earning less than the minimum wage decreased between 2009 and 2015 (from around 8 percent to around 5 percent). Interestingly, the number of low skilled workers appears to have decreased significantly between 2009 and 2015 with increased high skilled labor[10].

5.   **Redistribution through taxes and transfers on balance has had a minor effect in promoting equality.** According to the simple approach (model A, see Box 1.) labor-income taxes decreased the Gini coefficient by a little more than 1.5 percentage points in 2015 (see text chart)—a larger impact than in 2009. In particular, the inclusion of a seventh labor income tax bracket at 30 percent in 2013 (previously, the highest was a sixth bracket at 25 percent) for high income earners has contributed to lower net income dispersion. The contribution to the lower Gini coefficient between 2009 and 2015 from higher labor-income taxes is also confirmed in the robust model (see the text chart

Redistributional Effects On Household Net Per Capita Gini
(Percentage points, negative numbers are decreasing effects)
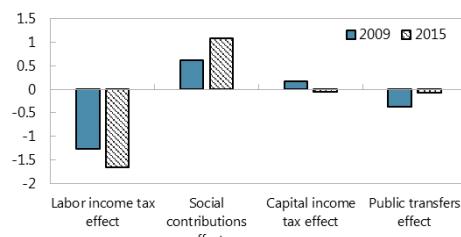
Source: Fund staff calculations using data from the yearly household survey data base "Encuesta Continua De Hogares, INE.
Note: Public transfers include unemployment benefits, benefits for sick leave, maternity leave, housing allowances, debit cards from the family allowance program (AFAM) and pensions.

with paragraph 4). Payments for social contributions, on the other hand, contributed to widen the Gini coefficient, especially in 2015 (again, confirmed by the earlier chart for the robust model). In particular, there is an income-based cap on social contributions, and the share of high-skilled labor (with higher incomes) increased between these years. Government transfers[11] also contributed to lower the Gini coefficient. They increased by almost 30 percent in real terms between the years examined, which contributed to lift income among the most vulnerable in society, although the effect on the Gini coefficient was fairly small.

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[8] According to Ministry of Labor and Social Security (2014), the real adjustment for each year in 2012-2015 was higher the lower the income level was, a trend that was already observed in 2010–2011. Moreover, in the latest wage negotiation round, increases in wages are again clearly higher for the lowest income earners than for those with higher incomes.

[9] Low-skilled labor is here defined as less than 9 years of education, medium-skilled as between 9 and 13 years and high-skilled as 14 years or longer. Average per hour labor income was in 2015 slightly below US$4.

[10] According to our calculations, using the yearly household surveys for these two years, the number of low-skilled workers decreased by more than 20 percent, but increased by almost as much for high-skilled labor. However, we found no evidence explaining to what extent this transformation is due to higher demand for high-skilled labor versus increased supply.

[11] These include unemployment benefits, benefits for sick leave, maternity leave, housing allowances, debit cards from the family allowance program (AFAM), and pensions.

6.   As in other Latin American countries there has for decades been an increase in female labor force participation in Uruguay. It increased from around 45 percent in 1990 to about 55 percent today. During the economic slowdown since 2014, female employment and participation rates remained stable, while these rates fell for men. The share of highly-educated women in the labor force is particularly high.

Labor Force Participation Ratio
(Percent of total)

Sources: INE and Fund staff calculations.

7.   Similar to other countries, there still exist a gender wage gap, however. Men are better paid than women at almost all education levels, although the gap has declined since 2009. The gender gap as the ratio of female to male wages, is low for the very lowest skilled workers with an education of up to 5 years, but increases thereafter at higher education levels. For low and medium skill levels, men earn about 20 percent more per hour. However, in 2015 the per hour gender wage gap had decreased significantly for high-skilled labor and was actually close to zero[12]. In particular, per hour wages for women in 2015 were close to those

Male and Female Wages
(In pesos and years of education)

Sources: Fund staff calculations using data from the yearly household survey data base "Encuesta Continua De Hogares, INE.

for men for those with 14 to 21 years of education (see text chart). Beyond that, the gap increases again, but the number of people with education of 22 years or above is small and contributes little to overall wage levels. The contribution of women to Uruguay's overall household net per-capita Gini coefficient is slightly negative, that is, it decreases the Gini coefficient[13]. This decreasing effect was around 0.4 percentage points in both years.
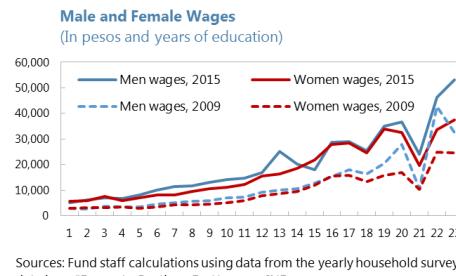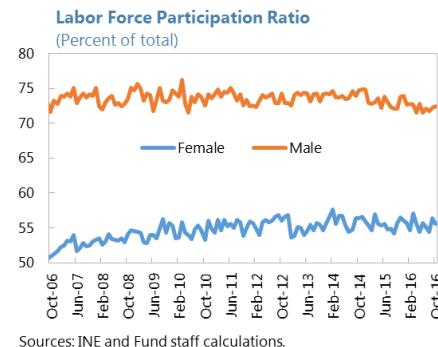
B.   Policies to Support Inclusion

8.   Policies to foster inclusive growth should remain an important part of Uruguay's policy agenda. Redistribution can be a helpful tool to reduce inequality and poverty. However, it is not a substitute for policies to bolster directly generalized skills formation, gender equality, and labor market efficiency. Indeed, the finding that recent changes in income distribution were driven by workers' primary sources of income underscores this message.

9.   There are no definite signs so far of negative incentive effects on labor supply of the government's policies that have compressed the distribution of wages. Both the employment ratio and the labor force participation rates increased between 2009 and 2015. The employment ratio increased by half of a percentage point to 59 percent and labor force participation by

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[12] The per hour wage gap for highly skilled labor decreased from 13 percent in 2009 to only 1 percent in 2015.

[13] These calculations are simply to compare the Gini coefficients with and without women. See Gonzales, Jain-Chandra, Kochhar, Newiah, and Zeinullayev (2015) for a broader analysis of the linkages between gender and overall income inequality.

0.7 percentage points to 63.8 percent. On the other hand, staff calculations based on the yearly household surveys, show a fairly large drop between 2009 and 2015 in people's willingness to add labor hours to their current hours. The percentage of men 15–63 years of age who wanted to add working hours dropped from 15 percent to 10 percent and from 12 percent to 9 percent for women. Also, the actual average work week fell from 39.5 hours to 38.5 hours, which could be a sign of some adverse impact on work incentives.

10.   Falling skill premiums could pose a risk for the willingness to develop human capital. Although dropout rates in secondary education have increased, the average number of years of education has continued to increase lately, especially among women (see text chart). Women surpassed men in terms of average years of education already in the early 1990s and this trend has continued since. However, there has been a significant decline in the income premium for more educated workers since 2010 (see text chart), especially for men, and most strongly for men with a high (compared with medium) level of education. This decline in the skills premium could be the result of the increased availability of educated workers[14], but over time it could further reduce the incentives for men to improve their skills.

11.   Policies should also focus on improving efficiency in secondary education. Uruguay has a higher teacher-to-student ratio than other comparable Latin American countries, but just marginally higher PISA-studies results (see text chart), following some improvement in 2015. A further challenge is the improvement of the coverage and quality of vocational training[15].

12.   Policies to further increase female labor force participation could limit the economic challenges of an ageing population. Boosting female labor participation would help offset the future

Average Education
(Years)
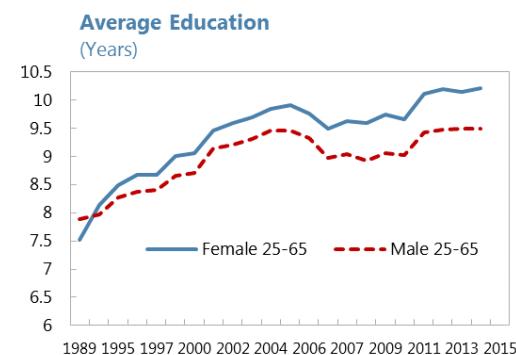
Sources: Socio-Economic Database for Latin America and the Caribbean (CEDLAS and The World Bank).
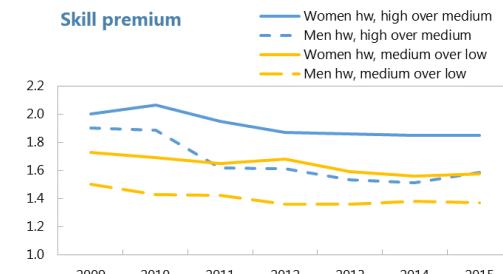
Skill premium

Sources: Fund staff calculations using data from the yearly household survey data base "Encuesta Continua De Hogares, INE.

Teachers and Outcome, Secondary Education, Latest Value Available
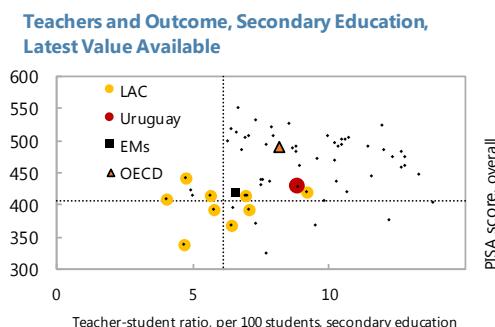
Source: IMF FAD Expenditure Assessment Tool (EAT); OECD, Pisa 2015 database and World Bank WDI database.

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[14] The number of male labor with high education increased by around 20 percent. For women the increase was around 15 percent.

[15] See OECD (2014).

drop in labor supply due to population ageing[16] and address the need to further increase skills-intensive labor supply[17]. Currently, the participation gap is still as high as 17 percentage points. In particular, the proportion of young women neither employed nor studying is high[18]. Policies are already in place to encourage women to work, including affordable child care for low-income households. Although the percentage of families that use child-care facilities is fairly low compared to OECD countries, it is far higher than many other countries in Latin America. Furthermore, the government has proposed to further enhance affordable child care in the coming years. As an additional step, parental leave could be enhanced further. In particular, the length of maternity leave could be increased from todays' twelve weeks, paid paternity leave could be extended, and "daddy months" could be introduced to facilitate womens' efforts to combine their careers with taking care of their children in a more balanced way. It could also decrease the gender wage gap[19], which would further strengthen womens' incentives to enter the labor market.

C.   Conclusions

13.   Uruguay has a long history of social welfare policies, and reforms have sought to raise people out of poverty and to lower inequality. Wage policies, increased transfers, and the labor-income tax for high wage earners have contributed to this. Greater social inclusion can increase the potential for economic growth. However, looking forward, further measures to increase social conclusion have to be assessed and weighed against their potential impact on incentives to develop skills and seek work. In addition, education reform could enhance the system's efficiency. In light of the long-term challenges of an ageing population, female labor force participation could be further encouraged.

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[16] Uruguay has a rapidly ageing population with shares similar to European and North American countries, see OECD (2014).

[17] See OECD (2014).

[18] 61 percent according to OECD (2014).

[19] See Johansson, Elly-Ann, "The Effect of Own and Spousal Parental Leave on Earnings" (2010), Institute of Evaluation of Labour Market and Education Policy, Sweden, Working Paper 2010:4.

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THE CHALLENGES OF POPULATION AGING FOR PENSIONS IN URUGUAY[1]

This paper investigates the long term fiscal gaps from higher pension spending as Uruguay's population is aging. It quantifies the expected increase in public pension spending for the defined-benefit and solidarity pillars of Uruguay's mixed system, and projects theoretical replacement rates considering both defined-benefit and defined-contribution pensions.

A.   Motivation

1.   Uruguay's population is rapidly aging. Uruguay has one the highest proportions of elderly citizens in Latin America. Fourteen percent of the population is currently over 64 and this share is expected to increase to about 22 percent by 2050 and 31 percent by 2100, as fertility continues to decline and life expectancy increases. The median age is projected to rise from 35 currently to 42 in 2050 and 49 in 2100. According to UN projections, Uruguay's population would start declining as soon as in 2055.

Figure 1. Uruguay: Age-Distribution of the Population

Uruguay, 2015
Total population: 3.4 million

Uruguay, 2100
Total population: 3.3 million

Source: UN, World Population Prospects.
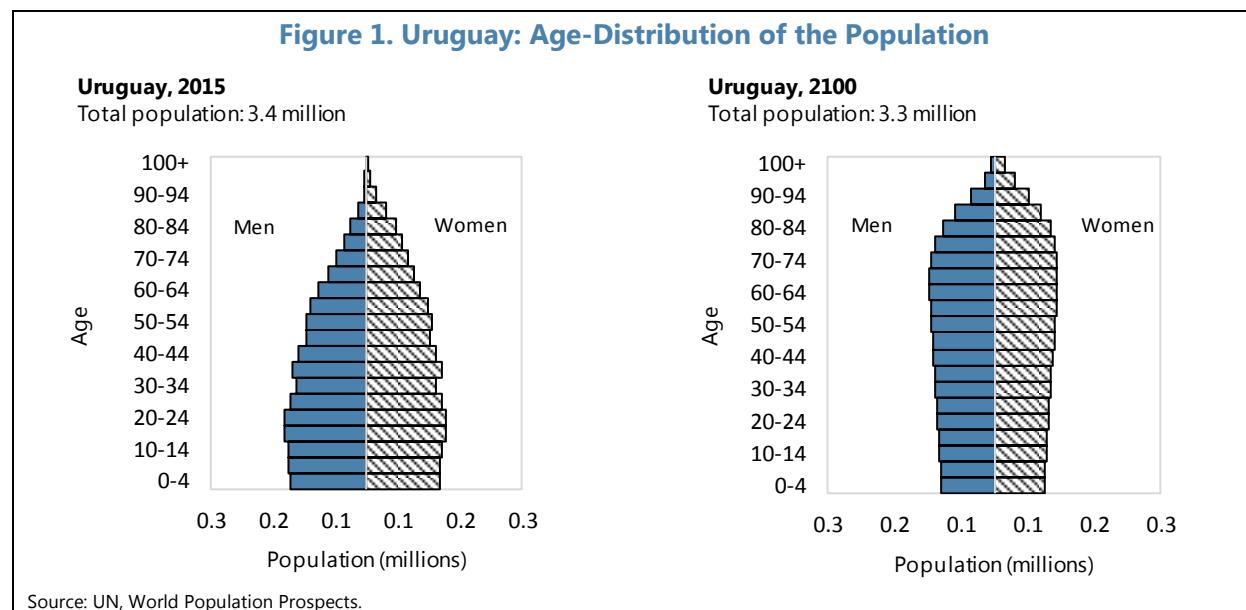
2.   These demographic changes will directly affect long term fiscal sustainability by putting pressure on the pension system. The old-age dependency ratio, defined as the population aged 60 and above over the working-age population, is expected to grow from less than 33 percent in 2015 to 50 percent in 2050, and close to 77 percent in 2100. This increase will put pressure on the

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[1] Prepared by Frederic Lambert.

financial equilibrium of the pension system whose financing mostly relies on contributions or taxes paid by workers, while expenditures benefit elderly people.

B. Uruguay's Pension System

3.   The Uruguayan pension system has evolved from a "pure" pay-as-you-go system to a mixed system. The Uruguayan pension system is one of the oldest in Latin America. The very first pension system, for veterans of the independence war and widows, was created in 1829. The early, fragmented, pension systems were progressively unified and extended to cover all public and private sector employees. Since 1989, the Constitution provides that pension benefits shall be indexed to the median wage. In 1996, the system was reorganized into a mixed system including a pay-as-you-go (PAYG), defined-benefit component and an individually-funded, defined-contribution component (Law 16.713). The PAYG pillar is administered by the Banco de Previsión Social (BPS) for most contributors. In addition, there exist five separate systems for banking sector employees, university professionals, public notaries, the military and the police. The second pillar is managed by private pension fund administrators (AFAPs) under the supervision of the central bank. Above a certain income threshold, workers can voluntary contribute additional savings. The system also includes a noncontributory elderly and disability pension program.

	Sources of funds	Qualifying conditions	Benefits	Coverage	Administration
Table 1. Uruguay: Structure of the Pension System					
0 pillar (solidarity pillar)	Transfers from the government.	Adults over 65 and low-income disabled individuals not eligible to the contributory system	Minimum elderly and disability pension	About 7 percent of the population above 65 years old (in 2014)	BPS
1st pillar (defined benefit, PAYG)	Employers' contributions (7.5% of earnings – general scheme), workers' contributions (a share of their total contribution of 15% of earnings, up to a ceiling), earmarked taxes (7 percentage points of VAT and Social Security Assistance Tax), and government transfers	Common retirement: 60 years of age and 30 years of contributions Old-age retirement (if not eligible for common retirement): 65 years and 25 years of contributions, up to 70 years of age and 15 years of contributions	Retirement benefits: common retirement, old-age and complete-disability Pension benefits: survivors' pension, temporary partial-disability benefit, funerary grant	Contributors (BPS only): 80 percent of the economically active population Beneficiaries (BPS only): 84 percent of the population above 65 years old	BPS for most contributors. Special funds for banking sector employees, university professionals, public notaries, the military and the police
2nd pillar (mandatory, defined contribution, individually funded)	Workers contributions (the remainder of workers' total contributions)	Same as for pillar 1 (common retirement)	Common retirement, old-age, complete-disability and temporary partial disability benefit. Survivors' pension	About 53 percent of contributors to pillar 1	AFAPs (Sura, Integration, Republica and Union Capital)

4.   Workers' contributions only partially finance the system. The first pillar of the system (PAYG) is funded by a combination of employers and workers' contributions, earmarked taxes, and transfers from the government to cover recurring funding gaps. Uruguay's active coverage (measured by the ratio of contributors to the economically active population) at 77 percent, is very high among Latin American countries and has been rising over the past ten years as informal employment has declined.

5.   Contributions are split between the defined-benefit and defined-contribution pillars. Under the general contribution scheme, employers' contributions (7.5 percent of wages) exclusively finance the PAYG pillar. There exist four alternative contribution schemes for the construction sector, rural enterprises, household employees, and "subsidized services" (workers exposed to radiations, asbestos workers, pilots, etc.). Workers' contributions (15 percent of wages) are split between the PAYG and the defined-contribution system, with shares that depend on the wage level. There are four salary brackets.

- For monthly wages under 5,000 pesos in 1995 (39,871 pesos in 2015—bracket 1), 100 percent of the workers' contribution goes by default to the BPS, but article 8 of Law 16.713 allows workers

to voluntary choose to direct 50 percent of this contribution to the individually funded system (AFAPs). Workers choosing to do so get a subsidy equivalent to 50 percent of their contributions to the BPS (i.e. the base for the computation of their pension from the PAYG pillar is increased by 50 percent).[2]

- For wages between 5,000 and 7,500 pesos in 1995 (39,871 and 59,806 pesos, respectively, in 2015—bracket 2), workers contribute to the BPS for the first 5,000 pesos, and to the individually funded system for the remainder. Alternatively, they can also increase their contributions to the individually funded system by directing 50 percent of their contribution on the first 5,000 pesos of wages to the AFAPs and the remainder to the BPS.

- For wages above 7,500 pesos (59,806 pesos in 2015—brackets 3 and 4), contributions are made to the BPS for the first 5,000 pesos, and to the individually funded system for the remainder.

- No pension contributions are required for the portion of compensation exceeding 15,000 pesos (119,612 pesos in 2015 – bracket 4), but workers can voluntary contribute to the AFAPs.

Law 19.162, passed in 2014, allowed certain BPS affiliates in the first and second bracket to revoke their participation in the individually funded system, in which case the AFAPs have to transfer the accumulated contributions to the BPS. The special regimes for banking sector employees, university professionals, public notaries, the military and the police have their own funding rules.

Figure 2. Uruguay: Distribution of Workers' Pension Contribution, by Income Bracket
(2014 values, in peso)

Source: BPS based on a graph by Republica AFAP.
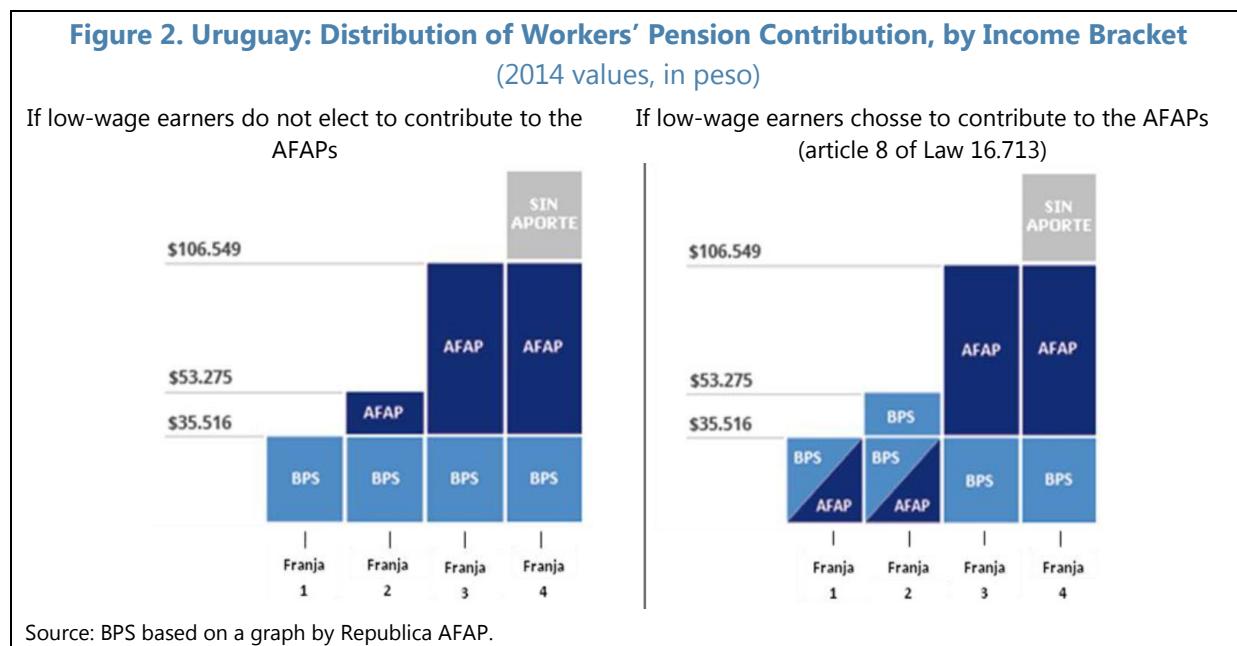
6.   **Benefits include contributory benefits and non-contributory solidarity pensions.**
Pension benefits are paid by the BPS for the PAYG pillar, by the insurance company (Banco de

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[2] This subsidy is offered considering that the PAYG system is partly government funded.

Seguros del Estado) for the defined contribution pillar (out of the accumulated individual saving transferred by the AFAPs), and by the respective special funds for the five special regimes:

- The **common retirement pension** is paid to workers aged 60 or above, cumulating at least 30 years of contributions. For the PAYG pillar, the replacement rate is equal to 45 percent plus one percent for each year worked above 30 years of employment up to 35 years, 0.5 percent for each year after 35 years with a maximum of 2.5 percent, and 3 percent for each year of work after 60 years old and 35 years of employment with a maximum of 30 percent, or 2 percent for each year of work after 60 until age 70 or until reaching 35 years of work whichever comes first. The base for the calculation is the average wage over the last 10 years of employment or the average wage over the best 20 years of earnings if higher, with a maximum equal to the average of the best 20 years plus 5 percent ("basic pensionable salary" or sueldo basico jubilatorio). Under the mixed system, the monthly pension paid by the BPS is capped at a maximum of 36,143 pesos in 2016.

- The **old-age pension** can be paid to workers (who do not qualify for the common retirement pension) aged 65 and above, with 25 years of contributions. Its amount under the PAYG pillar is equal to 50 percent of the basic pensionable salary plus one percent for each year of employment exceeding the required minimum number of years of service (25 years at age 65, 23 years at age 66, 21 years at age 67, 19 years at age 68, 17 years at age 69, and 15 years at age 70), with a maximum of 14 percent.

- **Complete-disability and temporary disability pensions** are equal to 65 percent of the basic pensionable salary.

- Individuals above 65 and disabled individuals whose resources fall below some minimum **are entitled to receiving a non-contributory pension (the solidarity pillar).** The minimum pension guaranteed by the non-contributory system amounts to 8,452 pesos in January 2016.

- There are no guaranteed benefits for the individually funded pillar.

7.   Passive coverage is very high, in absolute terms and also relative to other countries in the region. The proportion of people aged 65 and above who receive a pension exceeds 90 percent (BPS only) which places Uruguay in the top two countries in the region for passive coverage. About 7 percent of the population above 65 is covered by the noncontributory system (pillar 0).

Figure 3. Uruguay: Active and Passive Pension Coverage

Sources: BPS, IDB, INE, and staff calculations.
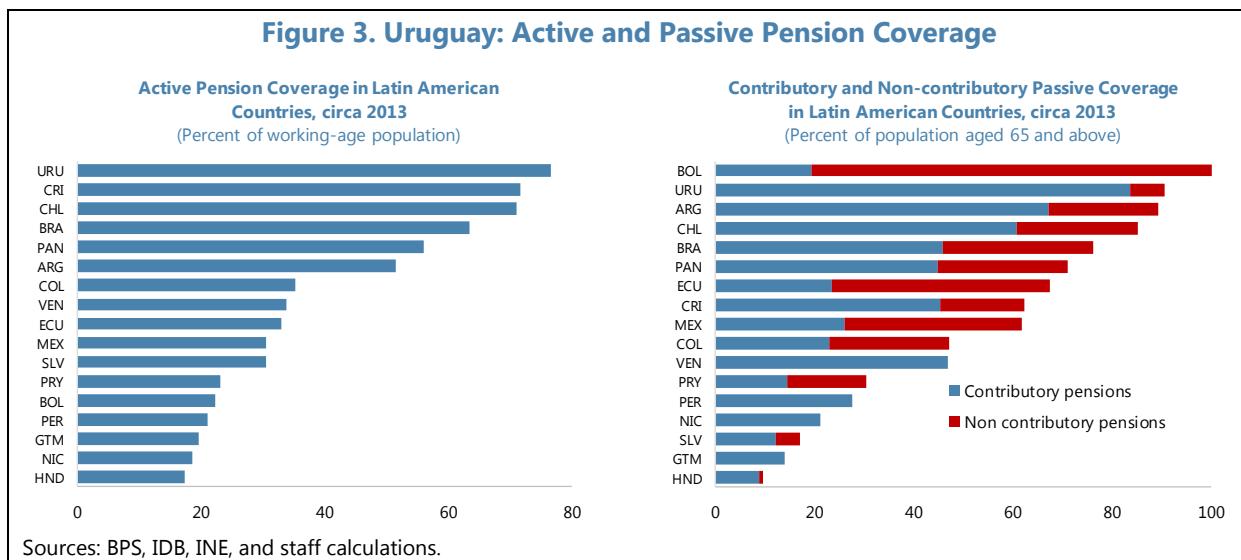
C.   Long-Term Fiscal Sustainability

8.   Public pension expenditures as a share of GDP are higher in Uruguay than in other emerging and Latin American countries in 2015. Expenditures for the solidarity pillar and PAYG pillar represented respectively around 0.5 and 7.4 percent of GDP in 2015, while expenditures for the five special regimes together are estimated around 3.1 percent of GDP. In comparison, average public pension spending was equal to 3.6 percent of GDP in the Latin American region and 4.5 percent in all emerging economies.[3] The higher old-age dependency ratio and passive coverage can explain this difference.

9.   Pension expenditures for the solidarity and PAYG pillars as a share of GDP are projected to increase by about 30 percent by 2065. Public pension expenditures for the two solidarity and contributory pillars administered by BPS are projected to slightly decline until 2030 along with the cost of the transition system, before increasing again through 2100.[4] According to

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[3] The Latin American region includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

[4] Law 16.173 creating the mixed system allowed BPS affiliates older than 40 years on April 1st, 1996, to remain in the old "transition" system. In contrast to pensions in the mixed system, pensions paid by BPS in the transition regime are not capped (since workers contribute based on 100 percent of their wages), so pension expenditures are higher.

Projections for both contributory and non-contributory systems until 2060 are from BPS (2015). They are extended up to 2100 using the following pension identity (Clements and others, 2013), assuming constant elderly coverage, employment and replacement ratios, and compensation share of GDP:

$$\frac{PE}{GDP} = \underbrace{\frac{population\ 60+}{population\ 15-60}}_{\text{Old-age dependency ratio}} \cdot \underbrace{\frac{pensioners}{population\ 60+}}_{\text{Elderly coverage ratio}} \cdot \underbrace{\frac{average\ pension}{average\ wage}}_{\text{Replacement rate}} \cdot \underbrace{\frac{population\ 15-60}{workers}}_{\text{Inverse employment ratio}} \cdot \underbrace{\frac{labor\ income}{GDP}}_{\text{Labor share of GDP}}$$

where *PE/GDP* denotes the ratio of pension spending to GDP, *population 60+* is the population aged 60 years or older, and *population 15 − 60* is the population between ages of 15 and 60.

those projections, pension expenditures could reach 10.3 percent in 2065 and 12.9 percent of GDP in 2100. Similarly, the fiscal gap stemming from the difference between projected expenditures and revenues is projected to slightly decrease, remaining around 0.7 percent of GDP by 2030, before resuming a steady ascent and climbing up to 6.2 percent by 2100.


Figure 4. Uruguay: Public Pension Spending Projections

Measure of pension imbalances
(excl. special regimes, in percent of GDP)

	2015	2030	2065	2100
Total pension expenditures	7.9	7.5	10.3	12.9
Non-contributory benefits	0.5	0.5	1.1	-
Contributory benefits	7.4	7.0	9.2	-
Pension revenues[1]	7.6	6.8	6.7	6.7
Pension deficit	0.7	0.7	3.6	6.2
PDV of cumulated spending increases/2015 GDP	-	-4.7	12.3	80.1
PDV of cumulated pension deficits/2015 GDP	-	10.1	57.1	146.8

[1] Includes pension contributions and a portion of BPS-earmarked taxes (authorities' projections until 2065).

Public Pension Spending (Percent of GDP)
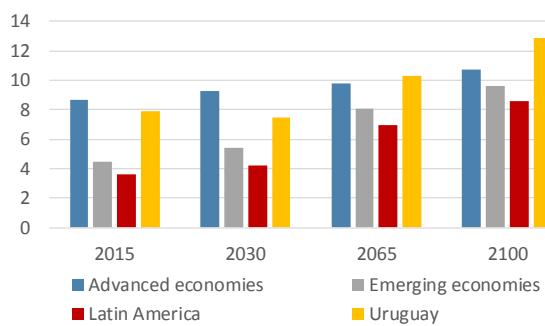
Present Discounted Value of Spending Increases
(Percent of 2015 GDP)
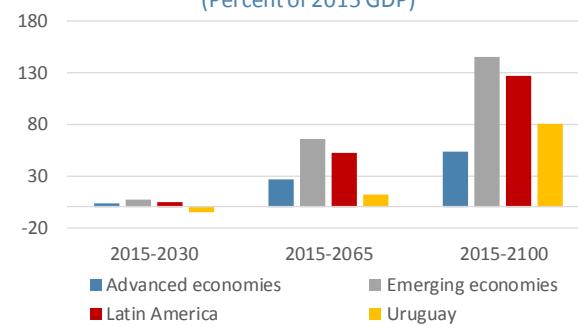
Sources: BPS and IMF staff calculations.

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10.   Public pension spending in Uruguay as a share of GDP would exceed that of advanced economies by 2065. The present discounted value of public pension spending increases over the period 2015–65 amounts to 12 percent of 2015 GDP, below the levels estimated for other emerging and advanced economies. This value however increases to 80 percent until 2100.[5] It does not include pension spending by special regimes, for the police and armed forces in particular.

D.   Adequacy of Pensions

11.   There can be a trade-off between fiscal sustainability and adequacy. The 1996 reform introducing an individually funded component accounts for the limited spending increase projected

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[5] The present discounted value of spending increases gives a sense of how much these increases could add to public debt in the absence of reform. In contrast to the present discounted value of future deficits, it does not require any explicit assumption about the path for revenues, which facilitates cross-country comparisons. The computation assumes an interest-growth differential of 1 percent, as in Clements and others (2015).

in the next 50 years. However, this may come at the cost of lower pension benefits, if for instance, contributions to the defined-contribution pillar are insufficient or rates of return too low.

12.   To assess the risk of inadequate pensions, we project theoretical replacement rates until 2100. The projection is done separately for men and women since life expectancy varies by gender. Individuals are assumed to start working at age 20 and to retire at age 60. The baseline projection conservatively assumes a contribution density of 75 percent, that is working-age individuals are assumed to contribute three years out of four to the pension system (and to be unemployed, outside the labor force or to work outside the formal sector during the fourth year). The model assumes that workers have perfect foresight and optimally choose whether to contribute or not to the defined-contribution pillar when they have the choice (wage-earners in brackets 1 and 2 in Figure 2). The projection is done in five steps:

- The average wage life-cycle profile is projected for each year of the projection period (2015–2100). For simplicity, a flat profile is assumed. Future real wage growth is set equal to 2 percent per year.

- Based on the wage profile and contribution rate, pension contributions by age are computed for each year.

- The value of individual retirement accounts at the legal retirement age is computed by cumulating pension contributions over time, assuming a 3.5 percent real rate of return.

  The value of the pension received at retirement is computed by applying the replacement rates guaranteed by the PAYG pillar to the contributing wage (possibly increased by the subsidy for wage-earners in bracket 1 having chosen to contribute to the defined-contribution pillar) and

  using a standard annuity formula for the pension paid by the defined-contribution pillar.[6]

- Theoretical replacements rates are computed by relating the total pension received at the legal retirement age to the last wage before retirement.

[6] The value of the annuity payment for an individual retiring at age *j* at time *t* is given by:

$$Annuity\ payment_{t,j} = V_{t-1}.(1-c).\frac{(r_t - index_t)}{\left(1 - \left(\left(1 + index_t\right)\Big/(1 + r_t)\right)^{le_j}\right)}$$

where V_{t-1} denotes the value of the individual retirement account at time *t-1*, c is the annuity cost (administrative cost), r_t is the nominal rate of return, $index_t$ is the rate of pension indexation/revaluation (median wage growth), and le_j is the life expectancy at age *j*.

**13.** **The projected theoretical replacement rates for the average wage-earner with a 75 percent contribution density stem solely from the PAYG pillar.** The reason is that these workers would prefer not to voluntary contribute to the defined-contribution pillar. The average wage in Uruguay (estimated at 23,141 pesos in 2014) falls in the lowest income bracket for the determination of the contribution to the defined-contribution pillar (Figure 2). The calculations, based on the above assumptions, suggest the average-wage earner would be better off solely contributing to the PAYG pillar, offering a replacement rate of 47 percent in 2030. However, average wage-earners with a full career (contribution density of 100 percent) would theoretically get higher replacement rates, of 56 percent in 2030 and 55 percent in 2065, by contributing to the defined-contribution pillar and taking advantage of the public subsidy on their contributions to the PAYG pillar.

Figure 5. Uruguay: Theoretical Replacement Rates by Source, by Contribution Density
(Percent of Last Wage)
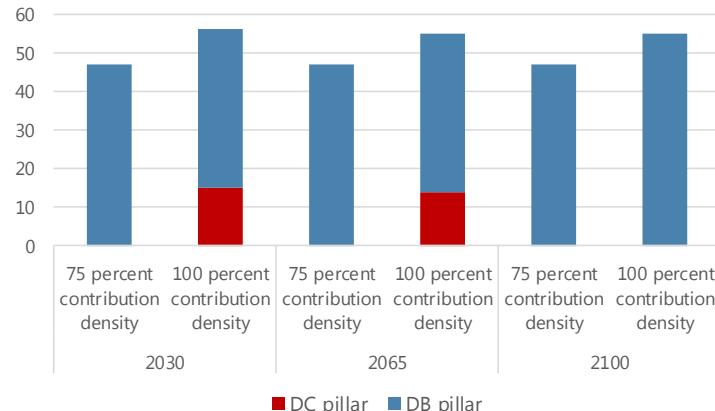
Source: IMF staff estimation.

14. **Replacements rates in 2065 and 2100 would exceed those in other countries in the region with defined-contribution or mixed systems.** Projected theoretical replacement rates for 2030 are lower than the current average replacement rate in OECD countries, excluding Chile and Mexico, and the average replacement rate projected in other Latin American countries with defined-contribution or mixed systems.[7] However, the latter is projected to decline over time, as in these countries the contribution of defined-benefit systems and solidarity pillars to projected replacement rates declines over time.

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[7] Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Mexico, Panama, and Peru.

Figure 6. Uruguay: Pension Replacement Rates, International Comparisons

Source: OECD, IMF staff calculations.
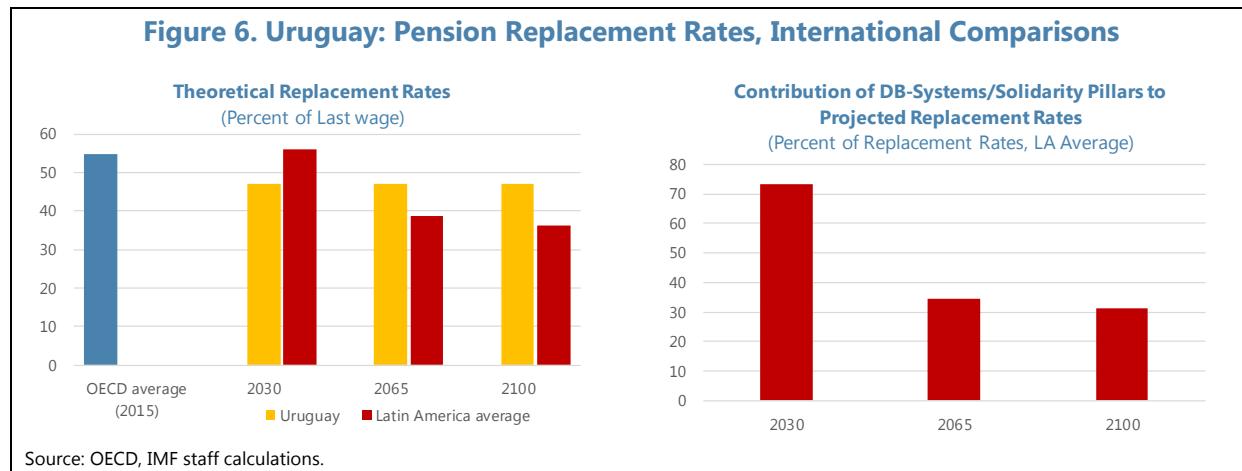
E. Policy Discussion

15.   Future reforms will need to address the growing fiscal expenditures required to maintain constant replacement rates. The above projected theoretical replacement rates for Uruguay are well below past replacement rates, that prevailed in the old single PAYG system. In 2010, the OECD estimated the median net replacement rate at 66.3 percent. For contributors to the defined-contribution pillar, the adequacy of future pension benefits will increasingly depend on the rate of return on individual pension savings accounts (sensitivity analysis not presented).

16.   However, overall contribution rates are high compared to other countries in the region and do not leave much scope for an increase. The total contribution rate, combining both workers and employers' contribution, reaches 22.5 percent in Uruguay against 13.6 percent on average in other Latin American countries (Table 2).

17.   Increasing the retirement age to 65 could be an option to improve both fiscal sustainability and adequacy. The legal retirement age is still relatively low in Uruguay and typically well below that of advanced economies facing similar aging challenges. Simulations suggest that a gradual increase in the retirement age to 65, along with the corresponding change in the computation of benefits, would prevent pension spending from the PAYG pillar from increasing above their current level at least until 2065. An increase in the retirement age would also lead to an increase in the individual savings accounts, since workers would contribute for more years, as well as in the annuity paid to retirees as it would in addition partly compensate the increase in life expectancy at retirement. Theoretical replacement rates would therefore also increase.

Table 2. Uruguay: Pension Systems in Latin America

Country	Contributory system	Pensionable Age	Vesting Period	Contribution Rates 1/	
				Total	Employer
Argentina	DB	65 (60)	30	21.2	10.2
Bolivia	DB/DC	58	10	15.2	3.0
Brazil	DB	65 (60)	35 (30)	28.0	20.0
Chile	DB/DC	65 (60)	20	11.2	1.2
Colombia	DB/DC	62 (57)	25	16.0	12.0
Costa Rica	DB/DC	65	25	12.2	8.3
Dominican Republic	DC	60	30	10.0	7.1
Ecuador	DB	-	30	10.7	1.1
El Salvador	DC	60 (55)	25	13.5	7.3
Guatemala	DB	60	20	5.5	3.7
Honduras	DB	65 (60)	15	6.0	3.5
Mexico	DB/DC	65	24	8.7	6.9
Nicaragua	DB	60	15	13.0	9.0
Panama	DB/DC	62 (57)	20	13.5	4.3
Paraguay	DB	60	24	12.5	7.6
Peru	DB/DC	65	20	13.0	0.0
Uruguay	**DB/DC**	**60**	**30**	**22.5**	**7.5**
Venezuela	DB	60 (55)	15	13.0	9.0
Latin America Average		**61**	**22**	**13.6**	**6.8**

Notes: Values in brackets report indicators for women when different. 1/ Percent of gross payroll.

Source: USA SSA 2015; OECD; IDB; and World Bank.

Figure 7. Uruguay: Simulated Effect of Reforms

Projected PAYG Pension Expenditure, 2015-2065

PAYG Spending Levels, 2065
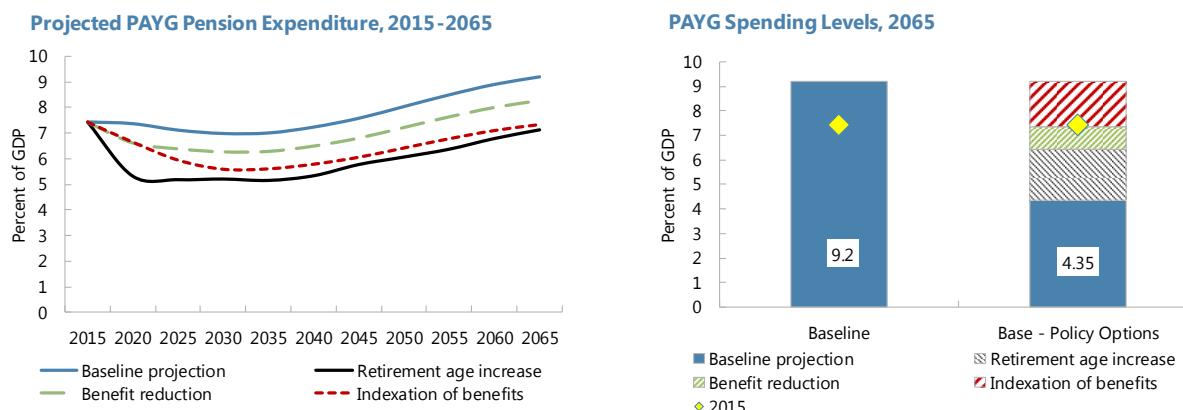
Note: Possible reforms include an increase of the legal retirement age to 65, a reduction of pension benefits by 10 percent, and an indexation of benefits on inflation.

Source: IMF staff calculations.

18.   A similar improvement in fiscal sustainability could be obtained through a change in the benefit indexation formula, from indexation to the median wage to indexation to inflation. Indexing pension benefits on inflation would also reduce the risks borne by insurance companies (currently solely the Banco de Seguros del Estado) which pay out pension annuities for the defined-contribution pillar out of accumulated savings whose nominal rate of return depends on price inflation. Such a change would, however, require a constitutional reform and would not help raise replacement rates.

19.   Addressing the deficits of some of the special regimes is also crucial for fiscal sustainability. The estimations presented in this paper did not take special regimes into account. Some of those regimes are currently running sizable deficits (e.g. military pension regime) which, if left unaddressed, would significantly add to projected fiscal challenges.

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