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ARGENTINA

SELECTED ISSUES

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HOW LARGE IS ARGENTINA'S CAPITAL ACCUMULATION GAP AND HOW CAN IT BE REDUCED? LESSONS FROM PAST INVESTMENT SURGES[1]

A. Introduction

1. **Over the last three and a half decades, Argentina's investment rate has been among the lowest among peer advanced and emerging market countries.** Investment rates (defined in this paper as gross fixed capital formation in percent of GDP) fell in the 1980s from already relatively low levels and recovered strongly in the 1990s. After rebounding rapidly from the historical lows experienced during the 2001 economic crisis, the investment rate fell again over the last decade, reflecting the deterioration of the macroeconomic environment and increasing government interventionist policies (Figure 1). As of 2015, Argentina's investment rate was well below the average of Latin American countries and that of a peer group of advanced and emerging market countries, with a larger gap in private investment (Figures 2 and 3).[2] The low investment rates may have contributed to the relative decline in Argentina's GDP per capita over the same period (Figure 4).

2. **Raising investment prospects would be essential to boost economic activity.** The administration that took office in December 2015 has emphasized the importance of generating an investor friendly environment that allows Argentina to recover some of the growth opportunities lost over the last few decades. With this in mind, the administration promptly removed exchange and capital controls, resolved its outstanding external debt disputes to regain access to international capital markets, and started the process of subsidy reform. In addition to structural reforms that foster investment (IMF, forthcoming), stabilizing the macroeconomic environment would be an important trigger for an investment rebound.

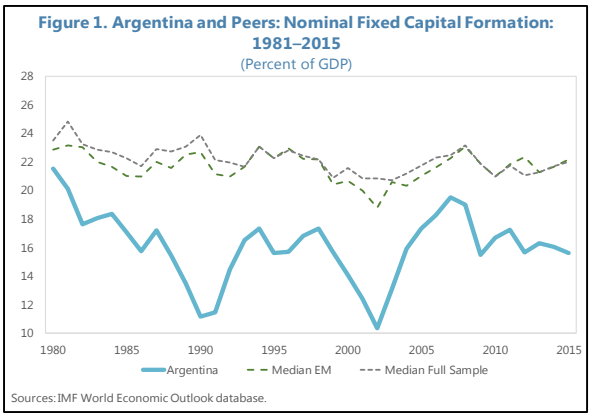
3. **In this paper we address the following questions:**

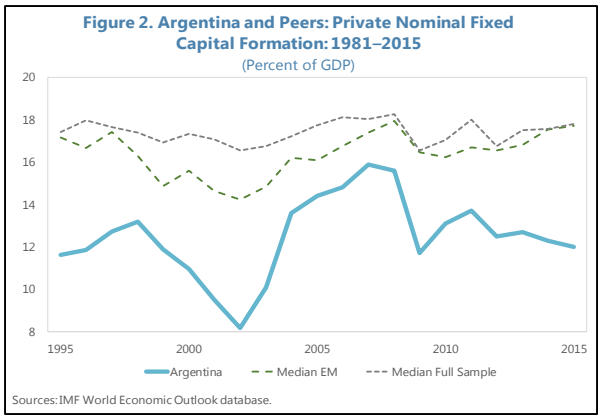
- How large is the "capital accumulation gap" from Argentina's low investment rate of the last two decades? What would be the increase in investment needed to close that gap, and how sizeable would be the boost on output?

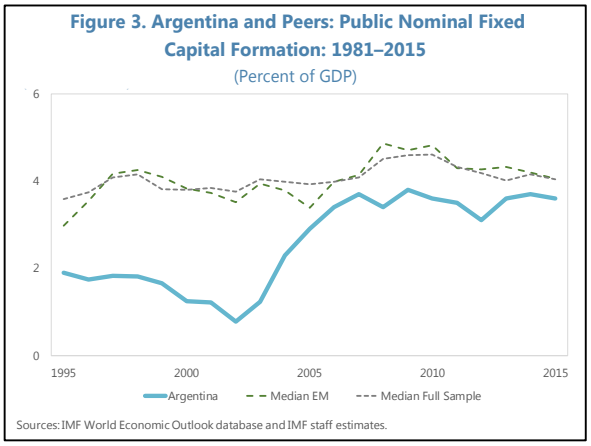
[1] Prepared by Jorge Iván Canales-Kriljenko.

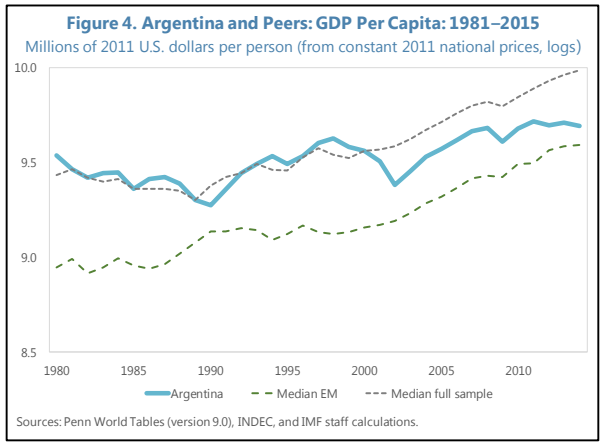
[2] To bring into the discussion the international experience, we compare developments in Argentina with those in a group of 32 other peer countries, selected to include all G-20 countries, 20 large emerging markets, all BRICS, five other large Latin American countries and peer historical development partners like Spain. All key trading partners are included. The peer group attempts to inform the evolution of developments in Argentina from countries that either face similar issues or that have higher income levels to which Argentina may aspire. The peer group includes, among advanced economies, Australia, Canada, Czech Republic, France, Germany, Israel, Italy, Japan, Korea, New Zealand, Spain, United Kingdom, and the United States, and among emerging markets, Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, Turkey, Ukraine, and Vietnam.

- What lessons can Argentina learn from episodes of significant investment surges in the past?









While quantifying the capital accumulation gap is a clearly a difficult task, one way of doing so is to look at the difference between Argentina's capital-labor ratio and that of the selected peer group of countries. We also compare Argentina's investment rates and capital-output ratios with estimates of their steady state values derived from standard neoclassical growth models. Given the uncertainty over the calibration and over estimates of capital stock in Argentina, these results would need to be interpreted as illustrative, rather than a precise numerical exercise. We then quantify the potential impact on GDP growth from the rebound of investment needed to fill these gaps, by estimating the links between output per capita and both investment and capital-labor ratios. Finally, we conduct an event analysis aimed at identifying episodes of significant and persistent investment surges in the past, and look at the conditions and policies that tended to be associated with those episodes.

4. **Our main conclusions are twofold:**

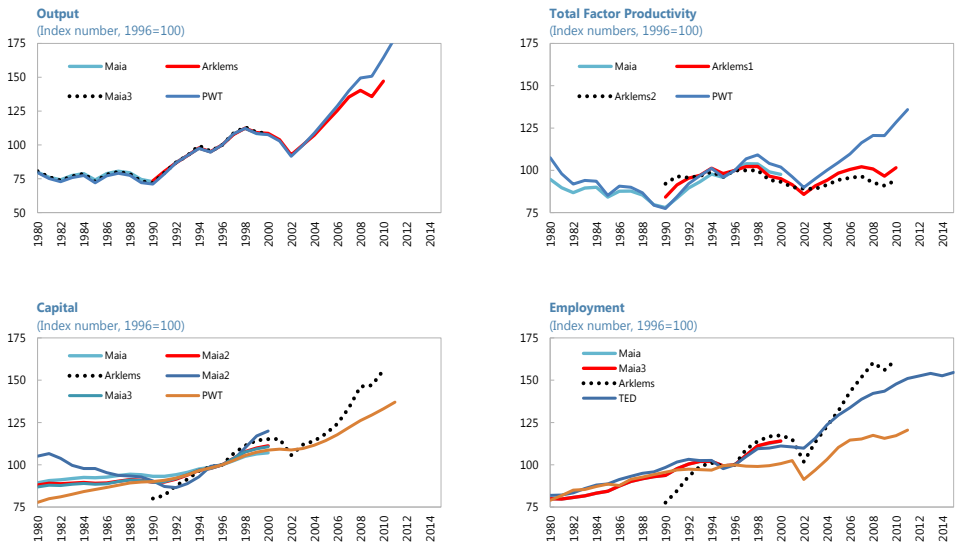
- Argentina's investment rate would need to increase significantly to eliminate the capital accumulation gap built during the last two decades, and this could significantly accelerate GDP growth. For example, for Argentina's capital-labor ratio to return to the median in the peer country group, the real investment rate would need to increase over the next 15 years by about

10 percentage points of GDP, with a potential positive impact on GDP growth by between about 1 and 3 percent per annum over the same period. The existence of a capital accumulation gap suggests that Argentina could well be bound to experience a significant investment surge.

- The event analysis shows that investment surges generally build over many years, and tend to coincide with an increase in national saving rate supported by fiscal consolidation. This suggests that a prudent fiscal policy, able to reallocate spending to increase public investment while gradually reducing the fiscal deficit, would facilitate the needed investment rebound.

B. Assessing Argentina's "Capital Accumulation Gap"

Figure 5. Argentina: Factors of Production, Alternative Data Sources: 1981–2015
(Percent of GDP)

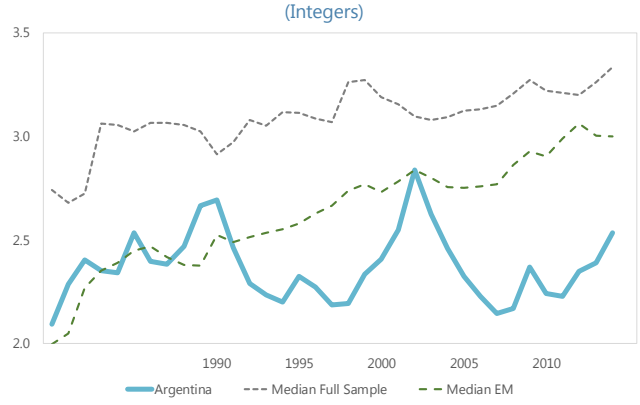


Sources: Coremberg (2008, 2011, and 20145, Maia (2001 and 2003), and Penn World Tables (version 9.0).

5. **Estimates of Argentina's capital stock are subject to severe data limitations.** There are a number of cross-country databases that can be used for international comparisons, but the data for Argentina reflect official statistics that have been recently revised (including new National Account data for the period 2004–15). Alternative sources for capital stock include Maia and Nicholson (2001), Maia and Kweitel (2003), the Arklems project (Coremberg 2008, 2011, 2012, 2014), the Penn World Tables ((Feenstra, Inklaar, and Timmer, 2013), or the TED database (The Conference Board, 2015), some of which differ significantly from each other (Figure 5). To estimate Argentina's capital stock, we use a standard perpetual inventory model which starts from the Penn World Tables capital stock in 2003 and updates it with investment data from the latest revised system of Argentina's National Accounts.

6. **According to these data, Argentina's capital-to-output ratio has failed to keep up with the increase in our peer country group.** In the early 1980s, Argentina was slightly above the median of the distribution of capital-to-output ratio among emerging market peers. Although the capital-to-output ratio has remained relatively stable around its mean, the ratio has increased more in other peer countries with low capital-to-output ratios. By 2014, Argentina was 15 percent below the capital-to-output ratio of median EM peer and 24 percent lower than the median peer in the full sample (Figure 6). Most of the relative decline is due to lower pace of capital accumulation in Argentina—its capital stock grew at an annual average of 2.5 percent between 1980s and 2014, compared with a median annual average growth over 35 years of 3.5 to 3.6 percent in the EM and full sample peer country groups respectively (average output growth in this period was 2.3 percent in Argentina and 2.6 for peer countries in full sample). Argentina's relatively high growth given its capital stock is to a significant extent attributed to periods of high commodity prices during the mid-2000s to the mid-2010s.

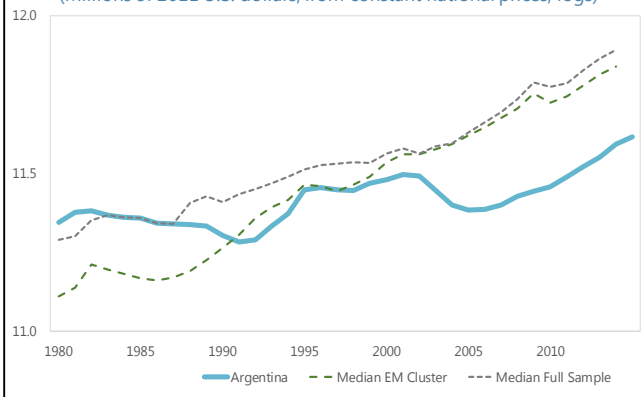
Figure 6. Argentina and Peers: Capital-to-Output Ratio: 1980–2014
(Integers)



Sources: Penn World Tables (version 9.0) and INDEC.

7. **Argentina's has lost ground also in terms of the capital-to-labor ratio.** In the early 1980s, Argentina's workers were slightly above the full sample median in terms of their availability of capital. The capital-labor ratio increased only modestly in Argentina since then through the year 2000. It declined with the end-of-convertibility crisis, and while it increased with the commodity boom, it never recovered the ground lost. Compared to the EM subsample, Argentina has lost its advantageous position of the early 1980s and now lags behind (Figure 7). Most of the gap in the capital-to-labor ratio corresponds to the slower growth in the capital stock, as employment growth in Argentina was close to the median level in the full-sample peer distribution over this period.

Figure 7. Argentina and Peers: Capital-to-Labor Ratio: 1980–2015
(Millions of 2011 U.S. dollars, from constant national prices, logs)

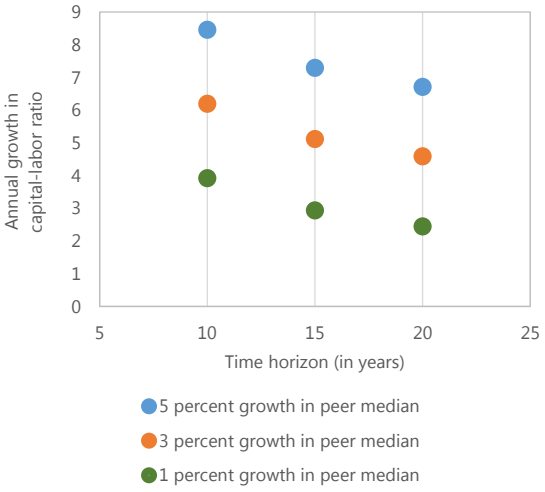


Sources: Penn World Tables (version 9.0), INDEC., and IMF World Economic Outlook database.

8. **Argentina's "capital accumulation gap" could be defined as the increase in the capital-labor ratio that would allow Argentina to return to the median of the full-sample peer country distribution.** In 2015, Argentina's capital per worker was 24.2 percent below the 2014 median in our distribution. The increase of Argentina's capital-labor ratio required to eliminate this gap depends on

assumptions about i) the number of years this would take and ii) the increase of the capital-labor ratio in the peer countries group over this period of time. For example, eliminating this gap in 15 years would require Argentina capital-labor ratio to grow at an average annual 5.1 percent, assuming that the median capital-labor ratio in the peer group will continue to grow at the same annual rate of 3 percent experienced on average between 2004 and 2014, and that Argentina's employment will increase at an average growth rate of 1 percent.[3] Figure 8 shows the range of growth rates of Argentina's capital-labor ratio required to return to the median of the distribution depending on different assumptions on these parameters.

Figure 8. Argentina: Growth in Capital-Labor Ratio Required to Catch Up with Peer Median



Sources: IMF staff calculations.

9. **What does this imply in terms of investment rates?** The relationship between the required increase in the capital-labor ratio and investment rates can be derived from the laws of motion of capital formation

$$K_{t+1} = I_t + (1-\delta_t)K_t$$

which could be transformed into the law of motion of the capital-output ratio,

$$k_{Y,t+1}(1+g) = i_t + (1-\delta_t)k_{Y,t}$$

or the law of motion of the capital-labor ratio

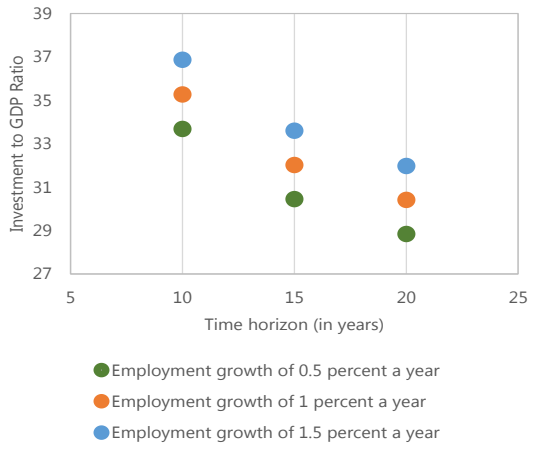
$$\frac{k_{l,t+1}}{k_{l,t}} = \frac{1+g_K}{(1+n^*)} = \frac{\frac{i_t}{k_{Y,t}} + (1-\delta_t)}{(1+n_t)}$$

Where g is the growth rate of output, $k_{l,t}$ is the capital-labor ratio, n_t is the growth rate in employment, d_t is the depreciation rate, i_t is the (real) investment rate, g_K is the growth rate of the capital stock, and $k_{Y,t}$ is the capital-output ratio. Introducing assumptions on the depreciation rate, the employment growth, and the dynamics of the capital-output ratio, this expression allows

[3] United Nations demographic projections imply an average growth rate of 1 percent in Argentina's working age population between 2015 and 2025. This suggests that a 1 percent growth rate on employment, abstracting from cyclical fluctuations, is a valid reference point.

deriving the investment rate consistent with the growth rate of the capital-labor ratio needed to eliminate the gap. For this calculation we assume a depreciation rate of 4.5 percent (the median in the Penn-World Tables data), an employment growth rate of 1 percent, and that the capital-output ratio averages 3 over the transition period.[4,5] This implies that returning to the median capital-labor ratio in 15 years would require an average annual investment rate of 32 percent, in real terms. Figure 9 shows how the required real investment rate varies with time horizons and employment growth rates.

Figure 9. Argentina: Investment Required to Reach Median Capital-to-Labor Intensity



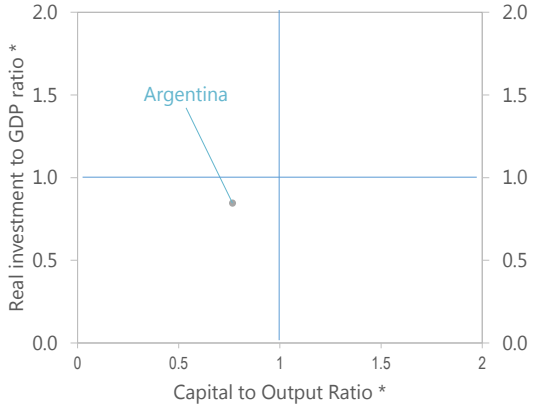
Source: IMF staff calculations.

10. **Another way of assessing if investment in Argentina is too low is to calibrate long-run (steady state) levels of investment using standard neoclassical growth models.** In these models, the steady-state level of investment rates is a function of the steady-state capital-output ratio, the depreciation rate, and the trend growth rate of output:

$$i^* = k_Y^*(g+\delta)$$

where i* is the (steady-state) ratio of investment to real output, k_Y* is the (steady state) capital-output ratio, g is potential output growth, and d is the depreciation rate. We calibrate the expression linking the steady state investment rate to the steady state capital-output ratio for all countries in the peer group, assuming a 4.5 percent depreciation rate (the rate used in the Penn-World tables to compute capital stocks), a potential GDP growth rate of 3.3 percent for Argentina (in line with the October 2016 World Economic Outlook), and a steady-state capital-output ratio (k_Y*) which is the median of the

Figure 10. Argentina: Capital/Output and Investment/Output Relative to Those to Needed to Support Median Long-Term Capital/Output Ratio: 2014



Sources: Penn-World Tables (version 9), IMF's World Economic Outlook and IMF staff calculations.

[4] This depreciation rate may be conservative for an economy such as Argentina experiencing a large shift in relative prices that may alter the profitability of sectors across the economy, and therefore the economic viability of the existing capital stock. Higher depreciation rates would require more investment to sustain a higher level of output.

[5] Based on the assumed parameters, the capital-to-output ratio would rise to 4 by 2030 (3.4 by 2025) from 2.5 in 2015, with an average level of 3 during the transition.

long-run capital-output ratios in peer countries.[6] Figure 10 shows that Argentina's investment rate and capital-output ratios in 2014 were below these estimated long-run levels. Moving to the long-run capital-output ratio would require Argentina's investment rate to be above its steady-state level. Once the transition is completed, sustaining the steady-state level of the capital-output ratio would require an investment rate of about 24 percent of GDP.[7]

11. **Using alternative combinations of key parameters of a standard production function also suggest the current investment rate is well below its likely steady-state value.** Starting from a Cobb Douglas production function, output growth can be expressed as follows:

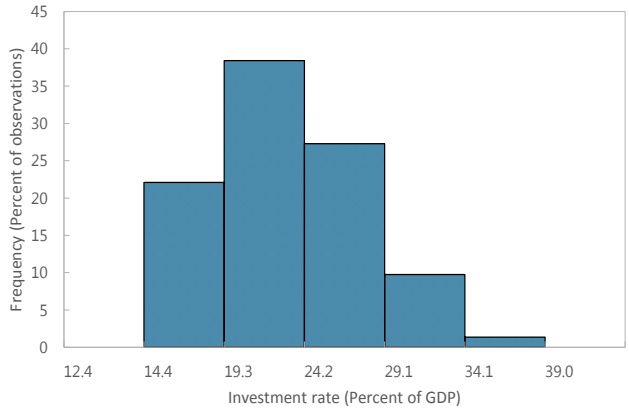
$$1+g_t = \frac{A_{t+1}}{A_t} n_t^{1-a} \left(\frac{\frac{I_t}{Y_t}}{\frac{K_t}{Y_t}} + (1-\delta_t) \right)^a$$

Alternative Parameter Specification

Depreciation rate (percent)	4.0	4.5	6.0
Growth rate (percent)	2.6	3.3	4.0
Employment growth (percent)	0.8	1.0	1.2
Capital to output ratio	2.7	3.0	3.3
Technological growth rate (percent)	0.7	1.0	1.3
Capital share of income	0.5	0.6	0.7
Steady-State Investment Rate	18.9	22.9	30.7

where A_{t+1}/A_t is the rate of technological progress (or total factor productivity) and α is the capital share of income. Recognizing the uncertainty over the long-run value of the parameters of the production function, a baseline set of values is assumed for each of them (middle column of the table) together with a realistic range of values around the baseline ones. In addition, all possible combinations of the parameters in the table are considered so as to estimate a frequency distribution of steady-state investment rates. The results are shown in Figure 11, and give a sense of the uncertainty over the estimated steady-state investment rate for Argentina. The results of the calibration suggest that staff baseline estimate for Argentina's steady-state real investment rate is around 23 percent, while the median of the frequency distribution is close to 24 percent.

Figure 11. Sensitivity of Investment Rates to Alternative Parameter Specification

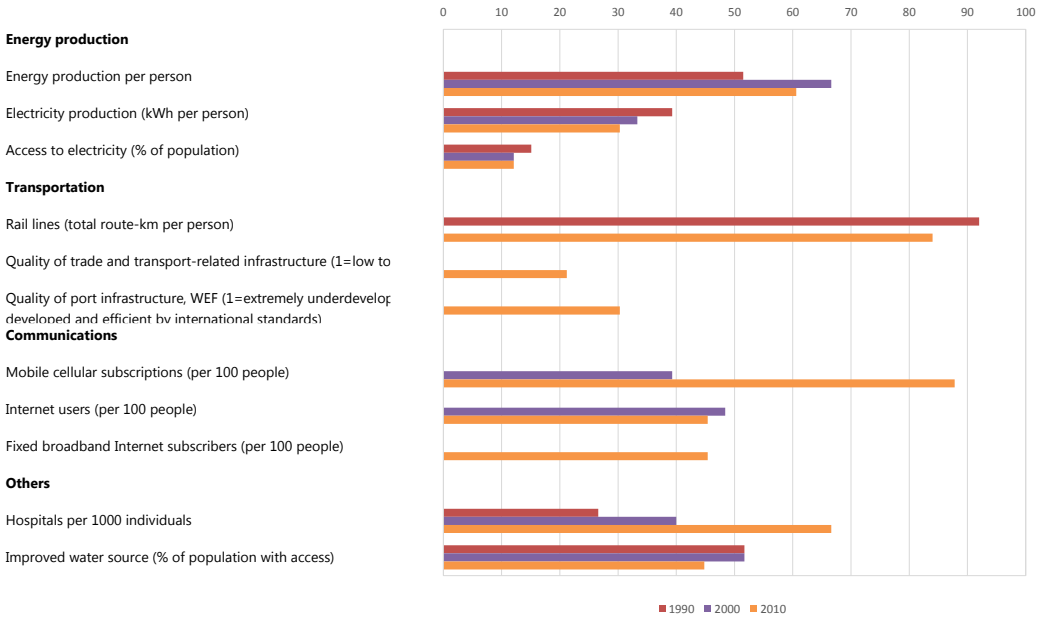


[6] For each county, the long-run capital-to-output ratio was calculated as the maximum value of the capital-output ratio over 15-year averages between 1950 and 2014, following IMF (2005).

[7] An increase of Argentina's real investment rate to its peak during the period 1980–2015 (21 percent of GDP) would close 50 percent of the estimated "capital accumulation gap" in the long run.

12. **Argentina's capital accumulation gap with respect to its peers is evident when it comes to infrastructure.** Electricity production and access to electricity is significantly lower. Argentina ranks in the low 12 percent in access to electricity and 30 percent in production of electricity among its peers. On both of these counts, Argentina has declined since the 1990s. It ranks better in the production of energy, an area where it has improved with the discoveries of energy resources in the period. The quality of trade and transport related infrastructure is also relatively low. On communications, the picture is mixed. Argentina ranks relatively high on cell phone penetration, but ranks below the median on internet access (Figure 12).

Figure 12. Argentina Infrastructure Indicators: Argentina's Percentile in Distribution of Peer Advanced and Emerging Markets



Source: World Bank's World Development Indicators database.

13. **If Argentina's investment rate were to increase, what would be the impact on output?** While there is a vast literature on the link between investment and output, there is a great range of estimates on the impact of an exogenous investment shock on GDP growth, Among the others, Barro (1991), Barro and Lee (1993), Houthakker (1961), Modigliani (1970) and Carroll and Weil (1994) all find a positive association between investment and growth using growth-regression and cross-section studies. In this section we customize our empirical analysis to Argentina's peer group using two separate methodologies:

- *A panel regression* that directly relates the increase in investment rates to GDP growth, and thus provides an empirical estimate of the investment accelerator effects. Because the answer may vary with the time horizon, we estimate the panel relationship over five- and ten-year

frequencies, (see Annex I). The exercise controls for growth in relative export prices, deviations of the real exchange rate from its long-term average, fiscal balances to GDP, and net foreign direct investment to GDP.

- *A production function* approach, that measures the impact of an increase of the capital-labor ratios on output per worker. This allows us to determine the impact on potential (long-term) growth from filling the capital accumulation gap, controlling for country specific demographic factors, labor market developments and relative export prices (Annex II).

14. **We find that a 1 percentage point permanent increase in the investment rate could increase annual output growth between 0.1 and 0.3 percentage points.**

- The panel regressions suggest that a one percentage point increase in the investment rate over a 5 or 10-year period would raise GDP growth by an annual average of about 0.1 percentage points over the same period. The panel regression also shows that increases in relative export prices, a depreciation of the real exchange rate, and stronger fiscal balances all have positive effects on growth.

- The production function approach yields that for each percentage point increase in the capital-labor ratio, output per worker would increases by 0.6 percentage points. This estimated parameter can be interpreted as the capital share of income (α) in a Cobb Douglas production function shown above. Based on the calibration of the production function described by the mid-column of the previous Table, a (permanent) increase in the investment rate by 1 percentage point would raise potential growth by about 0.3 percent.

C. What Drives Investment Surges? An Event Analysis

15. **In this section, we focus our attention on past episodes of persistent investment surges.** The objective is to identify the stylized behavior of key macroeconomic and financial variables during those episodes, so as to infer under what conditions a surge in investment would likely take place in Argentina over the coming years and what could the Argentine authorities do to increase the likelihood of such a surge taking place. Investment surges episodes are identified as periods in which the three-year moving average of investment rates (share of nominal GDP) increases by at least 2 percent of GDP. The "duration" of each episode is the number of years between the troughs and peaks of the investment series, whereas the "size" of each episode is the trough-peak increase.

16. **In general, investment surges took place over a number of years.** We found 57 episodes in our sample (Table 1) with an average duration of 4.8 years and an average size of 5.9 percent of GDP (a median duration of 5 years for a median increase of the investment rate of 5.1 percentage points of GDP). The longest episode took place in Spain between 1996 and 2007. Argentina experienced two surges. The first took place at the beginning of the convertibility period between 1992 and 1995. The second one right started in 2004 and ended with the global financial crisis in

2008. Also, we found that investment surges generally built up gradually, with the median investment rate increasing on average by 2 percentage points over the first two years, about 40 percent of the overall increase in the episodes.

Table 1. Argentina and Peers: Investment Surge Episodes: 1981–2015

Country	Start year	End year	duration	Investment rate [1]	Country	Start year	End year	duration	Investment rate [1]
Argentina	1992	1995	3	4.4	Mexico	1998	2001	3	4.0
Argentina	2004	2008	4	7.0	Mexico	2004	2009	5	2.8
Australia	1986	1990	4	2.5	New Zealand	1980	1985	5	3.7
Australia	2003	2009	6	3.8	New Zealand	1994	1997	3	4.0
Brazil	1986	1989	3	6.4	New Zealand	2001	2006	5	3.0
Brazil	2006	2013	7	3.9	New Zealand	2012	2016	4	2.7
Canada	2003	2008	5	3.3	Peru	1993	1997	4	6.7
Chile	1985	1991	6	10.0	Peru	2005	2010	5	7.6
Chile	1993	1995	2	2.9	Philippines	1988	1991	3	5.1
China	1984	1988	4	3.1	Poland	1995	2000	5	7.9
China	1992	1995	3	10.0	Poland	2005	2009	4	3.6
China	1998	2006	8	7.3	Russia	2006	2010	4	3.5
China	2009	2013	4	5.7	Saudi Arabia	1982	1984	2	4.0
Colombia	1993	1996	3	7.4	Saudi Arabia	2003	2010	7	6.5
Colombia	2002	2009	7	8.1	South Africa	2003	2009	6	6.5
Colombia	2011	2016	5	3.3	Spain	1987	1991	4	5.5
Hungary	1996	2001	5	3.0	Spain	1996	2007	11	9.4
India	1984	1991	7	6.2	Thailand	1985	1992	7	16.3
India	1994	1998	4	2.6	Thailand	2001	2007	6	5.3
India	2003	2009	6	8.7	Turkey	1985	1989	4	6.3
Indonesia	1980	1983	3	5.1	Turkey	1992	1998	6	2.7
Indonesia	1987	1991	4	3.5	Turkey	2004	2007	3	5.0
Indonesia	1993	1997	4	4.2	Ukraine	2003	2008	5	6.2
Indonesia	2004	2010	6	8.7	United Kingdom	1984	1990	6	5.3
Israel	1991	1993	2	8.2	United States	1994	2001	7	2.8
Japan	1987	1991	4	4.1	Vietnam	1992	1998	6	13.2
Korea	1987	1992	5	8.5	Vietnam	2000	2005	5	5.5
Malaysia	1980	1983	3	4.7					
Malaysia	1989	1997	8	20.1					
Malaysia	2009	2015	6	4.7					

1/ Change in the three-year moving average of the rate of fixed capital formation to nominal GDP over the period.

Sources: INDEC., IMF World Economic Outlook database, and IMF staff calculations.

17. **We now look at what distinguishes these episodes from the rest of our sample.** For a series of variables, we calculate the median during the investment rebound episodes and compare it with the median during all other years. A statistical test is performed to determine whether the difference between the two medians is significant at different confidence levels (Table 2).[8] Figure 13 presents the stylized evolution of the key variables around investment surge episodes.

18. **Public investment was typically higher during these episodes.** The median value of public investment to GDP was 4.4 over the whole sample. Controlling for cross-country differences, public investment was almost one percentage point higher during the investment surge episodes

[8] In particular, the method used is the Hodges-Lehmann robust median difference confidence interval tests. To identify the episodes, the confidence intervals are used to identify the values equivalent to a 1, 5, and 10 percent significance level (Newson 2002). The confidence intervals are computed with robust variances that take account of the clustering of observations for individual countries.

than elsewhere in the sample, at the five percent significance level. The median private investment was also higher during the episode, although the 0.8 percentage point median difference was not statistically significant. Notable increases in public investment took place in Saudi Arabia during 2000–03 (4.9 percentage points), Malaysia during 1980–83 (4.8 percentage points), Peru during 2005–10 (2.7 percentage points), Philippines during 1988–91 (2.3 percentage points), and Vietnam during 2000–05 (1.9 percentage points).

Table 2. Hodges-Lehman Median Differences on Investment Surge Episodes

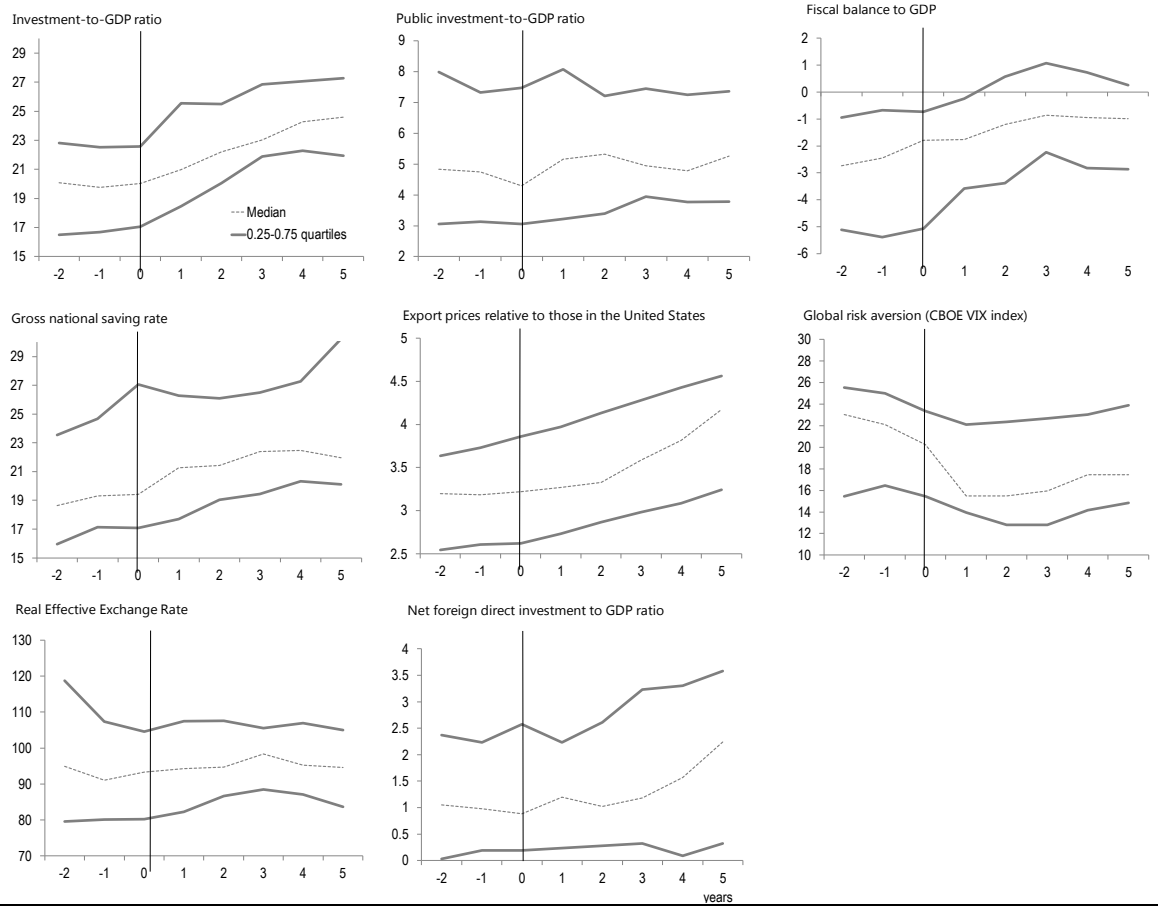
Investment-to-GDP ratio	2.349 ***	Inflation user cost	-0.002
Public investment to GDP ratio		Inflation	-0.168
Private investment to GDP ratio	0.872		
		Credit to GDP ratio	-9.296
National saving rate	1.689 *	Effective corporate tax rate	0.007
Fiscal balance to GDP	1.921 **		
Current account balance to GDP	-0.327	Capital account liberalization	0.000
		Current account controls	-6.250 *
Export Prices relative to those in the U.S.	0.573 ***		
Global risk aversion (CBOE VIX index)	-1.246 **	Net capital flows to GDP	0.765
Bank Lending Conditions US	-2.025	Net foreign direct investment to GDP	0.465
Consumer confidence index in US	3.950	Net portfolio flows to GDP	0.000
		Net other investment to GDP	0.299
Real effective exchange rate (+ appreciation)[1]	-4.151 **		

Significance at the 10, 5, and 1 percent levels is represented as *,**, and ***, respectively.
[1/] Percent deviation from long-term average. Results also hold for levels (at 10 percent level).

19. **The rebound in investment rates tended to coincide with an increase in gross national saving rates.** The median national saving rate rose during the investment surge episodes (a difference of 1.7 percentage point of GDP with the rest of the sample, which is significant at the 10 percent level). This accounts for a large fraction of the 2.3 percentage points of GDP increase in the investment rate around these episodes. Consistent with this, the investment surges have also tended to take place with stronger fiscal balances (whose median was 1.9 percent of GDP higher than when the episodes did not take place, a statistically significant difference). This suggests that policies that strengthen the fiscal balance position while at the same time reshuffling public spending to boost public infrastructure are the most favorable fiscal policies for encouraging investment. Current account balances tended to be weaker during the episodes, but the difference is not statistically significant, suggesting that the investment surge episodes captured in this sample were generally funded domestically.

20. **Real exchange rates have tended to be more depreciated during the investment surge periods.** For each country and each year in the sample, we calculate the difference between the real effective exchange rate and its long-run average (over the whole sample period) as a variable indicating currency misalignments. We found that domestic currencies were about 4 percent more depreciated (further below the long-term average) in real terms during the investment surge episodes than in the rest of our sample, a difference that was significant at the 5 percent.

Figure 13. Event Analysis Charts

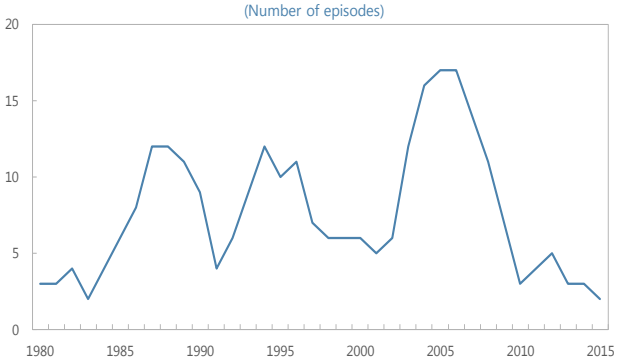


21. **The external environment played a crucial role**. In our sample, it is possible to identify three global investment surges: the first one in mid-to-late 1980s, the second one in the mid-1990s and the final one in the mid-2000s (Figure 14). The investment episodes identified in Argentina occurred at the time of the second and third global investment surges. For emerging markets, it has been documented that export prices (typically of commodities) and capital inflows have played a crucial role in explaining investment dynamics (Magud and Sosa (2015), IMF (2015). The main external variables that seem to be associated to the episodes in our sample are:

- *Higher relative export prices, defined as export prices of any given country relative to those in the United States (*at the 1 percent significance level). This seem to reflect the importance of commodity price

Figure 14. Argentina and Peers: Frequency of Investment Surge Episodes: 1981–2015

(Number of episodes)



Sources: INDEC., IMF World Economic Outlook database, and IMF staff calculations.

booms for commodity exporters, consistent with the large number of episodes during 2003–07. In fact, most of the episodes were associated with an improvement in the countries relative export prices (Table 3).

- *Lower global risk aversion (*at the 5 percent significance level), which signals greater availability of marginal funding from abroad. In addition, bank lending standards in the U.S. (a measure of availability of funding for foreign direct investment) tended to be less tight and U.S. consumer confidence stronger, although the differences were not statistically significant. In about two-thirds of the episodes for which data is available, global risk aversion was falling (Table 3).

- *Greater net foreign direct investment* (at the 10 percent level). Portfolio flows, however, were not significantly higher. Also, the rebound of investment in the episodes identified here does not seem to be associated with an increase in the credit-to-GDP ratio (difference in median across the two groups was not significant). This seems to suggest that investment sentiment may have played a larger role than easier access to finance in triggering the investment surges identified in this paper. In about three-fourths of the episodes for which data is available received larger FDI flows (Table 3).

22. **Structural reforms were also present in many of the episodes.** Liberalization of current and capital account controls were present in about a third of the episodes, and in the nonparametric analysis presented in Table 2 the liberalization of current account controls comes out as a statistically significant characteristics of the investment surge episodes captured in this paper. Trade liberalization was also present in some of the episodes. Although information on import tariffs is scant, the 11 episodes for which data is available experienced a reduction in the weighted average of import tariffs. Finally, the political environment seems to have improved in more than half of the episodes (Table 3).

Table 3. Direction of Variation of Key Variables During Episodes
(Number of episodes)

	Increase	Decrease	No change	Observations
Relative export price change	42	3	0	45
Change in global risk aversion	12	24	0	36
Foreign direct investment change	26	9	0	35
Capital account liberalization	15	5	31	51
Liberalization of current account controls	17	2	31	50
Tariff reduction (weighted average)	0	11	0	11
Political stability	29	15	3	47

23. **These macroeconomic and structural factors mattered to different degrees to each of the episodes considered in the sample**. To give a flavor, we will discuss here a few stylized facts for a few of the episodes and present some panel charts in Annex III. For example,

- In the 2004–08 episode in Argentina, most of the increase in the investment rate took place in the private sector, as public investment increased slightly and only in the later years of the episode, and accounted only a small fraction of the total increase. The external environment was favorable with rising export prices and falling global risk aversion. Part of the windfall gains were saved, as fiscal balance improved significantly giving room for the private sector to invest. A very depreciated real exchange rate helped with external competitiveness.

- A similar story holds for Mexico during roughly the same period 2004–09, with a favorable external environment for export prices and external borrowing, was reflected in an improvement in the fiscal balances, and the backdrop of recent currency depreciation.

- In Peru 2005–10, foreign direct investment played a more prominent role as it doubled to 5 percent of GDP during the episode. Public investment also rose by about 3 percentage points of GDP, in an episode characterized by rising commodity prices and a 4 percentage point improvement in fiscal balances. In Turkey 2004–07, FDI also played an important role, as did fiscal consolidation over the period.

- In New Zealand 2001–05, a significant part of the increase in the investment rate came from the rise in public investment, despite a strong improvement of overall fiscal balances. The significant real currency appreciation, associated with strong capital inflows as global risk aversion fell sharply, may have contained investment opportunities in the private sector.

- In Australia, 1986–90, wide-ranging structural reforms contributed to a favorable environment for investment. These reforms "freed up markets, promoted competition and generally sought to ensure that prices did their job of signaling costs and relative returns" (Banks, 2005). The package included trade liberalization, enhanced competition policy, and labor market reforms such as change in the wage settlement system. Important changes to the macroeconomic policy framework were also introduced with the adoption of inflation targeting and changes to the tax structure, including lowering the corporate tax rate. The investment rate rose by about 2 percentage points over the period, in a context of rising export prices and stronger fiscal balances. Most of the increase in the investment rate took place in the outer years, as the cost of structural reforms was paid up-front while the benefits take some time to materialize.

24. **Bilateral panel logit regressions are consistent with these results.** Because we are interested in the time (rather than the cross-country) dimension of the panel, we include country-fixed effects in these logit regressions The logit regressions suggest that the probability that a country would experience an investment surge increases in the presence of greater relative export prices, national saving rates, and foreign direct investment, while it falls with rising global risk

aversion and currency appreciation. However, the increases in public investment did not increase the probability of an investment surge (Table 4).

Table 4. Bilateral Panel Logit Regressions

	Coefficient	Odds-ratio	Signficance [1]
External variables			
Relative commodity prices	0.611	1.843	***
Global risk aversion (VIX index)	-0.048	0.953	***
Domestic variables			
National domestic saving	0.054	1.055	***
Fiscal balance to GDP	0.380	1.462	***
Net foreign direct investment to GDP	0.138	1.147	***
Real effective exchange rate	-0.005	0.995	*
Public investment to GDP	-0.033	0.030	

25. **Multivariate panel logit regressions confirm that investment surge episodes tended to be associated with an improvement in fiscal balances.** The multivariate regression relates the investment surge dummy to the ratio of public investment to GDP, the national saving rate, relative export prices, global risk aversion (VIX index), the real effective exchange rate, net foreign direct investment rate, and the fiscal balance to GDP ratio. Controlling for fixed and time effects, the only significant variables are the fiscal balance to GDP ratio (at the one percent significance level) and the real effective exchange rate (although the latter only at the 10 percent significance level). The odds ratio suggests that every percentage point of GDP improvement of the fiscal balance increases the probability of an investment surge by 1.4 percentage point. The sign of the real exchange rate, however, suggests that an appreciation would increase the likelihood of an investment surge, which seems counterintuitive (Table 5). For robustness, multivariate regressions were also conducted controlling separately for fixed and time effects (not shown). In both versions, the fiscal balance remained significant at the 1 percent level, with similar figures for the odds ratio (exceeding 1). In contrast, the real exchange rate was not significant in either specification. In the fixed effects specification, global risk aversion was significant at the 5 percent level, suggesting that fluctuations in the perceptions of risk by global investors may explain the bunching of investment episodes across time. Controlling only for time effects, which emphasizes the cross-country dimension, the national saving rate, the public investment to GDP, and relative export prices were also significant at the 1 percent level.

Table 5. Multilateral Panel Logit Regressions

	Coefficient	Odds-ratio	Signficance [1]
Public investment to GDP	0.105	1.111	
National saving to GDP	-0.036	0.965	
Relative export prices	-1.446	0.236	
Global risk aversion (VIX index)	-0.030	0.971	
Real effective exchange rate (+ = appreciation)	0.013	1.013	*
Net foreign direct investment to GDP	0.094	1.098	
Fiscal balance to GDP	0.311	1.365	***
Observations	395		
LR chi2(47)	181.6		
Prob > chi2	0		
Pseudo R2	0.3649		
Log likelihood	-158		
Fixed effects	Yes		
Time Effects	Yes		

[1] Significance at the 1, 5, and 10 percent levels, respectively (***,**,*).

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Annex I. Panel Investment and Growth

The international experience on the relationship between investment and growth can be summarized through a panel regression. The unbalanced panel is estimated for the period 1980–2014 controlling for growth in relative export prices as well as for fixed and time effects. Two versions of the panel are estimated to assess the relevance of how long an increase in the potential capital formation rate is sustained: 5 years, and 10 years. For example, the interpretation of the coefficient on the real investment (fixed capital formation) rate in the 10-year version of the panel would be that a 1 percentage point increase in the fixed capital formation rate sustained for 10 years would deliver an annual percent increase of 0.0954 percent. Over ten years, this would imply about a 1 percent increase in GDP.

The results are robust to different versions of the capital formation ratio and the inclusion of additional controls, including the real exchange rate deviations from long-run trends, the fiscal balance to GDP and foreign direct investment (FDI) in percent of GDP. The impact of commodity prices, however declines, suggesting that commodity prices may in turn affect the other controls, like the real exchange rate, fiscal balances, and even FDI. The difference in the growth impact of fixed capital formation when expressed as percent of nominal or real GDP virtually disappears at the 10 year frequencies. The estimates suggest that real exchange rate appreciation hurts economic growth (perhaps through competitiveness considerations) as do fiscal deficits sustained over 5 to 10 year horizons (perhaps through crowding out of the private sector). The results also suggest that private investment is more important than public investment in growth fluctuations, and that non-FDI funded fixed capital formation has a stronger impact than FDI on economic activity, perhaps through lower import leakages.

Annex I. Table 1. Growth and Investment Panel Regressions, Various Controls, Five Year Horizons

	A5	B5	C5	D5
Fixed capital formation				
Total, percent of real GDP	0.08530 ***			
Total, percent of nominal GDP		0.10600 ***		
Private, percent of nominal GDP			0.12800 ***	
Private without FDI, percent of nominal GDP				0.12800 ***
Public, percent of nominal GDP			0.06000	0.06000
Real export prices (change in logs)	0.16300 ***	0.15400 ***	0.13600 ***	0.13600 ***
Real exchange rate (Percent deviation from long-term average)	-0.01180 ***	-0.01110 ***	-0.01300 ***	-0.01300 ***
Fiscal balance (percent of nominal GDP)	0.11300 ***	0.11800 ***	0.10500 ***	0.10500 ***
FDI (percent of dollar GDP)	-0.19300 ***	-0.16400 ***	-0.16700 ***	-0.03880
Observations	640	645	604	604
Countries	26	26	25	25
R-squared				
Overall	0.727	0.731	0.741	0.741
between	1	1	1	1
within	0.453	0.463	0.470	0.470
rmse	0.0115	0.0114	0.0112	0.0112
Fixed effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes

Annex I. Table 2. Growth and Investment Panel Regressions, Various Controls, Ten-Year Horizons

	A10	B10	C10	D10
Fixed capital formation				
Total, percent of real GDP	0.11100 ***			
Total, percent of nominal GDP		0.11000 ***		
Private, percent of nominal GDP			0.13700 ***	
Private without FDI, percent of nominal GDP				0.13700 ***
Public, percent of nominal GDP			-0.01750	-0.01750
Real export prices (change in logs)	0.14400 ***	0.13800 ***	0.10600 ***	0.10600 ***
Real exchange rate (Percent deviation from long-term average)	-0.00587 ***	-0.00351 *	-0.00679 ***	-0.00679 ***
Fiscal balance (percent of nominal GDP)	0.05700 ***	0.07920 ***	0.08340 ***	0.08340 ***
FDI (percent of dollar GDP)	-0.14600 ***	-0.09520 **	-0.10100 **	0.03630
Observations	635	640	599	599
Countries	26	26	25	25
R-squared				
Overall	0.796	0.795	0.811	0.811
between	1	1	1	1
within	0.404	0.405	0.437	0.437
rmse	0.00820	0.00821	0.00793	0.00793
Fixed effects	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes

Annex II. Panel Production Function

Output per worker (or labor productivity) is a function of the capital stock and relative export prices. This relationship holds as a panel for Argentina's peer countries under a variety of measurements for the capital stock and employment identified in the earlier sections. Estimates for the elasticity of labor productivity to relative export prices varies between 10 and 14 percent across the different measurements of the capital-to-labor ratio. In turn, the elasticity of the capital-to-labor ratio to labor productivity ranges from 50 to 61 percent (Annex II. Table 1). Fixed effects for Argentina came out negative under all specifications. The relationship between labor productivity, the capital-to-labor ratio, and relative export prices also holds as a vector error correction form in a dynamic panel specification. The long-term coefficient is 0.5 (Annex II Table 2).

GDP per capita depends, by definition, on the same variables than output per worker and on the share that the population that is employed. A panel regression under this specification delivers all variables statistically significant and with the right signs (Annex II. Table 3). This prompts the question of what determines the level of employment of the population. Although the share of the population in working age (15–64) is a likely candidate, it turns out to be not significant under a variety of specifications. Two important variables appear to play an important role. The first is the female participation in the labor force, which is a slow moving (structural) characteristic of an economy. The second is related to the business cycle fluctuations of an economy, and could be proxied by the investment rate (Annex II. Table 4).

Annex II. Table 1. Production Function Panel Regressions

GDP per capita	Estimate	p-val	Estimate	p-val
Capital-to-labor ratio	0.611	0.000	0.558	0.00
Employment-to-population ratio			0.739	0.00
Relative export prices	0.106	0.030	0.135	0.02
Memo items:				
Fixed-effects	Yes		Yes	
Argentina FE	0.215		0.110	
Time-effects	Yes		Yes	
Period	1992-2014		1992-2014	
Robust standard errors	Yes		Yes	
Observations	593		593	
Number of clusters (countries)	26		26	
R-squared (overall)	0.995		0.995	

Annex II. Table 2. Vector Error Correction Production Function Panel

Output per employed person	Estimate	P-val	Estimate	P-val
Short-run adjustment				
Capital-labor ratio	0.527	0.000	0.340	0.000
Relative export prices	0.106	0.000	0.111	0.000
VIX index			-0.001	0.006
Long-run relationship	-0.136	0.001	-0.094	0.000
Lagged Long-run relationship				
Capital-labor ratio	0.509	0.000	0.456	0.000
Relative export prices	0.148	0.000	-0.047	0.000
VIX index			0.000	0.441

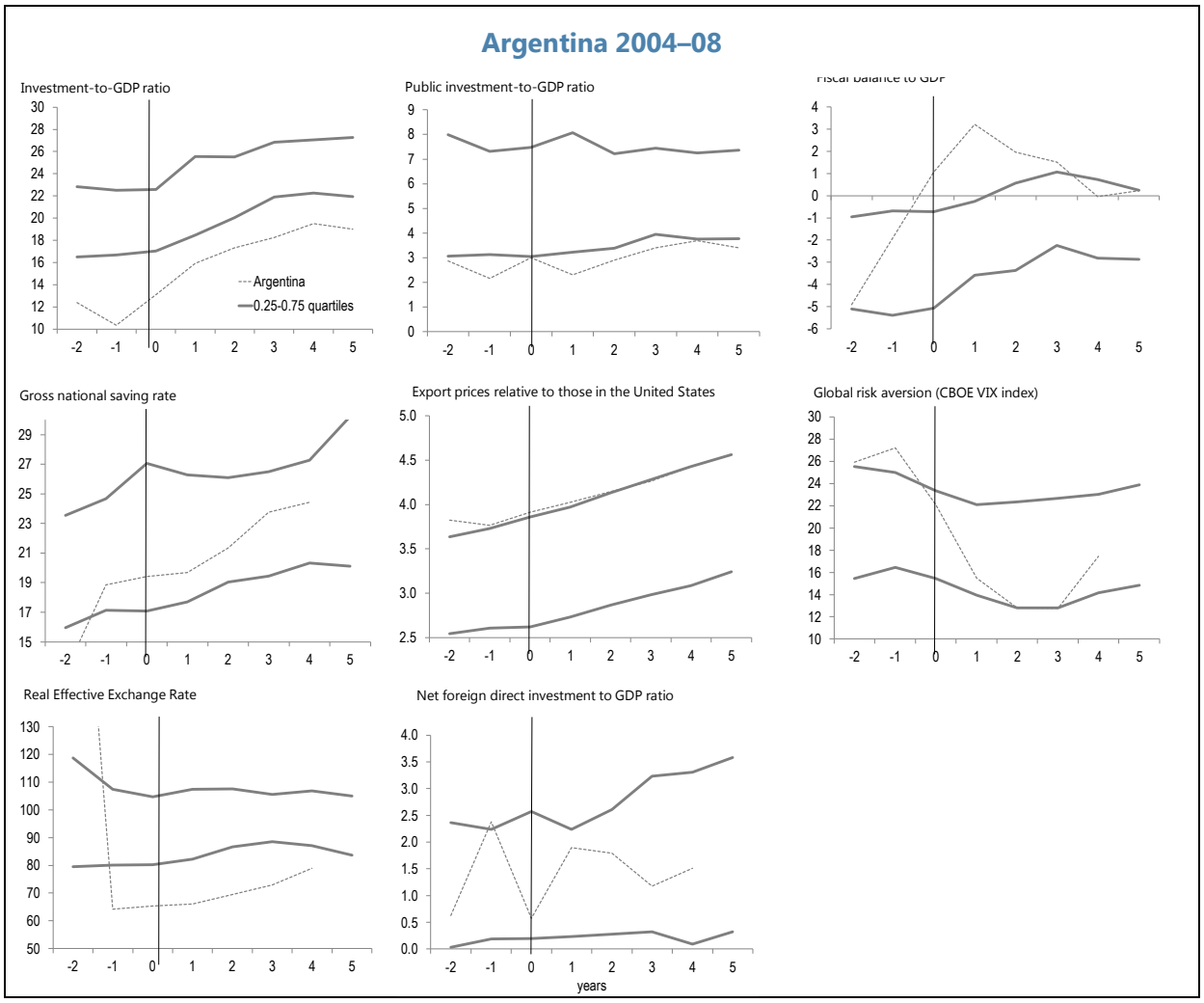
Annex II. Table 3. Production Function Panel Regressions on GDP Per Capita

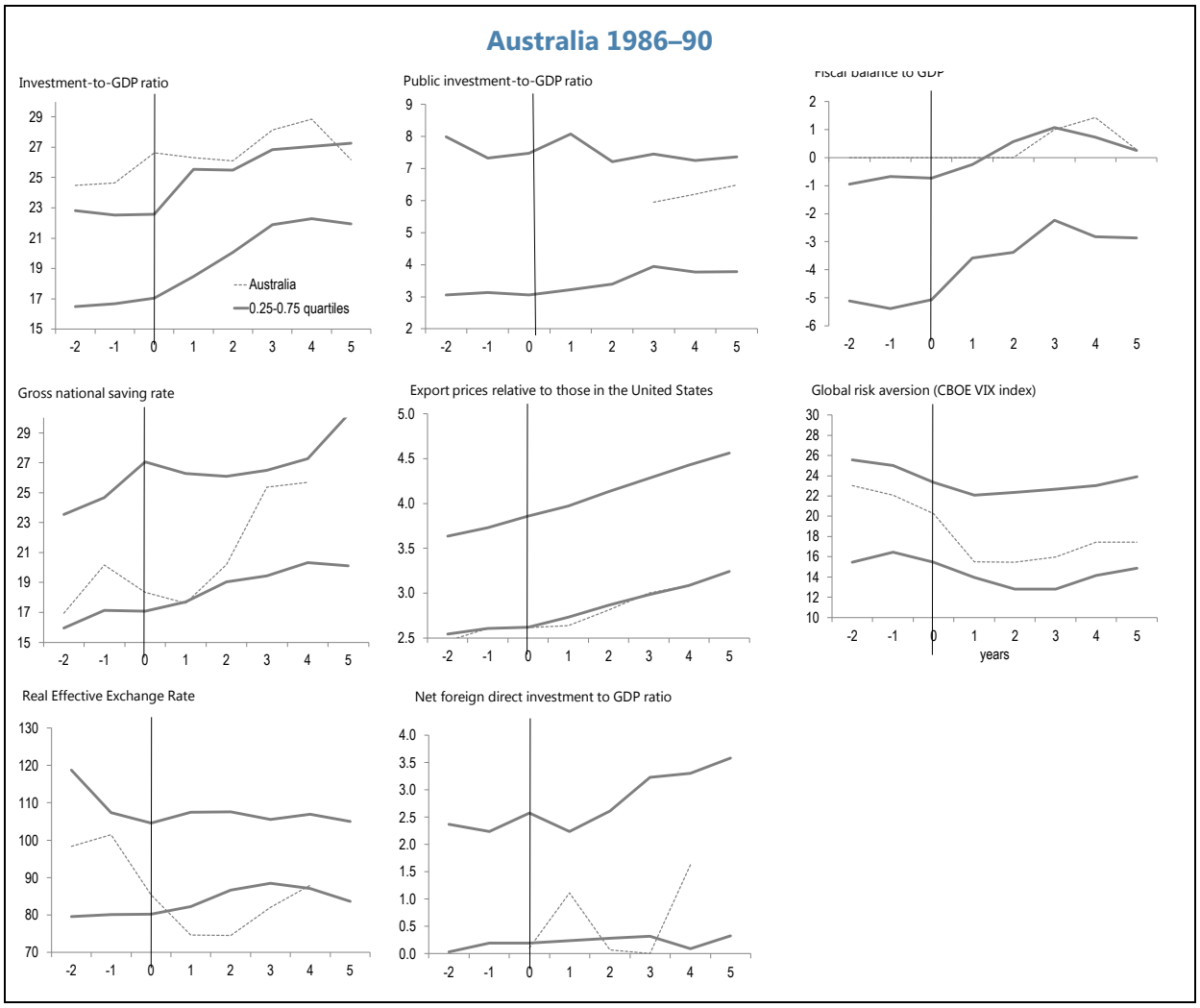
GDP per capita	Estimate	p-val
Public captial-to-labor ratio	0.297	0.00
Private capital-to-labor ratio	0.157	0.00
Relative export prices	0.203	0.00
Employment to population ratio	0.007	0.00
Memo items:		
Fixed-effects	Yes	
Argentina FE	-0.221	
Time-effects	Yes	
Period	1992-2011	
Robust standard errors	Yes	
Observations	592	
Number of clusters (countries)	26	
R-squared (overall)	0.995	

Annex II. Table 4. Panel Regressions on Employment to Population Ratio

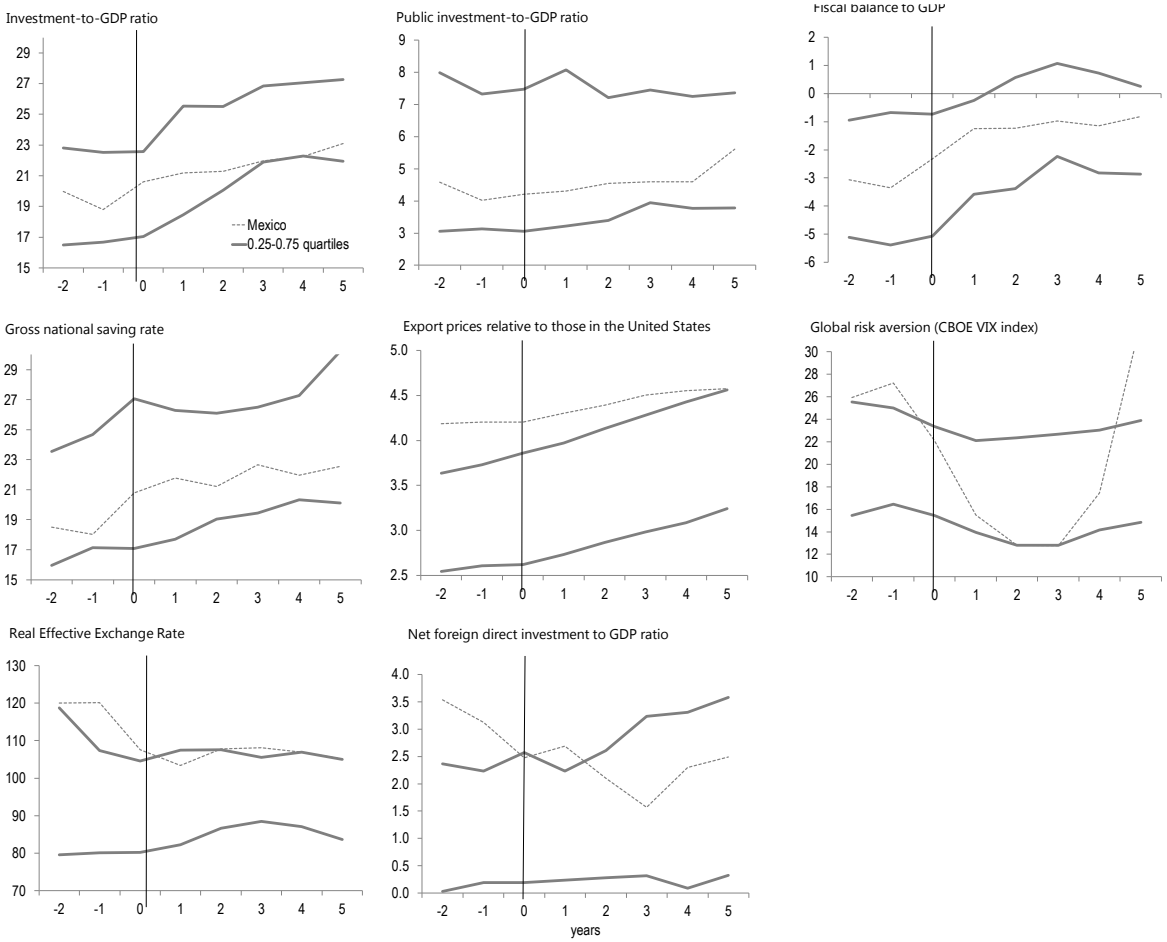
Employment to Population ratio	Estimate	p-val
Working-age population (15-64)	-0.324	0.09
Female share of labor force	1.025	0.00
Nominal fixed capital formation to GDP ratio	0.353	0.01
Memo items:		
Fixed-effects	Yes	
Argentina FE	-8.177	
Time-effects	Yes	
Period	1992-2014	
Robust standard errors	Yes	
Observations	756	
Number of clusters (countries)	33	
R-squared (overall)	0.945	

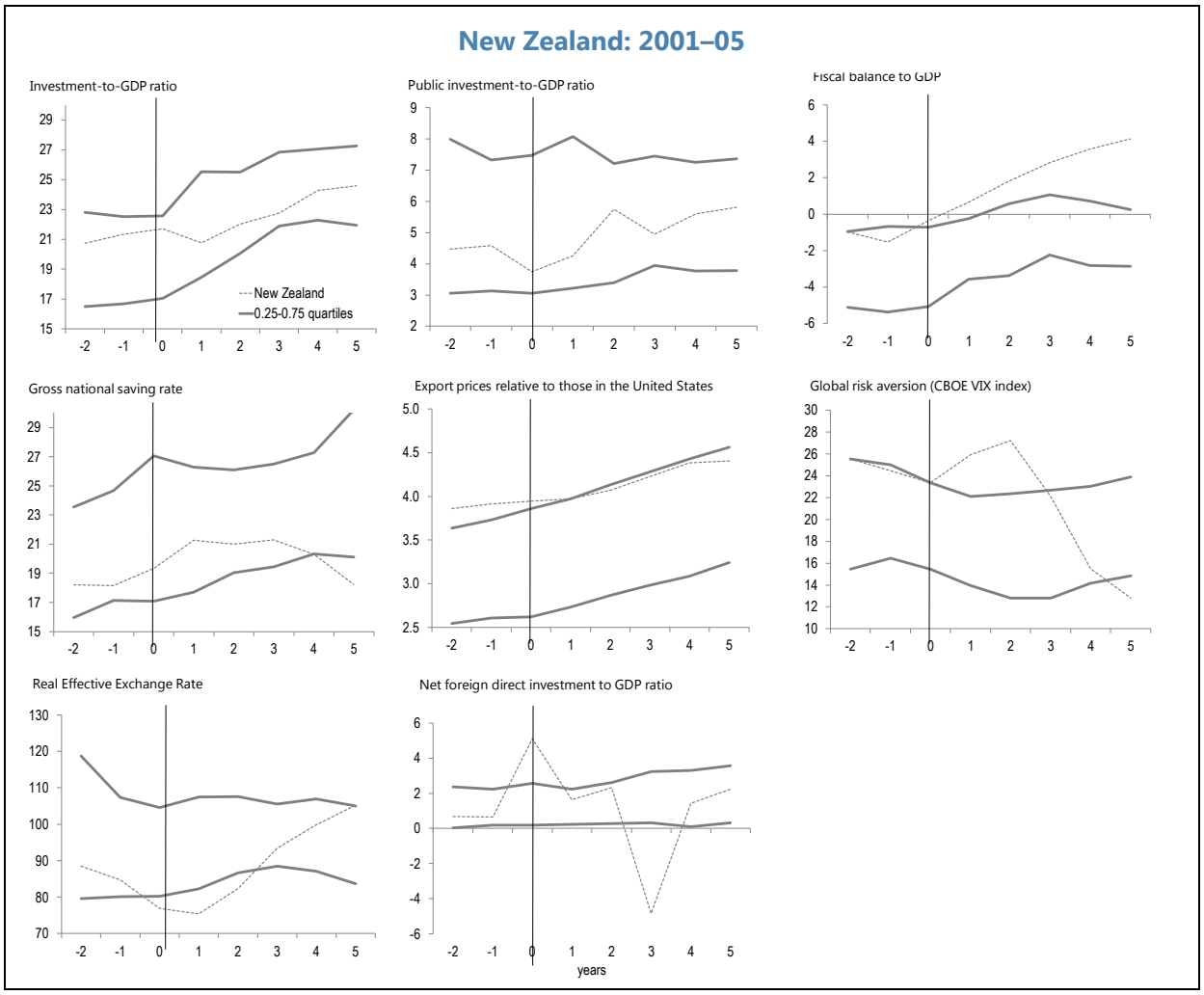
Annex III. Panel Charts for Selected Investment Surge Episodes



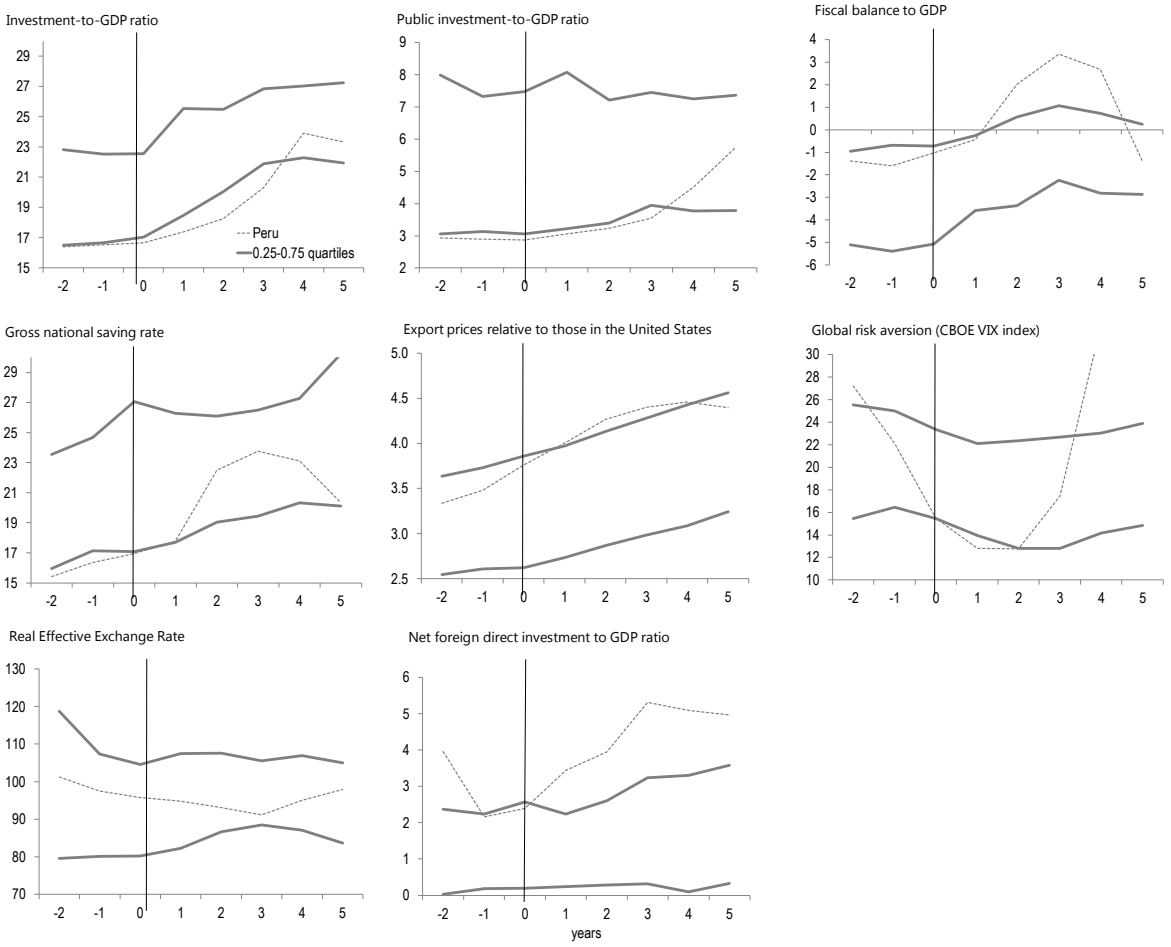

Australia 1986–90
Investment-to-GDP ratio
Public investment-to-GDP ratio
Fiscal balance to GDP
Australia
0.25-0.75 quartiles
Gross national saving rate
Export prices relative to those in the United States
Global risk aversion (CBOE VIX index)
years
Real Effective Exchange Rate
Net foreign direct investment to GDP ratio

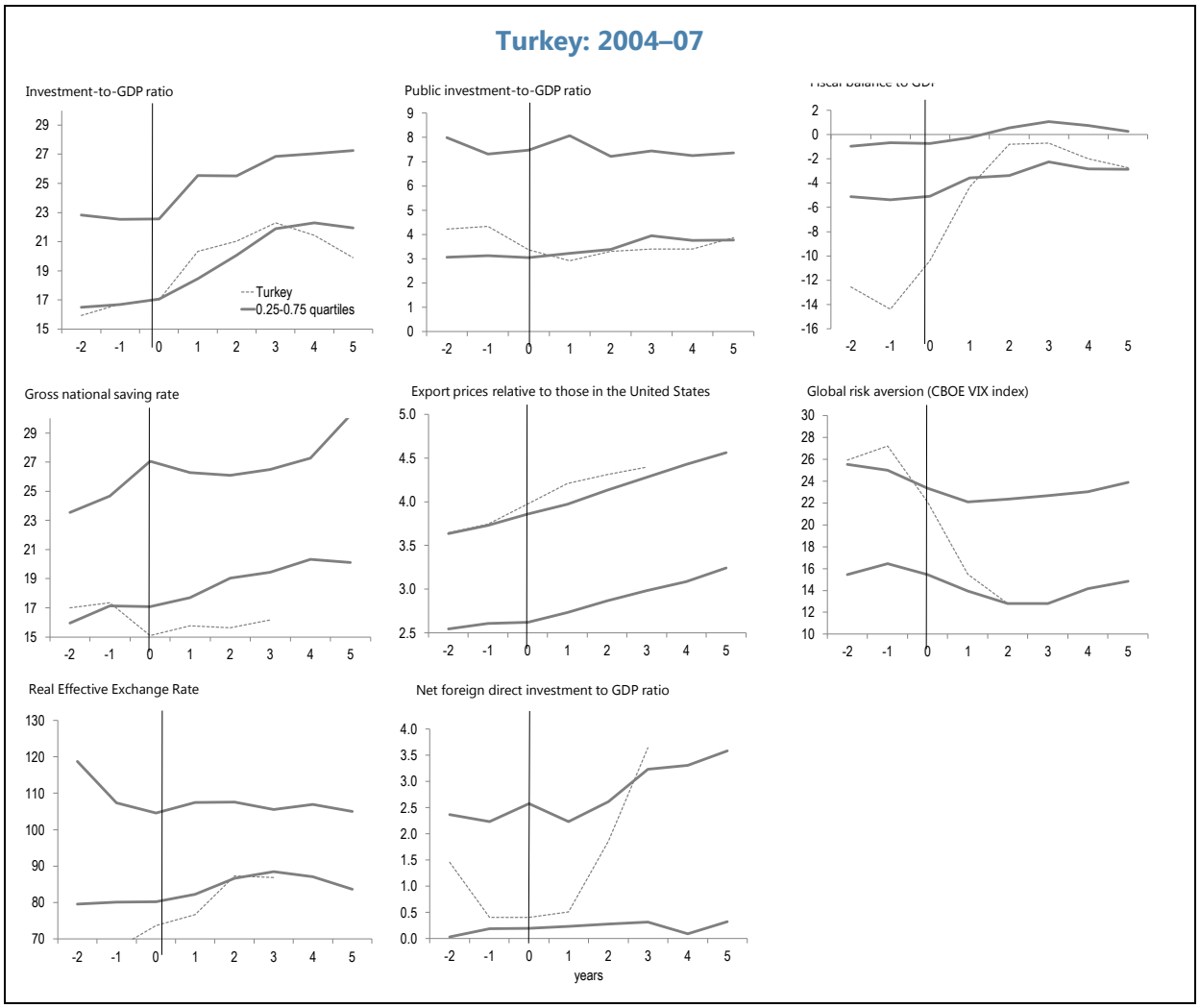
Mexico: 2004–09




New Zealand: 2001–05
Investment-to-GDP ratio
Public investment-to-GDP ratio
Fiscal balance to GDP
New Zealand
0.25-0.75 quartiles
Gross national saving rate
Export prices relative to those in the United States
Global risk aversion (CBOE VIX index)
Real Effective Exchange Rate
Net foreign direct investment to GDP ratio
years

Peru: 2005–10

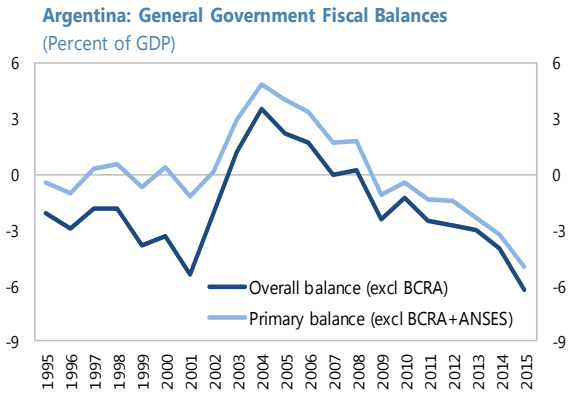

Investment-to-GDP ratio
Public investment-to-GDP ratio
Fiscal balance to GDP
Peru
0.25-0.75 quartiles
Gross national saving rate
Export prices relative to those in the United States
Global risk aversion (CBOE VIX index)
Real Effective Exchange Rate
Net foreign direct investment to GDP ratio
years


Turkey: 2004–07
Investment-to-GDP ratio
Turkey
0.25-0.75 quartiles
Public investment-to-GDP ratio
Gross national saving rate
Export prices relative to those in the United States
Global risk aversion (CBOE VIX index)
Real Effective Exchange Rate
Net foreign direct investment to GDP ratio
years

ARGENTINA'S FISCAL ADJUSTMENT: HOW CAN IT BE DONE?[1]

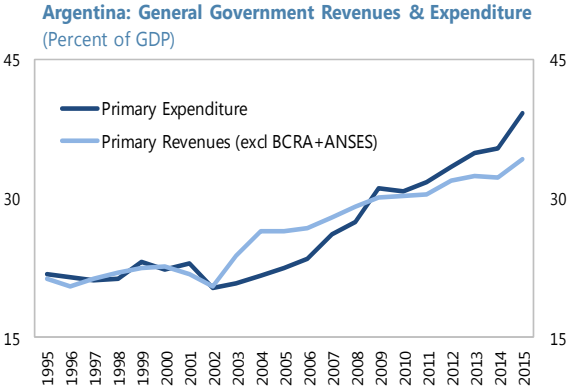
A. Introduction

1. **Argentina's fiscal balances deteriorated sharply over the past decade, becoming a key contributor to growing macroeconomic imbalances**. From a near flat overall fiscal balance in 2007, the overall balance of the general government[2] deteriorated to a deficit of 6½ percent of GDP in 2015, the worst deficit in over two decades. At the same time, the primary balance (net of transfers from the BCRA and ANSES) worsened from an average surplus of 1½ percent of GDP between 2002–10 to a deficit of 5¼ percent of GDP in 2015.



Sources: Mecon and staff extimates.

2. **The deterioration of the fiscal position was driven by a surge in government expenditure**. General government primary spending climbed by 13 percentage points of GDP from 26 percent of GDP in 2007 to 39 percent of GDP in 2015, with wages, pensions and subsidies contributing three-quarters of the increase. Government revenues also grew, from 28 percent of GDP in 2007 to 34 percent of GDP in 2015, reflecting an increase in the tax burden to 24½ percent of GDP, one of the highest ratios in the region. But they could not outpace expenditure. Moreover, the increase in tax revenues also involved a severely distorted tax structure, with several taxes directly hampering economic activity.



Sources: Mecon and staff extimates.

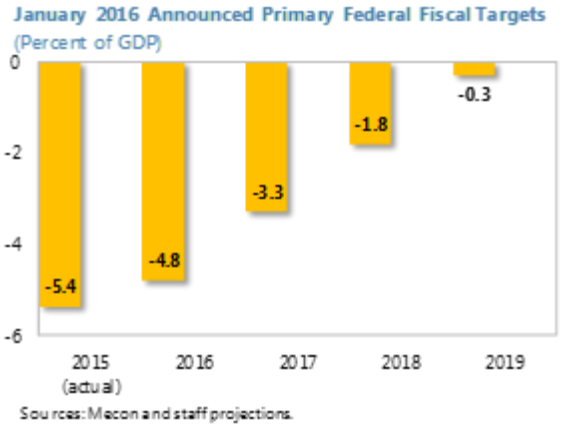
3. **With limited access to international capital markets after 2001, the fiscal deficit was increasingly financed by the central bank, which fueled inflationary pressures**. Above the line transfers, mostly unrealized valuation gains, from the central bank and social security administration (ANSES) to the Treasury averaged 1¼ percent of GDP from 2007–15. Since these gains were unrealized, their use by the Treasury compelled the central bank to print more money. In addition, the central bank gave below the line advances to the Treasury, which grew from

[1] Prepared by Diva Singh and Paolo Dudine.

[2] General Government refers to the federal government (including ANSES) and provinces.

0.1 percent of GDP in 2007 to 1 percent by 2015. Both types of central bank transfers added to the monetary base, increasing seignorage and inflation.

4. **In January 2016, the new administration announced a medium term fiscal consolidation plan, targeting a near-zero primary federal fiscal deficit by 2019 (Chart)**. Subsequently, the slowdown in economic activity prompted the government to revise its primary deficit target for 2017 to -4.2 percent in order to support activity. In 2016, measures resulting in a net consolidation of about 0.2 percent of GDP in 2016 have been announced. On the expenditure side, energy subsidies have been reduced[3] and a tight control of current spending, including discretionary transfers to provinces, instituted. Simultaneously, measures to safeguard social welfare have been introduced, such as the *tarifa social* for utilities, VAT tax credits for low income households, and expanded coverage for child subsidies. Pension measures have also been announced, including a retroactive payment to litigating pensioners to be paid over four years, and a 35–45 percent increase in the monthly pension of 2½ million pensioners. A number of revenue measures to reduce tax distortions have been introduced, including the removal of export taxes (with the exception of those on soy) and an increase in the minimum income level exempt from income tax. On financing, the government swiftly reached agreement with holdout creditors, which facilitated a return to international markets.



5. **This paper investigates how best to achieve the medium-term fiscal adjustment envisaged by the Argentine authorities in January 2016**. Despite the revision of the 2017 primary deficit target included in the Budget, this paper assesses the feasibility of the more front-loaded medium-term adjustment path announced by the authorities in January 2016. By examining the structure of public spending and revenues in Argentina, the paper evaluates what mix of fiscal measures would enable the authorities to attain their announced federal primary fiscal targets, with a contained impact on activity, and safeguards to limit the impact on the most vulnerable. Expenditure-cutting measures would need to be at the heart of the fiscal consolidation effort; identifying areas of inefficient spending would therefore be critical. An analysis of revenues would also be necessary, given the high tax burden and distortive tax structure.

6. **Our findings show there is room to achieve the targeted fiscal adjustment through expenditure rationalization while reducing distortive taxes, but the growth impact would**

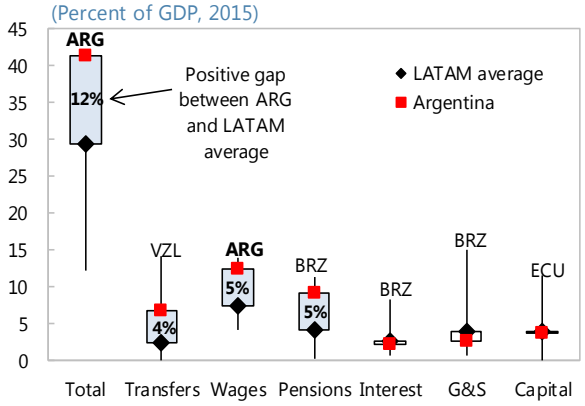
[3] The Supreme Court ruling in August 2016 to reverse the tariff hikes for residential natural gas is expected to reduce fiscal savings by about 0.2 percent of GDP.

critically hinge on its credibility. The public wage bill and energy subsidies are the main expenditure categories with scope for cuts, potentially yielding combined net fiscal savings of up to 5½ percent of GDP, after including cash transfers to safeguard the poorest. On the tax side, reducing the corporate income tax burden and adjusting personal income tax brackets are key priorities, together with the elimination of the financial transactions tax—which would collectively cost about 1¼ percent of GDP to the federal government. Finally, a general equilibrium approach indicates that the negative short-term impact of the fiscal consolidation on growth could be reduced significantly if firms and households were to find the adjustment credible. Enhancing the transparency and credibility of fiscal institutions would therefore be critical.

B. Primary Expenditure

7. **Argentina's level of general government expenditure is higher than LA6 and emerging market averages**. At 41 percent of GDP, Argentina had the highest ratio of general government expenditure in Latin America in 2015. From being lower than the LA6 and emerging market averages in 2007, Argentina's surge in spending over the past decade brought it to surpass all peers. Wages, pensions and non-pension transfers (including energy subsidies) are the largest components of public expenditure in Argentina, and each exceeded their respective Latin American average in 2015. In this section, we thus examine wages and non-pension transfers in more detail (for pensions, see Selected Issues Paper Chapter 3).

General Government Expenditure
(Percent of GDP, 2015)



Source: IMF staff estimates.

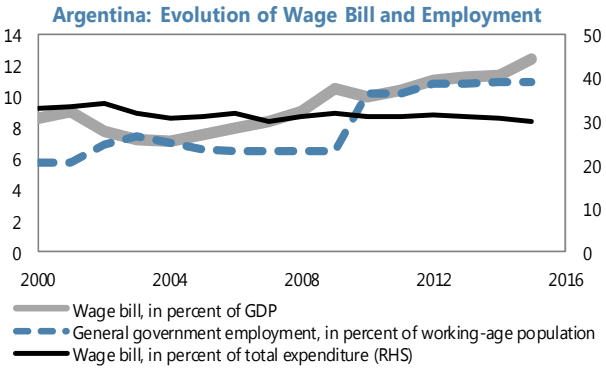
Wages

8. **Argentina's spending on wages as a share of GDP rose by 50 percent from 2007–15, and far exceeds the regional average**.

- Wages are the single largest component of general government expenditure in Argentina, at 12½ percent of GDP in 2015.

- Approximately 70 percent of general government wage expenditure, amounting to 8½ percent of GDP in 2015, owes to provinces. At the provincial level, the wage bill is the most important expenditure component, accounting for more than half of primary spending.

- Comparing general government expenditure on wages weighted by GDP across Latin America in 2015, Argentina had the highest spending on wages, well above the regional average of 7 percent. Indeed, Argentina's general government wage bill is not only well above regional peers and other EMs, but also above the advanced economy average of 10 percent of GDP.[4]



Sources: Mecon and staff projections.

9. **The increase in the general government wage bill was mainly driven by an increase in public employment**. Two pieces of evidence point to this:

- A breakdown of the price and volume effects driving the increase in the wage bill from 2007–15 demonstrates that two-thirds of the 4 percent of GDP increase in wages owed to volume effects, indicating that the increase in public employment over this period drove the surge more than wage levels (see Box 1).

- The number of public employees in Argentina increased steeply over the last decade. Between 2001 and 2014, the number of public sector employees in Argentina rose by 70 percent from 2.3 million to 3.9 million. Over 80 percent of this expansion happened at the provincial and municipal government levels.[5] As a result, the share of public sector employees in Argentina's workforce rose to 18 percent by end-2014, above the Latin American average of 12 percent, and the ratio of public employees to the working age population rose to 11 percent, comparable to the advanced country average, and well above the LA6 and EM averages of 7 percent and 8 percent, respectively.[6]

10. **While employment was the main driver of the wage bill, Argentina's public sector wage premium also stands out, above the LA6, EM and advanced economy averages**. Argentina's average public sector wage premium (measured as the public-private wage differential as a percent of private wage) was most recently estimated at 13¼ percent, above the LA6 and EM averages of 11 percent and 11¾ percent, respectively, and far exceeding the advanced economy average premium of 5½ percent.[7] It would be important to analyze the degree to which this premium is justified by the productivity and skill level of public employees

[4] IMF Board Paper "Managing Government Compensation and Employment—Institutions, Policies, and Reform Challenges", April 2016.

[5] Dieguez, Gonzalo and Gasparin, Jose, CIPPEC, "El rompecabezas del empleo público en Argentina: ¿Quienes hacen funcionar la maquinaria del Estado?", April 2016.

[6] IMF Board Paper "Managing Government Compensation and Employment—Institutions, Policies, and Reform Challenges", April 2016.

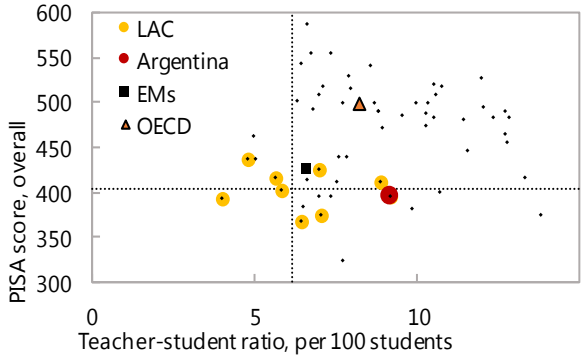
[7] IMF Fiscal Affairs Department staff estimates, and IMF Board Paper "Managing Government Compensation and Employment—Institutions, Policies, and Reform Challenges", April 2016.

in different sectors, given the pass-through of high public wages to the private sector, as well as the crowding out of other public spending by the wage bill.

11. **A closer look at functional areas of public employment in Argentina suggests potential savings from enhanced efficiency in education and health expenditure**. While the percentage of a country's workforce that is publically employed ultimately depends on national choices regarding the role of government, it is possible to assess the efficiency and cost-effectiveness of service delivery by looking at cross country data to estimate "efficiency frontiers."[8]

- *Education*: Over 70 percent of public expenditure in education in Argentina is directed towards teachers' salaries. While primary and tertiary education expenditure and indicators in Argentina are comparable to regional averages and produce relatively good outcomes, secondary school spending is high compared to peers, and does not appear to produce better education outcomes. In particular, the latest available estimates suggest that Argentina's secondary school expenditure per student was 70 percent higher than the LA6 average and 40 percent higher than the EM average, and Argentina's secondary school teacher-student ratio was higher than even the OECD average. However, Argentina's latest available PISA scores were below the average scores for the LA6, EMs and advanced economies (Chart).

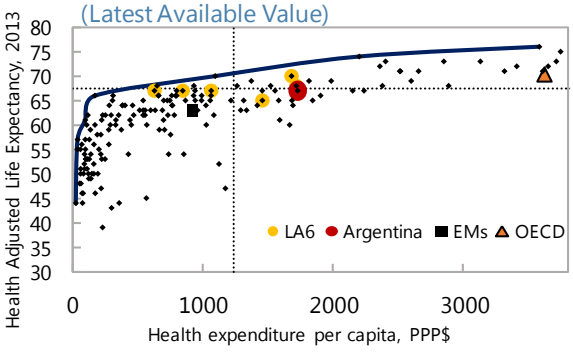
Secondary School Teachers and PISA Outcomes 1/
(Latest Value Available)



Sources: World Bank and IMF staff estimates.
1/ Dashed line is LA-6 average.

- *Health:* Public health expenditure, relative to total public expenditure as well as to total health expenditure, also appears to be high in Argentina relative to other countries with similar health outcomes (as measured through life expectancy and other indicators). Based on the most recent data, Argentina's public health expenditure amounted to 32 percent of

Health Spending Efficiency Frontier 1/
(Latest Available Value)



Sources: World Bank and IMF staff estimates.
1/ Dashed line is LA6 average.

[8] These are calculated using Data Envelopment Analysis (DEA), a non-parametric technique pioneered by Charnes, Cooper and Rhodes (1978), and further developed by Seiford and Thrall (1990), which helps measure the efficiency of activities with multiple outputs and inputs by focusing on frontiers rather than central tendencies.

total government expenditure, compared to 15 percent for the LA6 and OECD, and 12 percent for EMs. While this may simply indicate a policy choice to provide public healthcare in Argentina, PPP-adjusted *total* health expenditure per capita in Argentina was also significantly higher than the LA6 average, and almost double the EM average, while health outcomes were largely in line with peers, below the efficiency frontier. Furthermore, over two-thirds of public healthcare expenditure in Argentina is directed towards salaries rather than capital investment in machinery, technology and health infrastructure. These results suggest there could be room for enhancing efficiency by streamlining the public healthcare workforce.

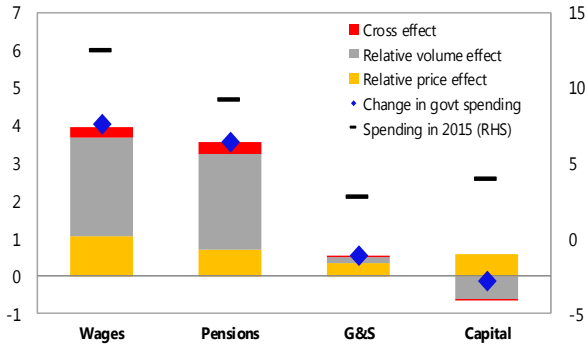
12. **A combination of judiciously implemented employment and wage measures could help reduce Argentina's general government wage bill without negatively impacting service delivery**. The IMF Board Paper "Managing Government Compensation and Employment—Institutions, Policies, and Reform Challenges" (April 2016) discusses lessons learned from several country cases and presents a host of wage and employment measures that have been effectively used to tackle wage bill pressures, many of which are relevant to Argentina. For example, strengthening payroll management to track and control public employees and their payroll, together with a census to identify ghost workers and double-dippers, could bring important savings, without any negative impact on service delivery. In addition, while a first-best approach involving a functional review of public sector ministries to merge units and streamline employment would take time, the paper suggests an attrition-based reduction in public employment, such as an elimination of certain retiring workers' positions, could help raise efficiency in the interim, without direct consequences to unemployment. On the wage-side of the equation, an ad-hoc public wage adjustment, such as a temporary across the board nominal wage freeze, could be warranted, especially given Argentina's high public wage premium. So far, the new administration has reportedly eliminated about 11,000 public sector jobs in 2016 through the downsizing of political employees and improperly hired personnel in various ministries. Going forward, in September 2016, the administration unveiled a comprehensive plan to increase efficiency in various ministries through voluntary retirement plans and the elimination of redundant positions over the next two years.

Box 1. Decomposing the Price and Volume Effects Driving Public Expenditure Growth

A decomposition of the price and volume effects behind public spending growth can provide useful information on the sources of expenditure growth, thereby disclosing what areas to target in order to enhance spending efficiency. For example, if wage and pension levels (price effects) were the drivers of spending growth in these categories rather than the number of public employees or pensioners (volume effects), policy responses could focus more on containing increases in the levels of wages and pensions.

To assess which effect was more pertinent in the case of Argentina, we employ the methodology used in the IMF's April 2014 Fiscal Monitor. Using the formula below, we separate the impact of volume growth from increases in prices across expenditure subcategories over the period 2007–15. The formula decomposes the change in each expenditure category over this period into three parts: the change in the price deflator for the category holding real expenditure for that category constant (price effect); the change in the real expenditure for the category holding the price deflator constant (volume effect); and the residual (cross effect). We use the nominal wage index as the deflator for wages and pensions (as the latter are linked to wages), and the consumer price index as the deflator for goods and services and capital expenditure. Social transfers were excluded given the lack of a suitable deflator.

Argentina: Decomposition of Change in Government Spending, 2007-15
(Percent of GDP)



Sources: Mecon and staff estimates.

$$\Delta\frac{C}{Y}=\left[\frac{P_T^G}{P_T^Y}-\frac{P_0^G}{P_0^Y}\right]\frac{c_0}{y_0}+\left[\frac{c_T}{y_T}-\frac{c_0}{y_0}\right]*\frac{P_0^G}{P_0^Y}+\left[\frac{c_T}{y_T}-\frac{c_0}{y_0}\right]\left[\frac{P_T^G}{P_T^Y}-\frac{P_0^G}{P_0^Y}\right]$$

where C = nominal government consumption; Y = nominal GDP; P^G = government consumption deflator; P^Y = GDP deflator; c = real government consumption; y = real GDP; T = time; and 0 = initial time.

Our results indicate that, as in other EMs, volumes drove the lion's share of spending growth in Argentina's two main expenditure categories: wages and pensions. Two-thirds of the increase in the wage bill between 2007 and 2015 owed to an increase in public employment. In the case of pensions, over 70 percent of the increase owed to volume effects or expanded coverage, given the moratorium of 2004–5.[2]

[1/] As demonstrated in Chapter 2, Box 2.1, of the IMF's April 2014 Fiscal Monitor.

[2/] Between 2005 and end-2011, 2.7 million elderly adults gained access to pension benefits due to the pension moratorium of December 2004 (Law no. 25994).

Energy subsidies

13. **Energy subsidies have risen dramatically in Argentina over the past decade causing social transfers to far exceed the regional average**. At the general government level, Argentina spent 6¾ percent of GDP on social transfers in 2015, against a regional average of 2¼ percent. Most of these transfers (6 percent of GDP) are at the federal level, and comprise energy subsidies (4 percent of GDP). The increase in federal energy subsidies, from 1¼ percent of GDP in 2007, happened as a result of the government's policy to keep domestic energy tariffs largely constant after 2002, in an attempt to prevent the pass-through of high international energy prices to consumers. The policy hurt the domestic energy sector—as tariffs fell well behind production costs and inflation. As investment in the energy sector declined due to the unpropitious environment in the sector, there was a gradual rise in the share of imported energy. Increased import dependency, in turn, hurt the fiscal accounts, particularly in light of the significant depreciation of the nominal exchange rate over this period (between 2011 and 2014, the average nominal exchange rate of the Argentine peso against the U.S. dollar depreciated 50 percent in foreign currency terms). Staff estimates for the impact of exchange rate depreciation on energy subsidy expenditures, using simple OLS regressions, suggest an elasticity of close to 1. Thus, the increasing share of energy imports coupled with currency depreciation were a direct blow to the government's energy subsidy bill. Indeed, staff estimates suggest the peso depreciation since December 2015 would have increased the energy subsidy bill to about 5½ percent of GDP in 2016, assuming no policy changes.

14. **Energy subsidies are poorly targeted**. As in other countries, energy subsidies in Argentina are largely regressive, with many poor segments of the population lacking access to the subsidized products. In particular, a 2015 study by CIPPEC estimated that the poorest 20 percent of households only received 12 percent of natural gas subsidies, and 18 percent of electricity subsidies, while the richest two deciles received 39 percent and 21 percent, respectively. The statistics for public transport are no better, with the poorest 20 percent receiving 11 percent of bus subsidies and 3 percent of train/tram subsidies, compared to 21 percent and 29 percent, respectively, for the top two income deciles. This suggests that public resources that are currently devoted to subsidize households that can afford to pay in full could be redirected towards well-targeted social programs and at the same time achieve fiscal savings. Given the small share of total energy subsidies received by low-income groups, staff estimates suggest that fully compensating the bottom 4 income deciles for a complete elimination of subsidies would bear a fiscal cost of only ½ percent of GDP (see Box 2). This compares to the gross fiscal gains from eliminating energy subsidies of 5½ percent of GDP. Thus, the net fiscal gains from subsidy reform, after fully compensating the bottom 40 percent of households, could potentially amount to as much as 5 percent of GDP.

Box 2. Measuring the Impact of Subsidy Reform on the Most Vulnerable

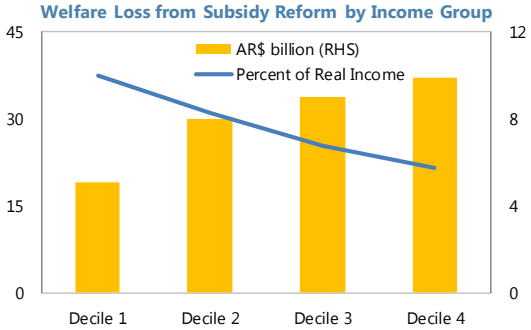
As per Coady et al (2013), an estimate of the direct impact of eliminating subsidies on the income of the most vulnerable can be calculated by multiplying the budget share of each income decile for energy by the increase in the cost of energy that would result from an elimination of subsidies.

Average Price in Argentina (percent of international benchmark)

	Nov-15	Feb-16 1/
Natural gas	0.39	0.24
Electricity	0.25	0.16
Fuel (public transport)	1.25	0.78

Sources: Montamat y Asociados and staff estimates.
1/ After 60 percent depreciation.

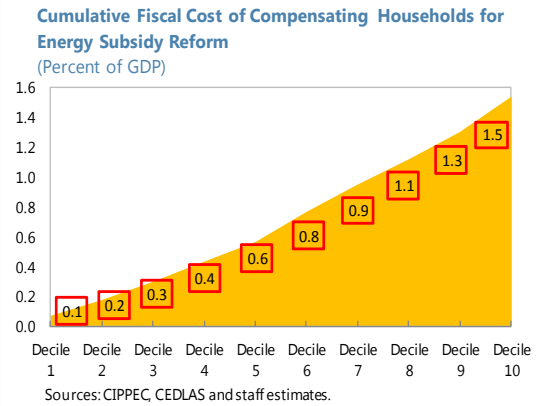
We estimate the increase in the cost of energy that would result from an elimination of subsidies by assuming an equalization of average domestic energy prices with their international benchmarks. As of February 2016 (see table), an equalization of the average natural gas, electricity and fuel prices in Argentina with their international benchmarks would have required average price increases of 310 percent, 540 percent, and 28 percent, respectively.



Sources: CIPPEC, CEDLAS and staff

Multiplying these price increases by the budget share of each income decile for each of these products gives us the percent loss in real income that they would face.[1] Thereafter, the income share of each decile allows us to quantify each income group's real income loss in pesos, and thereby the amount that they would need to be compensated.

Our results indicate a loss in real income of 37 percent, 31 percent, 25 percent, and 21 percent, for income deciles 1 through 4, respectively, corresponding to roughly 0.1 percent of GDP in each case. Compensating the bottom 4 deciles for their real income loss caused by the elimination of energy subsidies would therefore cost the government only 0.4 percent of GDP.

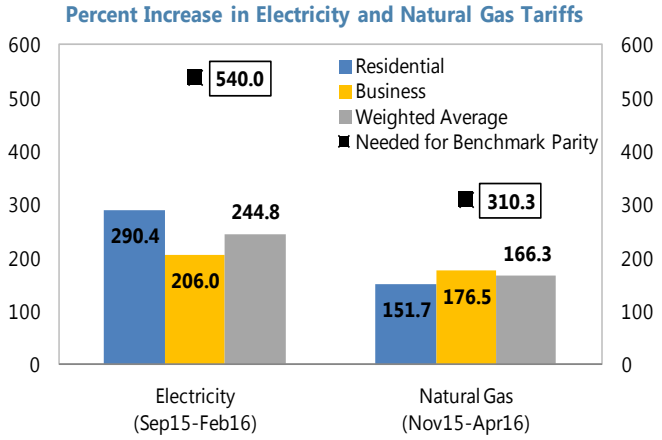


Sources: CIPPEC, CEDLAS and staff estimates.

[1/] The budget shares are available from CIPPEC's September 2015 report.

15. **The new government has increased electricity and natural gas tariffs in 2016 but went roughly halfway towards parity with international reference prices**.[9]

- The electricity and natural gas tariff increases executed by the new administration were not imposed on the entire population—a *tarifa social* was preserved for vulnerable segments, as was a basic monthly consumption level at or below which rates would remain zero.



Sources: CERES, Montamat y Asociados and staff estimates

- The electricity tariff hike implemented by the new administration in February 2016, raised the weighted average of residential and non-residential electricity tariffs by around 245 percent relative to September 2015.[10] Estimates of the post-December 2015 price differential between average domestic and international reference prices for electricity suggest an increase on the order of 540 percent would have been required to achieve parity.[11] Thus, other things equal, average domestic electricity tariffs appear to have moved 45 percent closer to parity with their international reference prices.

- In the case of natural gas, the tariff hikes implemented in April 2016 resulted in a weighted average increase of 166 percent relative to November 2015, whereas an increase of 310 percent would have been required to equalize the domestic price with its international benchmark.[12] However, in August 2016, the Supreme Court ruled for a reversal of the increase in residential (41 percent of natural gas subsidies) natural gas tariffs. The government subsequently announced a three-year plan to phase out natural gas tariffs and achieve import parity by 2019, with the exception of the *tarifa social* that will be maintained.

[9] Public transport tariffs have also been increased in 2016 but fiscal savings from this are unclear given the increased cost of fuel borne by the government to provide these services. Public transport (fuel) subsidies account for 1½ percentage points of energy subsidy expenditure projected for 2016.

[10] Estimates of the increase in residential and non-residential tariffs based on CERES, February 2016. Based on CIPPEC's September 2015 report, 46 percent of electricity subsidies are directed towards residential consumers, while 54 percent are directed towards non-residential (commercial and industrial) consumers.

[11] Estimates of the pre-December 2015 depreciation price differential between average domestic and international reference prices are from Montamat y Asociados. Estimates of the post-December 2015 price wedge, after the large nominal depreciation, are based on staff calculations, which deflate the pre-depreciation price wedge by the rate of depreciation to get the new wedge.

[12] The share of natural gas subsidies directed to residential and non-residential consumers are 41 percent and 59 percent, respectively. CERES, April 2016, and CIPPEC, September 2015.

- Since electricity and natural gas account for 75 percent of the government's energy subsidy expenditure, the executed increase in their tariffs, even after the Supreme Court ruling on residential natural gas tariffs, is estimated to reduce the fiscal cost of subsidies by about 1¾ percent of GDP in 2016.

16. **Full elimination of remaining electricity and natural gas subsidies would yield additional gross fiscal savings of about 2¼ percent of GDP**. Of the 5½ percent of GDP in energy subsidies estimated for 2016, 4 percentage points are accounted for by electricity and natural gas subsidies. Given the 1¾ percent of GDP reduction in these subsidies expected through the tariff hikes already implemented, another 2¼ percent of GDP in gross fiscal savings could be garnered from a full elimination of these subsidies through further tariff hikes of 55 percent for electricity and 46 percent for natural gas, to close the gap with international reference prices. Even after compensating the bottom 4 income deciles for their loss in real income arising from this, the government would see net fiscal savings of 1¾ percent of GDP.

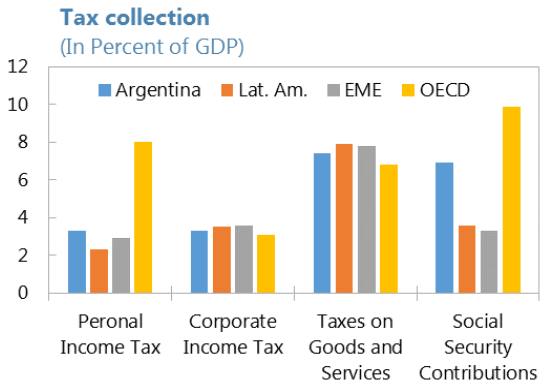
17. **In order to achieve and maintain full cost recovery on remaining energy subsidies, the adoption of a rule-based automatic price adjustment mechanism for setting energy tariffs is strongly recommended.** As international experience shows, adoption of an automatic price adjustment formula to set energy tariffs reduces the uncertainty on the future cost of energy, which is likely to be an important disincentive for investment, and also reduces the level and volatility of the fiscal cost of energy pricing policy. Implementing such a mechanism would require the establishment of a clear pricing structure for each energy product, linking retail prices of the product with international prices, based on costs, margins, taxes, as well as an agreed mechanism for handling import price volatility (see Coady et al, 2012).

C. Tax Revenues

18. **Argentina's tax burden increased dramatically in the past ten years and is one of the highest in the region and among emerging markets**. The ratio of tax revenue to GDP started to increase in 2001, following the introduction of the highly distortive financial transaction tax and export taxes. During 2006–15 overall general government tax revenue increased sharply, by over 7 percentage points of GDP reaching 32 percent of GDP, 10 percentage points above the regional average and only about 4 points below the OECD average.[13] Most of the increase came from a pickup in the VAT, a jump in social security contributions (mostly explained by the reabsorption of private pension schemes into the public sector), and, since 2011, a pickup in the personal income tax (PIT), mainly as the lack of indexation of income brackets since 2001 meant that inflation pushed more and more tax payers into brackets with higher marginal rates, and the lack of indexation of the non-taxable income and other deductions meant that the effective tax rates increased.

[13] It includes social security contributions.

19. **The contribution of individual taxes to total revenues is similar to that of regional peers and other emerging market economies**. On average, during 2011–15, indirect taxes (on goods and services) contributed about 44 percent of total revenues, social security contributions 21 percent, and direct taxes 18 percent. Although the distribution is skewed towards indirect taxes, which tend to be regressive, the structure of Argentina's tax revenues is common to most emerging market economies, where informality in the labor market and/or weak capacity in tax administration hamper effective taxation of income taxes (both personal and corporate).



Sources: MECON, WEO, and OECD.

20. **However, three features of Argentina's tax system stand out: a large number of taxes, concentration of collection into few taxes, and the existence of some highly distortive taxes with high revenue yields**. Without counting stamp duties at the local level, there are over 35 different type of taxes collected nation-wide, many of which are characterized by a great dispersion of rates (for example, there are 6 different rates on different types of fuel) and by special earmarking regimes. However, about 87 percent of total tax revenue comes from just 6 federal and 3 provincial taxes; another 10 percent is raised through 9 taxes; and the remaining 3 percent of total tax collection is distributed across the remaining taxes. In June 2016, the authorities approved the gradual elimination of the presumed income tax, and reduction of the tax on personal goods. However, a further simplification of the system, with the elimination of a number of taxes and the unification of others (for example, those on fuel) would likely result in little revenue loss, but savings in administrative and compliance costs. Distortive taxes include the financial transactions tax, provincial gross turnover tax, as well as export taxes on soy.

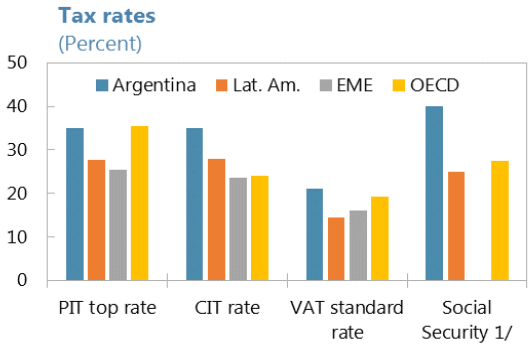
21. **Argentina's tax system suffers from four major weaknesses**:

- *Over the years, the personal income tax has lost progressivity***.** Bracket creeping and the decrease in the real value of deduction flattened the dispersion of PIT taxes paid by individuals in relation to their income. In January, to partially correct for the loss of progressivity, the authorities increased the minimum non-taxable income and other deduction, which effectively aligned their real value to 2011 levels.

- *Corporate income taxation hampers investment, innovation, and the growth of firms.* The Corporate Income Tax (CIT) rate, at 35 percent, is one of the highest among emerging market and OECD countries. There are no provisions to allow adjusting the cost of investment for inflation. In a context of high inflation, this effectively increases the marginal tax rate on investment. Also, provisions such as loss-carry forward (5 years), depreciation (straight line), and tax credit on R&D spending (with caps, limited resources in the budget, and a

competitive allocation system) are less favorable than in other countries. Finally, deductions and incentives target small firms rather than new, innovative, or growing firms.[14]

- *The tax wedge is large and makes labor expensive.* Social Security Contributions (SSC) are above OECD average: the sum of employee's and employer's rate spans between 40 and 45 percent of the wage (with a cap only for the employee). As employers are allowed to deduct a share of their SSC from their VAT obligation (at a rate that depends on the district where the employer is located), effectively the total SSC may drop by 10 percentage points for some employers. However, this reduction is highly inefficient because it is only based on location, irrespective of the size, age, productivity, or financing constraints of firms, and it does not create incentives to invest or innovate.



Sources: MECON, WEO, and OECD.
1/ Sum of employee's and employer's rates on gross wage. For Latin America, it includes Brazil, Chile, Colombia, Peru', and Uruguay.

- *Some taxes with high yield are distortionary***.** First, the financial transaction tax, which is levied on transactions in checking and saving accounts, create distortions in the payment systems, by generating incentives to settle payments in cash, has a form of cascading effects, and favors possibly inefficient vertical integration. In addition, with a rate of 0.6 percent on transaction, Argentina has the most onerous financial transaction tax among the four countries in the world that levy this type of tax. Second, at the provincial level, the turnover tax (levied on gross sales) creates distortions through cascading, as the tax paid by the final consumer does not depend only on the value (added or final) of the good or service, but it also depends on the number of transactions that occurred during production. Third, while export taxes on most agricultural and industrial exports have been eliminated, those on soy remain, albeit at a tax rate 5 percent lower than what was previously in place. These taxes hurt the competitiveness of Argentine farmers in this important sector.

22. **Addressing the weaknesses of the tax system would cost the federal government about 1¼ percent of GDP**. We consider two measures in particular:

- *Reducing the CIT by 5 percentage points and introducing incentives for research and development (R&D) and new firms*. As CIT revenues in 2015 were 3.1 percent of GDP, assuming that the cost is proportional to the rate cut, lowering the CIT rate from 35 to 30 percent would cost about 0.4 percent of GDP. At the same time, fiscal incentives that

[14] Moreover, private sector spending on research and development (R&D), an important engine of growth and innovation, is very low (about 0.1 percent of GDP in 2013, against 0.53 in Brazil, or an average of 1.35 in OECD countries) and existing incentives (120 million pesos in the 2016 budget) appear inadequate.

halve the private cost of R&D (which is estimated to be the efficient level of such incentives[15]) would cost 0.1 percent of GDP.[16] As the CIT is also shared with provinces, the revenue loss for the federal budget would be slightly above 0.2 percent of GDP. The loss at the provincial level from CIT reforms could partly be compensated by substituting the turnover tax for a more efficient provincial tax on goods and services, or by increasing property taxes, which are currently low by international standards.

- *Eliminating the financial transaction tax* would imply a loss for the federal government of 1 percent of GDP, excluding the provincial share in this tax.[17]

D. Assessing the Economic Impact of Fiscal Consolidation

23. **In this section, we assess the impact of fiscal consolidation packages on economic activity in Argentina**. The packages considered here deliver the adjustment in the federal primary fiscal deficit announced in January 2016 (for a cumulative 4½ percent of GDP). Leveraging on the review of Argentina's expenditure in Section II, we contemplate adjustment packages involving spending cuts in areas that lack efficiency, as well as measures to reduce the tax burden and improve the tax system, by addressing some of the major weaknesses identified in Section III.

24. **To do so we use the Flexible System of Global Models (FSGM), one of the general equilibrium models available at the IMF**.[18] The advantage of simulating the impact of fiscal policy on growth using a general equilibrium model is that it allows us to examine the behavior of the economy at large, by analyzing the interaction of various microeconomic decisions (IMF, 2014). Needless to say, the results of the analysis are very sensitive to the model's parameters and specific modeling assumptions; in particular:

- *Whether the fiscal consolidation package is credible*. If the fiscal authorities are credible and agents fully anticipate that the fiscal consolidation will be implemented as announced, this triggers agents to adjust their investment and consumption decisions, bringing forward the long-run benefit of the fiscal adjustment. For this reason, the short-term output costs of the consolidation are diminished.

- *The share of liquidity constrained agents in the economy.* The greater the share of households that lack access to financial markets and savings instruments, and thus consume all their income in each period, the stronger the impact of fiscal policy.

25. **For the purposes of our simulations, we assume partial credibility and a 60 percent share of liquidity constrained households**. It would be unrealistic to assume complete

[15] IMF, 2016, "Acting Now, Acting Together", Fiscal Monitor April 2016.

[16] It assumes an elasticity of 1 of R&D spending to its cost.

[17] This is the amount collected in 2015. Going forward, we assume an elasticity of 1 of this tax to GDP.

[18] A description of the model can be found in Annex II.

credibility for the new administration, given the track record of previous administrations and the history of expansionary fiscal policy in Argentina. Nonetheless, it would also be unreasonable to assume no credibility, given the multitude of measures already implemented by the new government. We therefore simulate our models under the assumption of *partial (or growing) credibility*, with agents only believing that the change in policy will be permanent once it has been in place for two years. With respect to liquidity constrained households, we assume a 60 percent share for Argentina, in line with the average share for EMs.

26. **First, we simulate a fiscal consolidation package that only includes expenditure measures**. This package (Table: Adjustment Scenario 1) assumes that the federal government achieves a 1½ percent of GDP consolidation per year from 2017–19 to meet its primary targets through expenditure measures that build on the analysis in Section II. In particular:

- A reduction in the wage bill of 2 percent of GDP.[19]
- A reduction in energy subsidies of 3½ percent of GDP.
- A ½ percent of GDP increase in cash transfers to households, which, as explained in Section II, compensates the bottom 40 percent of the population for the subsidy cuts.
- A ½ percent of GDP increase in capital expenditure (which, at 3½ percent of GDP in 2015 was below the regional average of 5 percent).

27. **Next, we simulate a fiscal adjustment scenario that also adds tax cuts**. This scenario assumes the same overall fiscal consolidation as the previous, but adds tax cuts in addition to spending measures, to correct some of the distortions highlighted in Section III (Table: Adjustment Scenario 2). In particular, the scenario incorporates:

- A 2¾ percent of GDP reduction in the wage bill.
- A 3½ percent of GDP reduction in energy subsidies,
- A ½ percent of GDP increase in cash transfers to the bottom 4 deciles to compensate them for the subsidy cuts.
- A ¼ percent of GDP increase in capital spending.
- A 0.6 percent of GDP decrease in taxes on households' income (through the financial transactions tax).

[19] As noted in Section II, the bulk of the wage bill is at the provincial level. Still, we assume that apart from reducing the federal wage bill, the federal government reduces discretionary federal transfers to provinces, and that provinces react by lowering their wage bill by the same amount.

- A 0.45 percent of GDP decrease in taxes on corporations (through the CIT and the financial transactions tax)

Adjustment Scenario 1

Changes in Expenditure and Revenue Components (In Percent of GDP)

	2017	2018	2019
Wages	-1.00	-1.00	0.00
Capital Expenditure	0.00	0.50	0.00
Transfers to OLG 1/	-1.00	-1.00	-1.50
Transfers to Liquidity Constrained	0.50	0.00	0.00
Taxes on household income	0.00	0.00	0.00
Taxes on corporations	0.00	0.00	0.00
Total adjustment	-1.50	-1.50	-1.50

1/ Assumes a reduction in electricity, natural gas and public transport subsidies.

Adjustment Scenario 2

Changes in Expenditure and Revenue Components (In Percent of GDP)

	2017	2018	2019
Wages	-1.00	-1.00	-0.80
Capital Expenditure	0.00	0.25	0.00
Transfers to OLG	-1.25	-1.25	-1.00
Transfers to Liquidity Constrained	0.50	0.00	0.00
Taxes on household income	-0.10	-0.20	-0.30
Taxes on corporations	-0.15	-0.30	0.00
Total adjustment	-1.50	-1.50	-1.50

1/ Assumes a reduction in electricity, natural gas and public transport subsidies.

28. **Our results indicate that the fiscal consolidation package including tax cuts can deliver stronger growth in the medium term** (Panel 1). We first run our simulation with partial credibility and holding monetary policy in the model constant, to isolate the impact of the fiscal consolidation on growth. The bigger cut in spending required to meet the fiscal targets in Scenario 2 results in a sharper drop in consumption and thus growth in 2017 (GDP growth falls by 1.2 percent in the first year of the adjustment compared to 0.7 percent in Scenario 1). However, from 2018 onwards, lower personal income taxes in Scenario 2 moderate the fall in consumption relative to Scenario 1 and eventually consumption grows at a faster pace. Moreover, investment is much stronger in Scenario 2 throughout the whole period, thanks to the corporate income tax cut, and GDP grows at a faster pace in Scenario 2 starting from 2018. On average over the first 3 years (2017–19), the loss in output in the two scenarios is quite similar (about ½ percent of GDP). Allowing a monetary policy reaction, the average output loss from 2017–19 reduces further, to 0.2 percent.

Average Impact on Growth 2017–19*

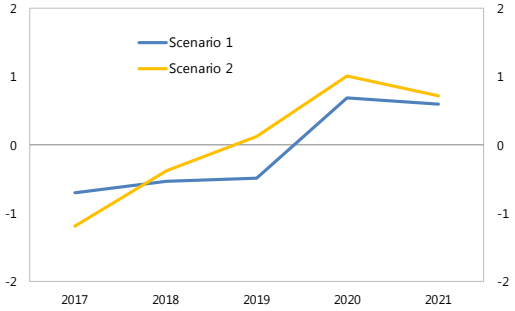
	Scenario 1	Scenario 2
Non-credible	-0.81	-0.91
Partially-credible	-0.57	-0.47
Credible	-0.40	-0.38

*Assuming no monetary policy reaction

29. **The results of our simulations also underscore the importance of policy credibility**. If the policy adjustment were *not* credible, the average loss in output during 2017–19 would be about ¼–½ percentage points higher relative to the partially-credible scenario, as agents would not fully internalize the benefits of the fiscal adjustment and would therefore not increase their investment or consumption accordingly. This suggests that strengthening the credibility of the fiscal policy framework could play an important role in reducing the negative impact of fiscal consolidation on growth.

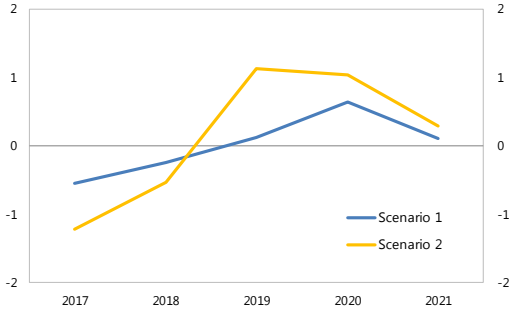
Figure 1. Partially Credible Policies, With vs. Without Monetary Reaction

Impact of Fiscal Consolidation on Real GDP growth: no monetary
(percentage points, relative to baseline)



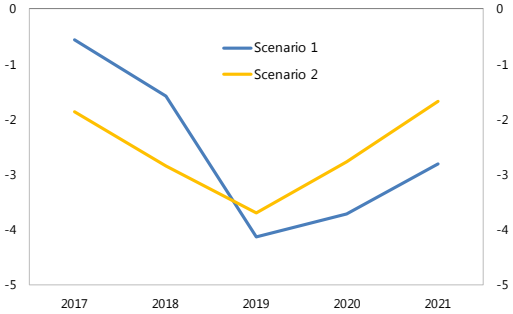
Source: staff estimates.

Impact of Fiscal Consolidation on Real GDP growth: with monetary
(percentage points, relative to baseline)



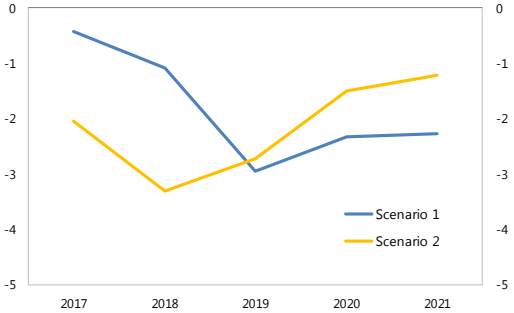
Source: staff estimates.

Impact of Fiscal Consolidation on Real Consumption: no monetary
(percent, relative to baseline)



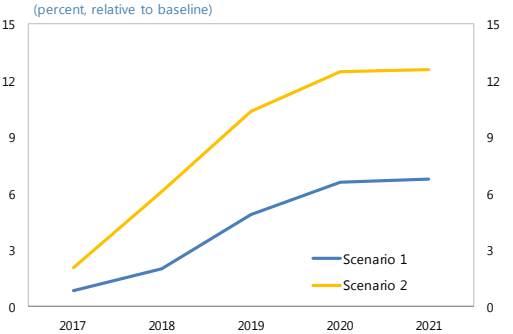
Source: staff estimates

Impact of Fiscal Consolidation on Real Consumption: with monetary
(percent, relative to baseline)



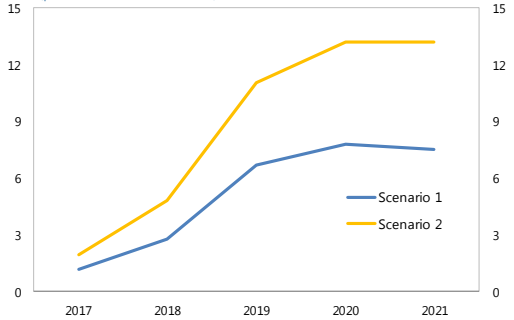
Source: staff estimates

Impact of Fiscal Consolidation on Real Investment: no monetary
(percent, relative to baseline)



Source: staff estimates.

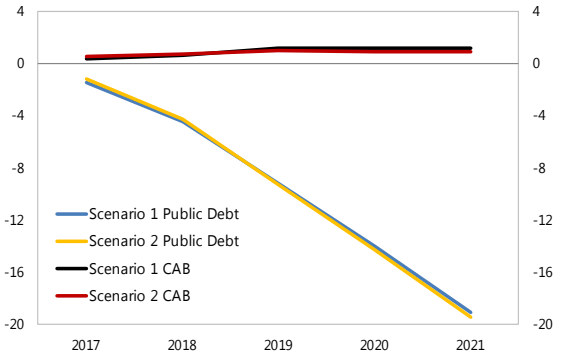
Impact of Fiscal Consolidation on Real Investment: with monetary
(percent, relative to baseline)



Source: staff estimates.

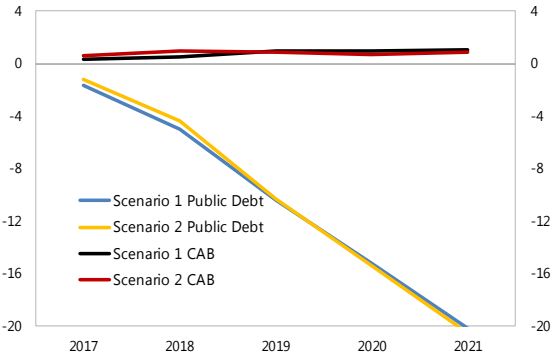
Figure 1. Partially Credible Policies, With vs. Without Monetary Reaction (concluded)

Impact of Fiscal Consolidation on Public Debt and CAB: no monetary
(percent of GDP, relative to baseline)



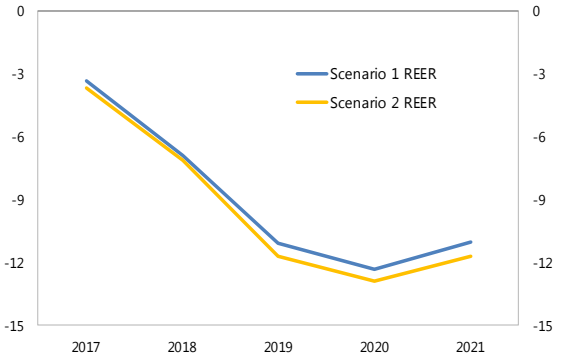
Source: staff estimates

Impact of Fiscal Consolidation on Public Debt and CAB: with monetary
(percent of GDP, relative to baseline)



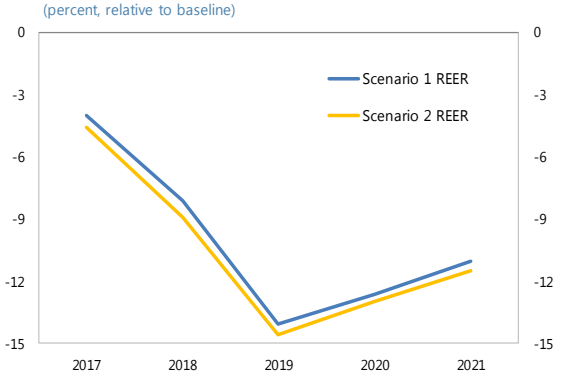
Source: staff estimates

Impact of Fiscal Consolidation on the REER: no monetary
(percent, relative to baseline)



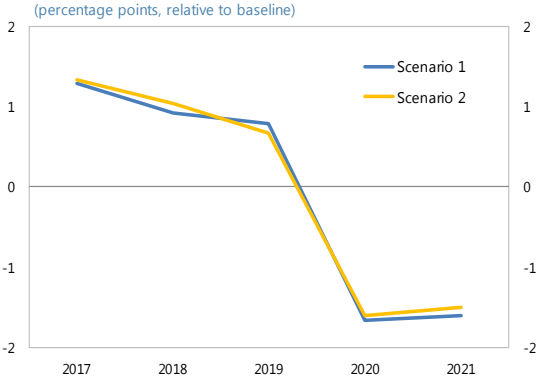
Source: staff estimates.

Impact of Fiscal Consolidation on the REER: with monetary
(percent, relative to baseline)



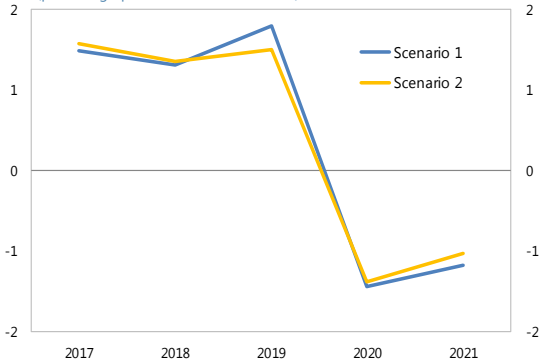
Source: staff estimates.

Impact of Fiscal Consolidation on Inflation: no monetary
(percentage points, relative to baseline)



Source: staff estimates.

Impact of Fiscal Consolidation on Inflation: with monetary
(percentage points, relative to baseline)



Source: staff estimates.

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Annex I. Model Description and Fiscal Policy Analysis

In this paper, we use the G20MOD module of the IMF's Flexible System of Global Models (FSGM) to assess the macroeconomic impact of fiscal policy measures (Andrle and others, 2015). This module encompasses an individual block for each G20 country and four other blocks that effectively complete the rest of the world. The FSGM is an annual, semi-structural, multi-region, general-equilibrium model. Each module features an identical economic structure, but differs in its coverage of countries, key steady-state ratios, and parameterization to capture each region's economic characteristics. The steady-state ratios are country-specific (including GDP composition, structure of fiscal revenue and expenditure, tax rates, trade structure, inflation, and interest rates), and the values mainly correspond to the values at the end of the WEO horizon. Furthermore, the reduced-form structure of the model allows for more empirical content in the determination of its properties in terms of introducing more heterogeneity into the behavior of individual countries.[1]

In particular, the FSGM uses estimated and calibrated parameters to describe particular behavior of each economy. A two-step approach is used to determine the parameter values in most of the equations of the FSGM. First, single equation estimation in panels is undertaken for all regions and countries covered in G20MOD to determine the initial values of the parameters. For example, the estimation of the inflation Phillips curve allows for country-specific values. In addition, especially for coefficients that have a more structural interpretation (for example, households' inter-temporal elasticity of substitution, consumption habit persistence), the calibration is fixed in accordance with the microeconomic and empirical literature. In the case of Argentina, most of these structural parameters are set in accordance to parameters of other emerging market economies. The second step is to use the full model to make adjustments to the initial parameter values to obtain sensible system-wide properties (e.g., through model responses to various shocks) by comparing these to other structural and semi-structural models.

Private consumption and investment have micro-foundations, with agents having model consistent expectations, while trade, labor supply, and inflation have reduced-form representations.[2] The model's potential output is determined by a production function with trend total factor productivity, the steady-state labor force, the non-accelerating inflation rate of unemployment (NAIRU), and the

[1] These reduced form equations differentiate FSGM from previous IMF's global models, such as the Global Economic Model (GEM) by Laxton and Pesenti (2003) and the Global Integrated Monetary and Fiscal Model (GIMF) by Kumhof and Laxton (2007). Both GIMF and GEM are complex structural models with multiple goods and full stock-flow consistency. This complex structure constrains the number of countries/regions that can be described at one time with these models. Relying on reduced form equations in the trade sector, FSGM is capable of handling a large number of blocks.

[2] The consumption block uses a discrete-time version of the Blanchard-Weil-Yaari overlapping generations model, based on a constant-elasticity-of-substitution utility function containing only consumption. For private business investment we use an updated version of Tobin's Q model with quadratic real adjustment costs. The private business capital stock is chosen by firms to maximize profits.

capital stock, and there is a full stock-flow consistency in the model (fiscal deficit/debt, investment and capital stock, and current account balances and NIIP).

While monetary policy follows a standard reaction function, fiscal policy is anchored by a debt rule that assures long-run sustainability.[3] In the case of Argentina, for some of the simulations, and in an attempt to isolate the fiscal policy impact, it is assumed that monetary policy does not change. For the fiscal policy, it is assumed that the primary deficit is reduced in the first three years in line with the illustrative scenarios of fiscal adjustment described in Section IV of this paper, and thereafter, primary balance remains unchanged (while the savings from lower interest spending are saved), putting the government debt on a downward path.

Frictions in the form of sticky prices and wages, and assumptions on the types of households imply an important role for fiscal (and monetary) policy. In particular, FSGM displays important non-Ricardian properties that affect how fiscal policy operates in the economy. First, rather than using infinitely-lived households, FSGM uses overlapping generations households. This way, households treat government bonds as wealth since there is a chance that the associated tax liabilities will fall due beyond their expected lifetimes. The OLG households can save and smooth their consumption, and national savings are endogenously determined given the level of government debt. Second, there are also liquidity constrained (LIQ) households. LIQ households do not have access to financial markets, do not save, and thus consume all their income each period. Ample micro and macro evidence suggests that such non-Ricardian consumption behavior is a key transmission channel for fiscal policy.[4] Thus, the larger the fraction of LIQ households, the larger the impact of temporary policies. Like most global models, we assume that the share of liquidity-constrained households is smaller for advanced economies (35 percent) than for emerging market economies (60 percent).

FSGM's fiscal sector is sufficiently disaggregated to capture peculiarities of different taxes and expenditure categories. This disaggregation captures each country particularities in terms of government size, spending and taxes composition, and enables the model to simulate fiscal policy reforms and to incorporate feedback mechanisms to the macro-economic variables. In particular, the expenditure categories include government consumption, investment, targeted transfers and general transfers. The revenue categories include corporate income taxes, personal income taxes, royalties, value-added taxes, and lump-sum taxes.

Given the micro-foundation of the households' sector, each policy instrument has a different multiplier. For example, the near-term effects of transfers are likely to depend on how the transfers are distributed across households. Cuts in transfers that are concentrated on households facing liquidity constraints are likely to be associated with a larger multiplier compared to cuts to general

[3] See Andrle and others (2015) for more details.

[4] Using micro data from the Consumer Expenditure Survey, Johnson et al (2006) and Parker et al. (2011) find evidence of a substantial response of U.S. household spending to the temporary tax rebates of 2001 and 2008. On the macro side, Gali, Lopez-Salio and Valles (2007) present evidence from structural VARs that government spending shocks tend to boost private consumption, and show how the inclusion of financial constrained agents in their DSGE model helps it account for this behavior.

transfers to all households. On the revenue side, a reduction in personal income taxes would reduce labor costs and increase the desired level of capital stock by firms, spurring investment spending. Alternatively, an equivalent reduction in corporate income taxes has a larger impact on investment spending, because it directly increases the returns on capital.

ARGENTINA'S PENSION AND SOCIAL SECURITY SYSTEM: A SUSTAINABILITY ANALYSIS[1]

A. Introduction

1. **During the past ten years, Argentina's social security spending has been posing increasing pressure on the fiscal accounts.** In particular, spending on pensions doubled, in percent of GDP, during 2005–15, not only reaching one of the highest level in the region (7.4 percent of GDP) but also becoming the largest single expense in the federal budget (about 35 percent of total federal government spending, MECON, 2015). The excess of social security spending above contributions reached 2.8 percent of GDP in 2015, weighing heavily on public finances.[2]

2. **This paper addresses the following questions:**

- What are the major structural challenges that Argentina's social security (and pension system in particular) currently faces?
- Is the system sustainable over the long run, under current policies?
- What are viable reform options, and how much savings would these yield?

3. **We discuss the key features of Argentina's social security system and present an actuarial study on pensions.** To project social spending over the long-run we simulate the effects of the current system on Argentina's population dynamic, cohort by cohort, under long-run economic assumptions for growth, inflation, productivity growth, and participation rates.

4. **We find that Argentina's social security system needs to be reformed to remain financially viable in the long run.** The deficit of the pension system would increase to over 5 percent of GDP in 2066, and the public pension fund is not large enough to finance this deficit. Correcting this imbalance would require parametric reforms within the system, but also institutional changes to clearly separate social security from social assistance, both in terms of budget implications and administrative responsibilities.

[1] Prepared by Paolo Dudine.

[2] This paper focuses only on the part of social security spending directly administered by the National Social Security Agency (ANSES, Agencia Nacional de Seguridad Social). It excludes pensions of the police and military forces (0.5 percent of GDP in 2015) and disability and other non-contributory pensions under the Ministry of Social Development (1.2 percent of GDP in 2015). Including these items, social security spending amounted to 9.2 percent of GDP in 2015, or 45 percent of total federal spending.

B. The System

5. **Argentina's social security system is a public only, pay-as-you-go system, that mainly offers two types of benefits: family allowances and pensions** (Box 1). Family allowances are granted for dependents and for life events such as pregnancy, birth, and marriage, at amounts that are a function of the recipient's income, and province of residence. Pensions mostly consist of retirement, old age, invalidity, and survivor benefits. Unemployment insurance exists, but the magnitude of this program is practically nil. The system, administered by the National Social Security Agency (ANSES, *Agencia Nacional de Seguridad Social*[3]), is the result of a long process of reforms and experimentations with different structures (including coexistence of a private and a public pillar), culminated in the reforms of 1993 and 2008 (see Box 3 for a brief summary of the system's history).

6. **Since it was last reformed, in 1993 and then 2008, the system underwent three major developments, with contrasting effects on its financial viability.** These developments reflect both structural issues of Argentina's economy (informality, and the presence of pockets of poverty) and the effects of policies introduced to confront them.

- *Expansion of coverage*. Beneficiaries of family allowances quadrupled in ten years, from 3 million in 2005 to 11.3 million in 2015. Most of the increase was contributed by the introduction, in 2011, of a Universal Child Allowance (AUH, *Asignación Universal por Hijo*) which extended allowances to 3.7 million children from low income households, mostly unemployed or informal sector workers. During 2005–15, pension coverage was extended by over 40 percentage points, to around 87 percent of men and 83 percent of woman above retirement age, one of the highest rate in the region. In particular, two pension moratoria (at end-2008 and in 2014) allowed about 2.9 million people who had reached retirement age, but lacked sufficient years of contributions, to receive a benefit after recognizing a debt for the missing contributions.[4] Greater coverage has positively contributed to alleviate poverty among the elderly (UNDP, 2014), and improve social indicators among the poorest (especially AUH, which was instrumented as a conditional cash transfer), but it has also required greater financing (Lustig and Pessino, 2014).

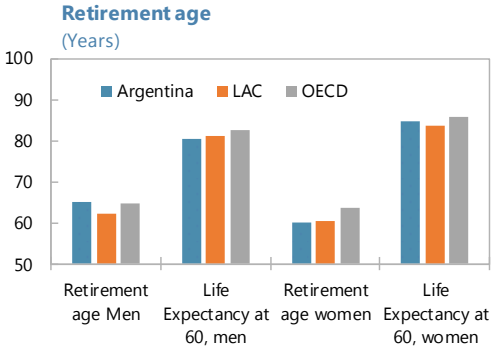
- *Low participation rates*. A high level of informality and frequent interruptions in work careers result in low annual participation rates (Bertranou et al., 2014, Rofman and Apella, 2015, and World Bank, 2008). Since the system was unified in 2008, about half of working age males and only 25 percent of females have been providing social security contributions.

[3] In addition to contributory pensions and family allowances, ANSES executes payments for invalidity pensions, and retirement benefits and pensions of armed forces personnel and the police. These however are regulated by and budgeted under the accounts of the Ministry of Social Development, the Ministry of Defense, and Ministry of Security respectively.

[4] The pension received was the minimum pension less a deduction linked to the recognized debt, up to certain limits.

Box 1. Argentina's Current Pension System

Argentina's pension system is a defined benefit pay-as-you go system. Among the main features of the system are:

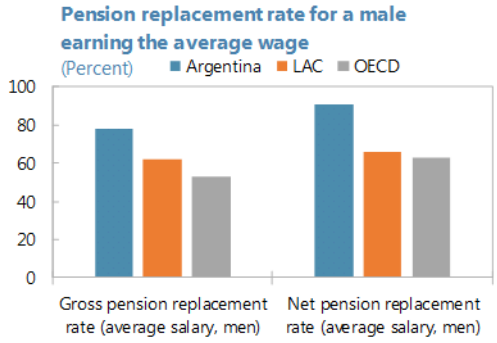


Sources: OECD "Pensions at a Glance, 2015" and OECD, IADB, and World Bank "Pensions at a Glance: Latin America and the Caribbean".

- *Retirement age*: it is 60 for women and 65 for men, with at least 30 year of contributions. While retirement age for men and contribution requirements are in line with OECD average, retirement age for women is 3 years lower, in particular as expected life at age 65 is similar to the OECD average.

- *Contributions*: During their work life, employees contribute 11 percent of their gross earnings (slightly above the OECD average of 8.2 percent), up to a maximum. Employers contribute between 17 and 21 percent of gross earnings, with no maximum.[1]

- *Pension amount*: at retirement, beneficiaries are entitled to a basic pension (PBU, *Pensión Básica Universal*[2]) and a contribution-related pensions. In 2015, the PBU was roughly equivalent to 26 percent of the national average wage. The contributory pension is calculated as a proportion (1.5 percent times the number of years of contributions, up to 35) of the average wage of the last ten years of work history. In computing this average, past wages are adjusted based on the benefit indexation formula (*movilidad*). The sum of the contribution-related benefit and the PBU is bound by a minimum and a maximum. In 2015, the minimum was about 54 percent of the national average wage. As a result, the replacement rate (the ratio of the benefit to the last wage earned) is about 72 percent for a person earning an average wage, above the OECD average (53 percent for a person earning the average wage).



Sources: OECD "Pensions at a Glance, 2015" and OECD, IADB, and World Bank "Pensions at a Glance: Latin America and the Caribbean".

- *Pension indexation*: after retirement, all benefits (including the PBU, the minimum, and the maximum) are adjusted based on the *formula de movilidad* (see Box 2)

As of end-2015, 5.3 million people received at least one form of pension, of these about 4.8 million were retirees (data ANSES). Women account for about 50 percent of non-retirement pensioners and 65 percent of all retirees, reflecting earlier retirement, longer life expectancy, and greater coverage under the moratoria. Overall, the system covers 87 percent of men and 83 percent of women above their respective retirement age, including those who entered the system under the moratoria regime; excluding them, the coverage ratio would be 62 percent for men and 20 percent for women. In terms of distribution, about half of beneficiaries received the minimum pension, and less than 5 percent the maximum. At the same time, about 9.4 million people contributed to the system, or about 36 percent of the working age population.

1/ Employees and employers contribute another 3 and 6 percent respectively for health insurance.

2/ Although it is called "universal" this basic pension only accrues to people who meet the age and contributions criteria.

Box 2. The Indexation Formula (La Fórmula de Movilidad)

Starting in March 2009, all benefits (pensions, but also family allowances) are adjusted twice a year according to an indexation formula, which links the rate of increase in benefits to the rate of increase of ANSES' resources per disbursed *pension* benefit. Benefits disbursed under the moratoria regimes are not included. The formula determines the rate of increase (d) as the lower of two rates: (i) the simple average of the rate of increase in ANSES' tax revenues per disbursed pension benefit (*rb*) and the rate of increase of open ended employees' wages (w) (specifically, the *Remuneración Imponible Promedio de los Trabajadores Estables*, RIPTE); and (ii) the rate of increases in ANSES' total revenue per disbursed benefit (*trb*) times a coefficient. Total revenue includes tax revenues plus social security contributions. Transfers from the Treasury are excluded from the formula. By law, the formula cannot result in a decrease in benefits.

$$d = min\begin{cases} 0.5 * rb + 0.5 * w \\ 1.03 * trb \end{cases}$$

Although designed to link benefits to available resources, the fact that the formula incorporates the percentage change in revenues per pension benefit carries some distortions:

- *The formula infuses pro-cyclicality to social security spending.* Everything else equal, a faster increase in ANSES' tax revenue during an economic boom conduces to a greater increase in benefits. Reversely, sluggish tax revenue during an economic contraction conduces to a slower increase in benefits.

- *Benefits depend on pension coverage.* Everything else equal, an increase (decrease) in coverage leads to a lower (greater) increase in benefits. For example, simulation indicates that, in 2015, had coverage of contributory pension been 1 percentage point greater (smaller) than it was, the increase in benefits would have been 0.8 percentage point smaller (greater). If unaddressed, this could potentially undo the savings of any reform that directly or indirectly affects coverage.

- *The formula causes benefits to grow above inflation*. Since 2009, benefits grew, on average, 2.7 percentage points a year above inflation, and over 6 percentage points above inflation in 3 single years. This bias arises because, over the long-run, all the ingredients of the formula tend to grow at a rate that is equal to inflation plus the difference between the growth of labor productivity and the growth in the stock of retirees. Wages (especially those of stable workers) can be expected to growth as the sum of inflation and labor productivity. ANSES' tax revenue, assuming a constant ratio to GDP, can be expected to grow at a rate roughly equal to the sum of inflation and potential GDP growth, which, in turn, corresponds to productivity growth (population projections indicates that working age population will not grow in the long-run). As a result, as far as labor productivity grows above the rate of growth of the population older than retirement age (1.3 percent in the long-run), benefits would grow above inflation.

Box 3. History of Argentina's Social Security System

Argentina's social security system is one of the oldest in the world. Its origins date back to the turn of the 18th century, as private and public funds for separate work categories emerged. An extensive public social security system was instituted in 1944, and funds for family allowances were created in the late '50s. Beginning in the late '60s and early '70s, the system underwent several reforms aimed at reducing fragmentation and expanding coverage, including of family allowances. During the '80s and early '90s, a decline in real wage growth, a reduction in the number of contributors (as informality picked up), and a tilt in population age put growing pressures on the finances of the system (Rofman and Apella, 2012).

The 1993 reform aimed at correcting emerging imbalances. The reform introduced a two-tier system, with a public and a private pillar (law 24241). The first tier, participation to which was compulsory for all workers, offered a universal flat benefit to all retirees (PBU, *Pensión Básica Universal*), financed by employers' contributions. The second tier, offering a contribution based pension, consisted of two alternative schemes. Employees had to decide whether to contribute to a federal, pay-as-you-go, defined benefit system administered by the National Social Security Administration (ANSES, *Administración Nacional de Seguridad Social*), or to private, funded, defined contribution schemes. Parametric reforms were also introduced, including an increase in both the retirement age and the number of annual contributions necessary to receive a pension. In addition, the breadth and coverage of family allowances was expanded in 1996.

The new system started soon to confront challenges. First, participation into private funds quickly reached over 70 percent of total contributors (Piffano et. al., 2009, CIFRA, 2009). Combined with a reduction in employers' social security tax rate, this caused a rapid reduction in contributions to the public pillar. From 5 percent of GDP in 1995, these declined to less than 3 in 2000. Second, in 1994, in the context of a reform of fiscal federalism, ten provinces transferred their public pension schemes to the federal system. As a result, pension spending did not decrease as anticipated, and actually stayed flat at 5.6 percent of GDP. Finally, as more years of contributions were required for eligibility, career intermittences and labor informality caused the coverage of old-aged people to decline, especially among women (Rofman, 2003).

At end-2008, the funded schemes were permanently eliminated, their assets consolidated into a public pension fund (FGS, *Fondo de Garantía de Sostenibilidad*), and their beneficiaries and contributors integrated into the federal pension system (SIPA, *Sistema Integrado Previsional Argentino*). The parameters established in 1993 were kept unchanged.

- *Extension of ANSES' mandate from social security to social assistance.* Since 2010, ANSES has been tasked with the administration and financing of other social programs outside the core of social security.[5] Besides stretching ANSES' role as social security administrator, this can create conflicts between its different objectives. For example, as one of the objectives of the public pension fund (FGS, Fondo de Garantia y Sustenibilidad) is to support socio-economic development, ANSES has been using the FGS to finance the program PRO.CRE.AR (mortgages under this program constituted 5 percent of total FGS' assets in June 2016). This double mandate could create conflicts between ANSES' objectives of allocating FGS portfolio to secure its long-run return and the objectives of fulfilling the program target and coverage.

[5] These programs include: PROG.R.ES.AR (2010) which provides financial assistance to young low-income working (or unemployed) students, PRO.CRE.AR (2012) aimed at offering affordable mortgages, and CONECTAR IGUALDAD, (2010) to foster computer literacy in schools and provide laptops to students and teachers.

7. **As a result of these developments, the gap between social security spending and contributions has been increasing.** After declining to 1.3 percent of GPD in 2010, the excess of social security spending over social security contributions reached 2.8 percent of GDP in 2015, on account of two trends:

- *Robust spending increases*. Spending on pensions and family allowances increased from 3.7 percent of GDP in 2005, to 8.5 in 2015. Family allowances contributed about 0.8 percentage point to this increase, almost entirely on account of the expansion of coverage. Spending on pensions instead explains most of the increase, as they went up from 3.4 percent of GDP in 2005 to 7.4 in 2015. The absorption of benefits previously granted by private pension funds explains less than 10 percent of this increase, while the expansion of beneficiaries under the moratorium regimes explains about 70 percent.[6]

- *Sluggish social security contributions.* The jump in contributions resulting from the unification of the pension system (from 2.1 percent of GDP in 2005, to 3.7 in 2008, and 5.1, on average, during 2009–11) initially helped reduce the excess of social security spending over contributions, but since 2011 social security taxes were not buoyant enough to keep up with the rise in spending.

8. **So far, the social security "deficit" has been masked by ANSES's overall cash surplus.** ANSES has been able to fund the social security deficit as well as spending on other social assistance programs thanks to non-contributory earmarked revenues (about 2.4 percent of GDP in 2015), the 15 percent share of the provincial and federal revenue pool (1.6 percent of GDP in 2015), and the interest and dividends earned on the assets of the FGS (0.9 percent of GDP in 2015). As a result, ANSES' overall cash balance reached 1 percent of GDP in 2015.

9. **Looking ahead, Argentina's social security system faces important challenges, which may considerably strain the federal budget.**

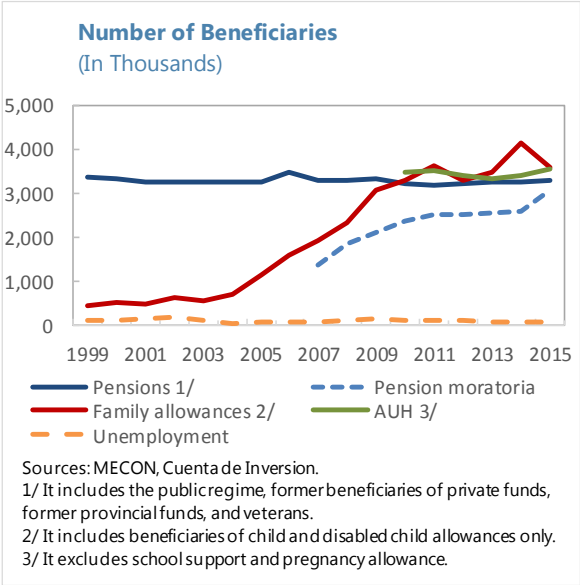
- *Repayment of pension debt*. In June 2016, Congress approved the "*Re-conciliation law*" which, in compliance with past sentences of the Supreme Court, recognizes a debt to current retiree derived from the incorrect calculations of initial benefits and the improper application of the indexation mechanism (see Box 2 for a description of the indexation mechanism). The authorities estimate this debt at about 0.8 percent of 2017 GDP, and are planning to fund it by disposing FGS assets. Moreover, by reinstating indexation retroactively, the law effectively introduces a 40 percent adjustment (on average) to potentially 2.3 million retirees, for an annual cost of about 0.7 percent of GDP during the medium term (based on authorities' estimates).

- *The introduction of a universal pension for old age***.** The "*Re-conciliation law*" introduces an old-age pension equivalent to 80 percent of the minimum pension to all people 65 and older who cannot access a contributory pension. By the Reconciliation law, this pension, which effectively mimics the moratoria regime, will be funded with general tax revenues.

[6] Unemployment insurance amounted to less than 0.05 percent of GDP per year during 2005–15.

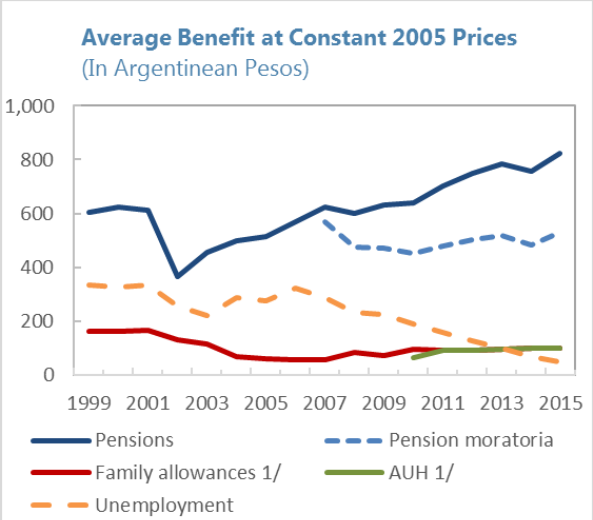
Figure 1. Argentina: Social Security Coverage, Benefits, and Spending

The number of beneficiaries increased.



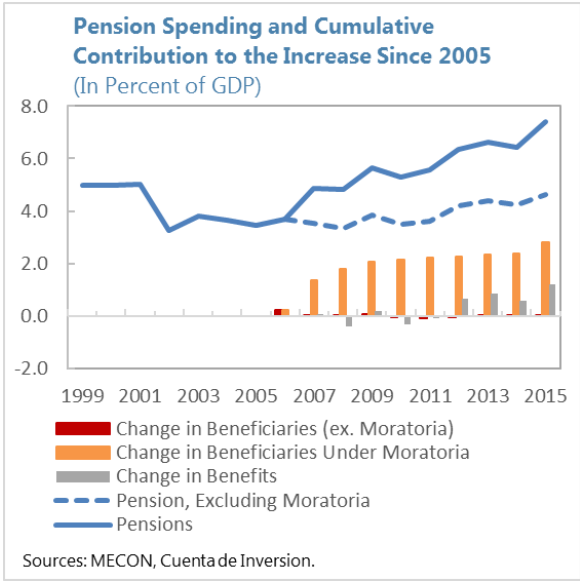
Sources: MECON, Cuenta de Inversion.
1/ It includes the public regime, former beneficiaries of private funds, former provincial funds, and veterans.
2/ It includes beneficiaries of child and disabled child allowances only.
3/ It excludes school support and pregnancy allowance.

Except for pensions, most benefits stayed constant in real terms



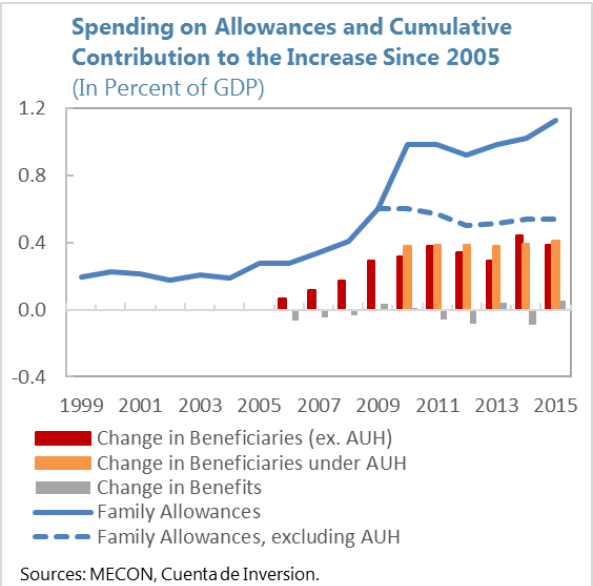
Sources: MECON, Cuenta de Inversion, INDEC, and staff calculations.
1/ Child allowance for lowest income reference group.

Larger coverage drove the increase in spending on pensions…



Sources: MECON, Cuenta de Inversion.

…and in spending on family allowances.



Sources: MECON, Cuenta de Inversion.

- *A shift of revenues to provinces*. With the 15 percent of the tax revenue pool gradually returning to provinces in accordance to a sentence by the Supreme Court, ANSES will lose about 1.6 percent of GDP in revenues by 2020—the equivalent of about 70 percent of its (non-contributory) revenues. By law, the Treasury will compensate ANSES for this loss.

- *Population aging*. The old-age dependency ratio (the share of population 60 and older to working age population) is expected to double in the next 50 years, reaching 52 percent.

10. **Under current policies and challenges ahead, the social security "deficit" and ANSES' overall balance would deteriorate significantly over the long run, driven by pensions**. We project ANSES balances using a model that incorporates the specific features of Argentina's pension and family allowance system, projection of population dynamic from the UN Population Survey, and long-run macroeconomic assumptions (see Annex I for more details on the model):

- *spending on family allowances* will slowly decline to 0.5 percent of GDP by 2066, as the share of children to total working populations declines;[7]

- *spending on contributory pensions* will reach 8.2 percent of GDP by 2026 and almost 10 percent of GDP by 2066;

- *spending on old-age pension* will have an annual cost of 0.4 percent of GDP, on average, in the medium term, and slightly less than 2 percent of GDP in the long run;

- *social security contributions* will slightly increase to 6.1 percent of GDP by 2026 but decline to 4.7 percent of GDP by 2066, as the growth of the working age populations declines to zero.

In particular, the cumulative increase in the pension "deficit" (the difference between contributory pensions and social security contributions) over the next 50 years is estimated to be large, about 40 percent of 2015 GDP in net present value (NPV) terms (Figure), well above FGS' financial assets (estimated at 12 percent of GDP in 2016).

C. Reform Proposals

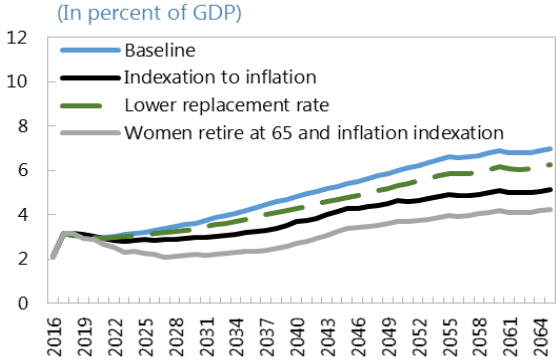
11. **Correcting this imbalance would require a reform of Argentina's current pension system**. This may include some of the following measures:

- *Change in indexation formula*. Indexing benefits (and actualizing past wages) only to realized inflation would still allow retirees to preserve the real value of their benefit, but it would reduce the increase in pension spending by about 20 percent of GDP in NPV terms on account of two effects: benefits would increase slower, and initial benefits would be slightly lower.

[7] Spending on child allowances is by far the greatest among all family allowances.

- *Higher retirement age for women combined with a change in indexation formula:* A gradual increase of retirement age for women from 60 to 65 over ten years combined with a change in the indexation formula (to avoid that the slower pace of increase in disbursed benefits could increase the value of benefits too much—see Box 2) would reduce the increase in the pension deficits to almost zero, in NPV terms. On account of both increasing retirement age and changing indexation, spending would drop and contributions increase.

Deficit of pension system 1/
(In percent of GDP)



Source: Fund staff estimates.
Note: 1/ Includes old age pensions.

- *Lower replacement rate*. Reducing the replacement rate for people entering the work force now from 72 to 60 percent of the average wage (for example by reducing the contribution-related benefit from 1.5 to 1.1 percent for each year of service) would yield a cost reduction, in net present value terms, of 7 percent of GDP. If instead the same result was achieved by gradually (over ten years) reducing the minimum pension from 75 to 45 percent of the median wage, this would yield a cost reduction of about 10 percent of GDP.

- *Increase in participation*. Increasing the share of contributors to working age population by 25 percentage points by 2026 (by gradually incorporating a greater number of workers into the formal sector) would reduce the net present value of pension deficits by about 35 percent of GDP.

12. **A clear budgetary and administrative separation of social security and social assistance may also need to be considered.** This separation would improve the transparency of fiscal accounts and the cost-benefit analysis of single programs, and improve the integration across social policies and programs implemented by other ministries. The provision that the newly instituted old-age pension be financed by the Treasury with tax revenues is a welcome step in this direction. For example, AUH (a non-contributory, non-insurance, type of program), PROG.R.ES.AR, and PRO.CRE.AR could be moved under the responsibility of the Ministry of Social Development, while CONECTAR IGUALDAD could be the responsibility of the Ministry of Education.

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Annex I. The Model

We project ANSES balance over the next 50 years based on population projections from the ILO and the UN to determine the mass of potential participants and beneficiaries, macroeconomic assumptions to determine ANSES' tax revenue and social security contributions, and the current parameters of Argentina's pension system to determine benefits. We calibrate other ratios (for example, coverage and participation) to past data from ANSES' social security statistics, MECON's physical and financial account (*Cuenta de Inversión*), and INDEC (unemployment, income distribution, and population statistics).

The assumption underlying our long-term pension projections are:

- *Population dynamic*. We use population projections from the ILO and the UN and assume that the end-2015 stock of pensioners will decrease according to current mortality rates. The implied old dependency ratio (the ratio of people 60 and older to those with age 15–59) doubles in 50 years, from 26.3 percent in 2016 to 51.7 percent in 2066.

- *Macroeconomic assumptions*. We assume real GDP growth rate, the GDP deflator, and inflation rate will have converged by 2026 to their long-run levels. We assume that long-run GDP growth is 3.3 percent, inflation and the growth in the GDP deflator 5 percent, and that productivity growth will be 2.3 percent, that is about 70 percent of the real GDP-working age population growth differential. As a result, wages are assumed to growth 7.4 percent over the long run. Finally, we assume a real interest rate growth differential of 2.5 percent.

- *Programs coverage*. We use past data to calibrate the coverage of all family allowances to population below 21, which has remained fairly stable in the past 3 years. For contributory retirement pensions, we assume that coverage for each new future cohort of men and women reaching retirement age will be the same as in 2015, excluding those who received a benefit under the moratoria regimes. We assume that all people above the age of 65 who do not receive a contributory pension will receive the pension for old age.[1] Finally, we use past data to calibrate the coverage of other pensions to total population and assume that this will remain at 2015 levels.

- *Indexation*. We compute the indexation formula on our projections of wages, ANSES' tax and total revenues, and number of beneficiaries.

- *Pension spending*. We calibrate pension benefits on contributors' average wage. For each cohort, we index wages of the past ten years using the result of the indexation formula. Finally, we assume 30 years of contributions and derive the initial pension benefit. We use

[1] However, reflecting the extension of the moratoria regime for women between the age of 60 and 65 until 2019, we assume that during 2016–19 all women above age 60 who do not receive a contributory pension will receive the old-age pension.

the indexation formula to increase 2015 benefits (for current beneficiaries) and future initial benefit (for each new cohort of beneficiaries). To account for the effect of the June 2016 *Re-conciliation law*, we calibrate the 2017 increase in current benefits to the adjustment cost estimated by the authorities (around 60 million pesos); and decrease FGS assets by a total of 83 million pesos over 3 years.[2]

- *Social security contributions and tax revenue*. We increase social security contributions by the increase of wages and of working age population. We assume that ANSES tax revenue will remain constant in percent of GDP over the long run.

- *Other assumptions.* We assume that the return rate on FGS assets will remain at current level, with a capital gain on FGS assets at about 5 percent in real terms. We assume that the Treasury will fully compensate ANSES for its share of the federal-provincial revenue pool. Finally, we assume that operating costs and the cost of other social assistance program will remain constant in percent of GDP.

[2] The Re-conciliation law establishes that half of past obligations will be paid at settlement. The remainder will be paid in quotas over 3 years, but the amount due would be updated using the pension indexation formula.

DISINFLATION UNDER INFLATION TARGETING: A SMALL MACRO MODEL FOR ARGENTINA[1]

1. **The Argentine administration that took power in December 2015 has announced a gradual disinflation to single digits by the end of its mandate in 2019.** The starting point has been one of the highest inflation levels in the world. Despite the issues in measurement, using a variety of indicators (both public and private) shows that inflation in the city of BA rose sharply from single digits in 2007 and stabilized between 25 and 35 percent (y/y) during 2009 and 2015, with inflation expectations well anchored within that range.[2] To a large extent this reflects the earlier administration's decision to fund the large increase in public sector spending with an inflation tax. Inflation in early 2016 spiked to above 40 percent (y/y using the city of BA CPI index) reflecting the normalization of utilities tariffs needed to phase off energy subsidies, and the sharp depreciation following the removal of ER controls and unification of ER markets in late 2015. Since April 2016, real interest rates have remained positive and core inflation has been on a declining trend, while the economy has moved into recession.

2. **To build credibility and align inflation expectations with the new objectives, the government formally launched the inflation targeting framework in September 2016.** The intention and timetable to move in this direction was announced early in 2016 and, in May 2016, the BCRA switched to interest rate from money targets as operational variables of monetary policy (Figure 1). In addition, the national statistics agency has resumed publication of credible data on inflation, against which the 12–17 percent target for 2017 will be measured. A companion SIP further describes the operational aspects of the current conduct of monetary policy and the steps that are needed to make further progress on the way to inflation targeting (Jacome, forthcoming).

3. **This paper uses a neo-Keynesian type model to analyze the policy challenges and tradeoffs involved in the disinflation process**. In embarking on a disinflation process under a new inflation targeting framework, Argentina would need to develop tools for assessing the stance of monetary policy and set policy interest rates. In this paper, we estimate a standard small macroeconomic model, similar to the one used by a number of inflation-targeting central banks for forecasting and policy analysis purposes, and close to the BCRA's small macroeconomic model (Escudé and others, 2007). Despite its simplicity, and while it abstracts from many important features of the economy, the model captures the key channels of monetary policy transmission and allows discussing the main tradeoffs involved in monetary policy making. In particular, it allows to answer questions such as: How should the path of interest rates look like in order to reduce inflation to a single digit figure in 2019? What is the output cost that could be associated with the disinflation process announced by the authorities? What can moderate this cost?

[1] Prepared by Jorge Ivan Canales-Kriljenko.

[2] Large discrepancies between official inflation statistics at the national level and private sector and provincial estimates suggests significant uncertainty about the measurement of inflation since late 2006. This study uses a consumer price series concatenated from private and provincial sources as later described.

4. **Although the results should be interpreted with caution because of the potential empirical limitations, they suggest that Argentina will likely require significantly high real interest rates and a greater output gap during the disinflation period**. Getting to the intermediate target of about 10 percent by 2018 would require about two quarters of real interest rates of about 20 percent, which will then subside rapidly in the following quarters. The cost of disinflation in terms of foregone output, or sacrifice ratio, arises from need to break the prevailing inflation inertia. In its steady-state specification, the model suggests that lowering inflation to the desired 5 percent could cost about 8 percent of potential GDP, a sacrifice ratio of 0.3 (the amount of output lost for every percentage point reduction of inflation). The output cost, however, could be much lower if price setting became more forward looking. In particular, the sacrifice ratio would fall to about 0.2 of potential GDP if the authorities were able to reduce inflation inertia from 70 percent to about 50 percent. We also show that the sacrifice ratio would be lower in our model if the weight on nominal interest rate volatility falls. At the same time, if the authorities were to run monetary policy by trying to reduce the volatility of real exchange rate fluctuations, the sacrifice ratio would fall. Importantly, the model presented in this paper only focuses on the short-term cost of disinflation and is not able to capture its long-run benefits. A large literature has proved that reducing inflation to single digits delivers long-term gains. In particular, lower inflation has been associated to greater market efficiency (Tommasi, 1994), higher private saving (Grigoli and others, 2014), lower income inequality (Albanesi, 2007) and poverty (Cardoso, 1992), and ultimately higher long-term growth (Loayza and Ranciere, 2006).

A. The Model

5. **The model is a variant of the new-Keynesian monetary models used in many inflation targeting countries and heavily used within the IMF.**[3] The key behavioral equations of the model are the following: (1) a Phillips curve equation that relates inflation to past and expected future inflation, the output gap, and the change in the real exchange rate; (2) an output gap (IS) equation that relates economic activity to its own lag values, the real interest rate, the real exchange rate, and the foreign output;[4] (3) a risk-adjusted uncovered interest rate parity condition linking domestic and foreign interest rates to the exchange rate, allowing for a stochastic spread differential; a (4) money market equilibrium (LM) equation, which related the demand for real money balances to changes in output and real interest rates, and (5) an interest rate monetary policy reaction. A description of the model is contained in Annex 1.

6. **For simulations purposes, we assume that interest rates in the model are set under an optimal monetary policy rule**. Although we estimate a policy reaction function to allow identification of other model parameters, the monetary policy reaction function estimated with past data is unlikely to characterize the reaction function of monetary policy under the new IT regime. In

[3] See, for example, Berg, Karam, and Laxton, 2006a and 2006b; Carabenciov and others, 2008; Canales Kriljenko and others, 2009. A similar model was also estimated in a BCRA paper (see Elosegui, Escudé, Garegnani and Sotes Paladino, 2007.)

[4] These variables are expressed in gap terms, that is, as deviations from their steady state values or long-run trends.

the period used for estimating the model a number of shifts in monetary policy frameworks and exchange rate regimes took place. In none of those, nominal interest rates have played an active role, with monetary policy run essentially by closely managing the exchange rate. To better guide policy, in this paper we assume that monetary policy is conducted with the objective to minimize a quadratic loss function that incorporates the main objective of the central bank—to minimize deviation from inflation targets and both output gap and interest rate volatility (Benes 2014). The loss function is of the form

$$\sum_{t=1}^{\infty} \beta_t \left((\pi_t - t\arg et_t)^2 + lambda1 * (outputgap_t)^2 + lambda2 * (R_t - R_{t-1})^2 \right)$$

where π_t is inflation and R_t is the nominal interest rate. The optimal policy reaction function comes as the solution to the model equations plus a set of equations with the corresponding optimization conditions for minimizing the loss function. For the main simulations of the model, we assume the weights on the output gap, and on the change in nominal interest rates are half those of inflation deviations from target, which deliver sensible model dynamics.

B. Data and Estimation

7. **The model was estimated with quarterly data over the period 2003Q1–2015Q4**. The period was chosen to allow some distance from the 2001 crisis associated with the end of the convertibility period. Choosing the data for estimation is not trivial in Argentina.

- For the *inflation rate*, we construct a time series by splicing three different inflation series: the IPC-GBA until 2006, private estimates for inflation in the city of BA from 2006 and 2012, and the inflation index published by the city of Buenos Aires from then onward.

- For *GDP,* the model uses the revised official GDP time series for 2004Q1–2015Q4 disseminated on June 29, 2016, and spliced with the earlier official statistics for 2003.

- On *exchange rates*, the estimation uses the official exchange rate. This choice is not straightforward. Parallel foreign exchange markets emerged in 2011 when foreign exchange and capital controls were tightened. We use the official exchange rate, after having tested for both in time series econometric analysis. Although an increasing amount of goods were likely priced taking into consideration the evolution of the parallel market exchange rates, the adjustments in the official exchange rate tended to give rise to large spikes in inflation. Correspondingly, the official exchange rate tends to carry most of the information content. In some alternative specifications, the parallel market spread did carry some limited information content. The

parallel market spread, which has de facto been eliminated, is not considered in the final specification.[5]

- For *interest rates,* we used LEBAC rates weighted by their maturity structure. Real interest rates are defined as the nominal interest rate deflated by the one-quarter-ahead annualized inflation.[6]

8. **The key parameters of the model have been estimated using Bayesian methods to characterize the structure of the Argentine economy.** The estimated parameters and Bayesian priors are presented in Table 1. The values of the key parameters are initially calibrated (i) factoring earlier findings in the literature (ii); to deliver steady state means and standard deviation of the macroeconomic variables that are close to their sample estimates; (iii) to result in plausible estimates of latent variables like the output and exchange rate gaps; and (iv) to deliver well-behaved impulse response functions. All parameters are then re-estimated with the calibrated parameters as priors with varying degree of certainty. The main results obtained are:

- *Inflation inertia*. The resulting model suggests a significant degree of backward-looking inertia in the inflation process. The point estimate of the parameter of the lagged CPI term in the Phillips curve is 0.67, very similar to what found for Argentina by D'Amato and Garegnani (2009) but higher than estimates in inflation targeting countries in Canales-Kriljenko and others (2009).[7] Box 3 in the Staff Report explores the empirical link between inflation inertia and that in wages and inflation expectations.

- *Exchange rate pass-through coefficient.* The coefficient of the real effective exchange rate on the Phillips curve is 0.1. This is similar to the levels estimated Canales-Kriljenko and others (2009) for Colombia, Mexico, and the European Union, but lower than that estimated for Chile, Brazil, and Peru.

- *Effect of output gap on inflation* The parameter of the output gap on the Phillips curve equation is nontrivial at 0.472. This is larger than the range of the estimates on the lagged (as opposed to the contemporary) output gap for individual Latin American inflation targeting countries (Canales-Kriljenko and others, 2009). For comparison, D´Amato and Garegnani (2009), using a different methodology, find a very small coefficient of the output gap on the Phillips curve of 0.01.

- *Effect of real interest rates on economic activity*. The parameter of the real interest rate on economic activity is relatively small (0.1). This low number may reflect the low level of financial intermediation in Argentina, partly due to the prevailing financial repression of the last decade.

[5] Although excluding the parallel market rate from the specification could in principle bias the results under conventional econometric methods, the use of Bayesian priors and methods would tend to reduce this bias.

[6] In particular, the natural logarithm of (1+nominal interest rate) less four times the one-quarter ahead difference in the natural logarithm of the price level.

[7] In the BCRA model estimated by Elosegui and others (2007) with data covering the period 1993–2006, the weight of past inflation is slightly higher than the weight on future inflation.

As point of comparison, the corresponding parameter for the Latin American inflation targeting countries was 0.16, with parameters among the 9 economies considered fluctuating between 0.1 and 0.2 (Canales-Kriljenko and others, 2009).

Table 1. Parameter Estimates

		Starting	Min	Max	Distribution			Estimate
					Name	Mean	STDEV	
Phillips curve								
backward looking	a1	0.700	0.50	0.90	Normal	0.70	0.03000	0.670
output gap	a2	0.500	0.40	0.60	Normal	0.50	0.03000	0.472
Pass through	a3	0.080	0.07	0.15	Normal	0.08	0.01000	0.099
Dynamic IS curve								
Inertia	b1	0.700	0.50	0.90	Normal	0.70	0.03000	0.700
real interest rate gap	b2	0.100	0.09	0.12	Normal	0.10	0.01000	0.095
real exchange rate gap	b3	0.040	0.01	0.07	Normal	0.04	0.00500	0.036
Foreign output gap	b4	0.600	0.50	0.70	Normal	0.60	0.03500	0.605
Interest rate reaction function								
interest rate inertia (gradualism)	g1	0.700	0.67	0.74	Normal	0.70	0.01050	0.708
inflation gap	g2	2.000	1.90	2.10	Normal	2.00	0.03000	2.003
output gap (gradualism)	g3	4.000	3.90	4.10	Normal	4.00	0.03000	3.998
Persistence to shock to inflation target	gtar	0.897	0.85	0.99	Normal	0.90	0.01340	0.891
Money market								
GDP growth	delta1	1.000	0.90	1.10	Normal	1.00	0.02500	0.982
Interest rate increase	delta2	1.600	1.52	1.68	Normal	1.60	0.02400	1.600
error correction	delta4	0.500	0.20	0.70	Normal	0.50	0.07000	0.502
GDP	delta5	1.000	0.95	1.05	Normal	1.00	0.01500	1.000
interest rates	delta6	0.500	0.48	0.53	Normal	0.50	0.00750	0.500
Money market								
Expected exchange rate	phi	0.500	0.30	0.70	Normal	0.50	0.06000	0.540
Exchange rate inertia	e1	0.500	0.01	0.70	Normal	0.50	0.06000	0.010
Steady states								
Output growth	ss_DLA_GDP_BAR	0.030	0.01	0.10	Normal	0.03	0.00340	0.031
Real Interest Rate	ss_RR_BAR	0.000	-0.07	0.05	Normal	0.00	0.02500	-0.002
Real Interest Rate abroad	ss_RR_RW_BAR	0.020	0.00	0.08	Inverse Gamma	0.03	1/0.04^2	0.008
Real interest rate spread	ss_SPREAD	-0.050	-0.10	-0.03	Inverse Gamma	-0.05	0.01000	-0.046
Inflation target steady state	ss_D4L_CPI_TAR	0.160	0.10	0.30	Normal	0.20	0.05500	0.216

- *Effect of real exchange rate on economic activity*. The estimates suggest that currency undervaluation (a positive real exchange rate gap) stimulate economic activity.[8] The real exchange rate appreciation during the convertibility period, in particular, was arguably among the causes for the sharp slowdown of economic activity and increased unemployment toward the end-1990s.

- *Output gap inertia*. At about 0.7, the inertia in the output gap is fairly high, compared to the average lagged coefficient of 0.48 for Latin America, as estimated in Canales-Kriljenko and others (2009). A high number tends to increase the output cost of monetary policy as economic activity will take more time to get back to its potential level.

- *Spillovers*. The estimates suggest that developments in trading partners have an important effect on Argentine economic activity.

- *Money market*. The estimates suggest that a long-run money demand relationship exists and that in the short run real money balances evolve so as to eliminate deviations from such relationship. The long-run trend in velocity was restricted to be close to nil.

- *Potential growth*. The estimate for the period is of a "steady state" potential growth of 3.1 percent.

- *Neutral real interest rate*. Given the easy global liquidity conditions prevailing during a large part of the period, especially since 2008, the steady state neutral real interest rates abroad ended up slightly negative during the estimation period. The financial repression supported by exchange and capital controls explains the negative steady state spread of -4.6 percent. Because financial repression and controls have been substantially reduced, this parameter is replaced going forward by the neutral foreign real interest rate in the U.S. (1 percent, Pescatori, 2015) plus an assumed average spread of 200 basis points to account for currency risk associated to higher inflation and volatile financial conditions.

9. **We now provide a description of the monetary policy transmission mechanism in the model.** An increase in the domestic real interest rates in this model affects inflation through 2 channels. The first one is by slowing economic activity relative to potential. The second is by appreciating the currency. A higher interest rate lowers the interest rate sensitive component of aggregate demand, which tends to reduce the output gap. Also, it increases the exchange-rate and risk adjusted returns of domestic assets encouraging capital inflows and appreciating the currency. In turn, this reduces competitiveness, further slowing economic activity. Thus, although real interest rates do not directly enter the inflation equation in the model, they have a material impact on inflation by affecting the output gap and the real effective value of the currency, which do enter in it. In particular, the inflation equation in the model suggests that inflation in any given period is about

[8] This is consistent with what found in many other studies covering Argentina and other EMs in general, including Berg and others (2008), Glüzmanna, Levy-Yeyati and Sturzenegger (2012), Hausmann and others (2005), Levy-Yeyati and Sturzenegger (2007), Rapetti (2011), Rapetti, Scott, and Razmi (2011), and Rodrik (2008).

two-thirds of the inflation in the earlier period plus about half the size of the output gap and close to 10 percent of the real exchange rate depreciation of the period. This suggests that to contribute to disinflation, the output gap needs to either be negative or become smaller while the currency would need to appreciate, both of which could result from higher real interest rates.

10. **Impulse responses provide a feel of the impact of monetary policy on the economy and how the optimal monetary policy would react to shocks to the economy.** A shock to interest rates that would deviate from the optimal response by about one percentage point would result in about a 1.2 percentage point increase in real interest rates, a real exchange appreciation of about 0.4 percent in real terms, a slowdown in economic activity that would reduce the output gap by about 0.2 percentage points, and a reduction in inflation of about 0.2 percent, relative to the situation in the absence of a shock (Figure 1). In response to a domestic demand shock that lowers the output gap by about 1 percentage point, monetary policy will react by lowering nominal interest rates by about half a point and real interest rates by about 0.3 basis points. In this situation, the currency will depreciate in nominal and real terms by about 1 percentage point. Inflation would decline by over 0.2 percentage points and slowly recover toward the targeted levels (Figure 2).

Figure 1. Impulse Response to an Interest Rate Shock

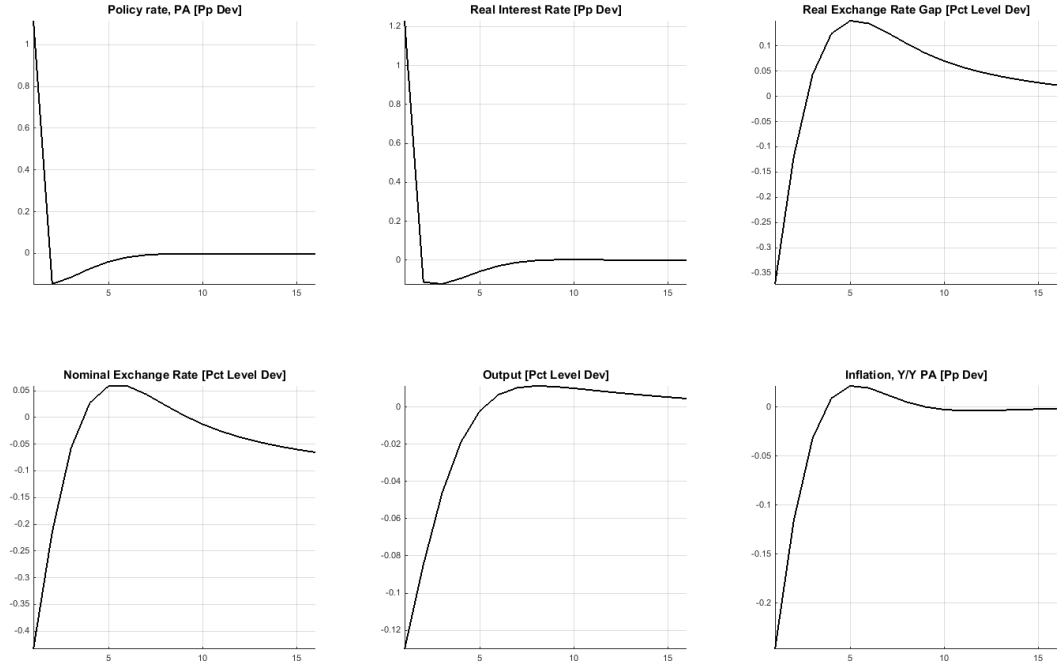
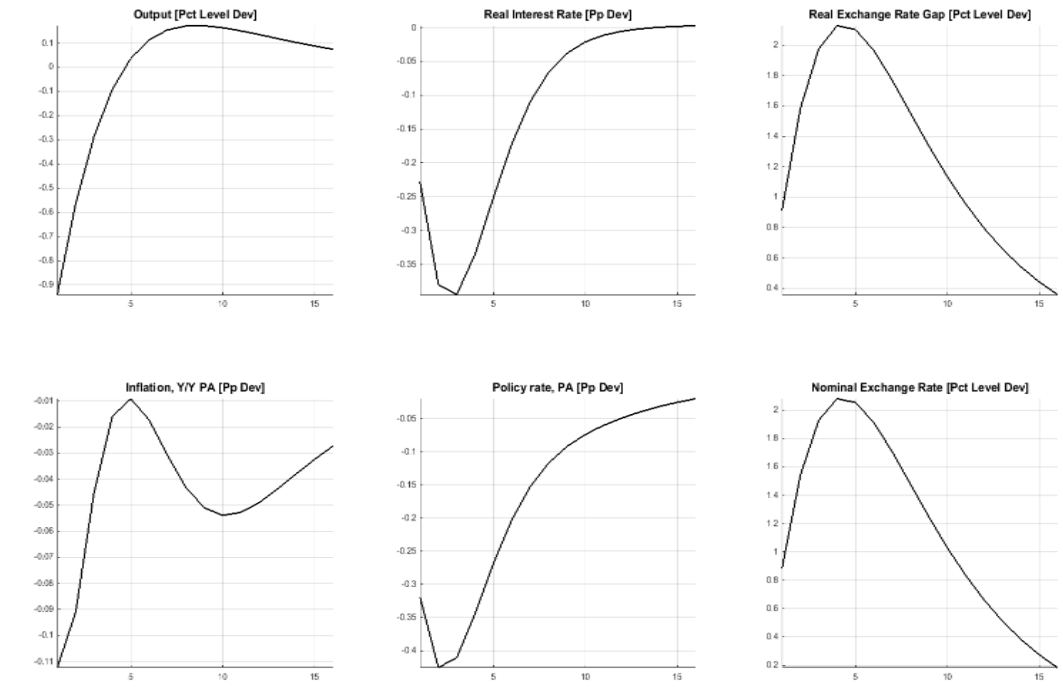


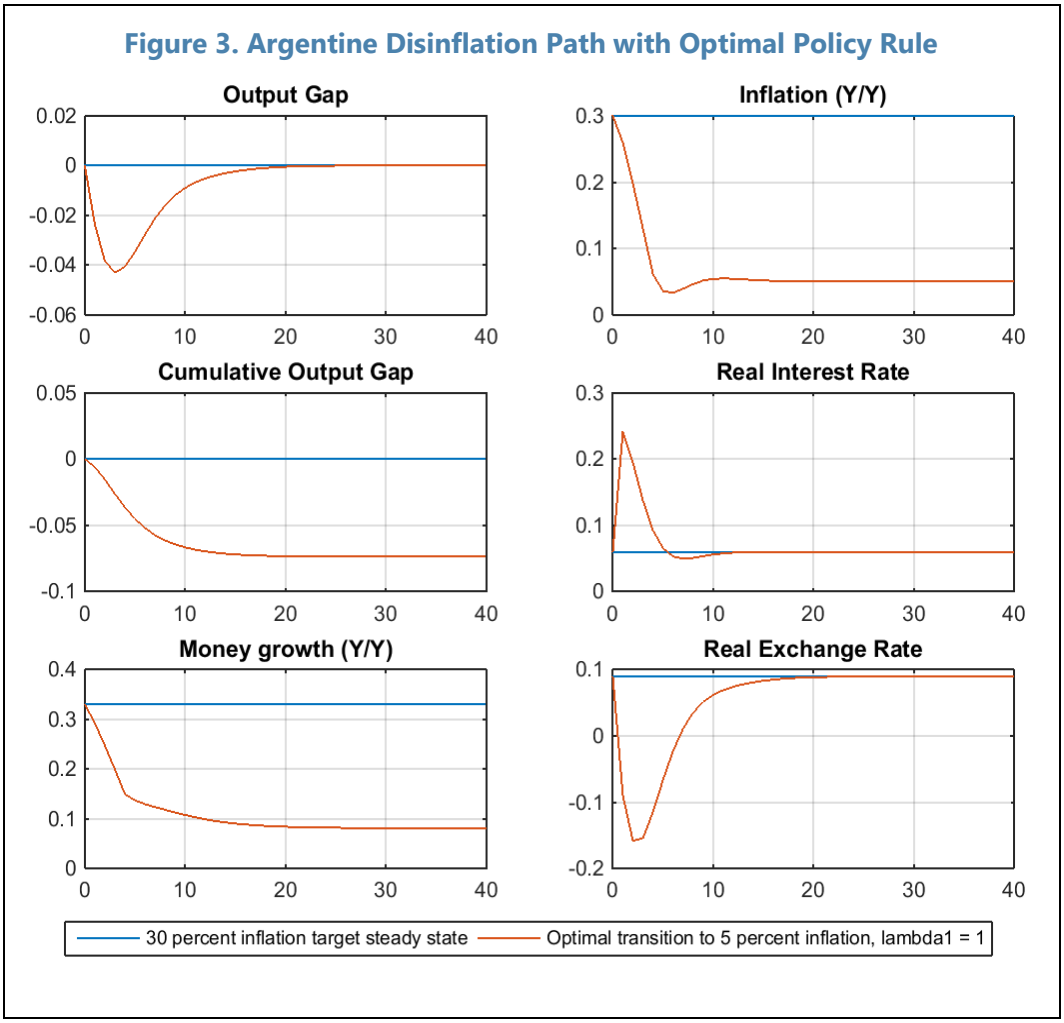
Figure 2. Impulse Response to a Domestic Demand Shock (to Output Gap Equation)



C. Implications for Monetary Policy

11. **Lowering inflation in our model comes with a loss in economic activity, as measured by the sacrifice ratio.** In particular, the sacrifice ratio measures the average percent output loss relative to potential for each percentage point reduction in inflation. Following Benes (2014), we estimate the sacrifice ratio by first computing the steady state inflation for a 30 percent inflation target (the level of expected inflation prevailing over the last five years). We then compute another model with an inflation target of 5 percent, as envisaged by the authorities by 2019. Next, we simulate the transition to the new model starting from the steady state of the model with 30 percent and compute the cumulative sum of negative output gaps (Figure 3). This percent output loss is then divided by the 25 percentage point reduction in inflation. The exercise suggests the permanently lowering inflation to 5 percent from 30 percent in 5 years would come at a cumulative output cost of 8 percent of potential output. Thus, the sacrifice ratio would be of 0.3 percentage points of potential output loss for each percentage point permanent decline in inflation.

Figure 3. Argentine Disinflation Path with Optimal Policy Rule



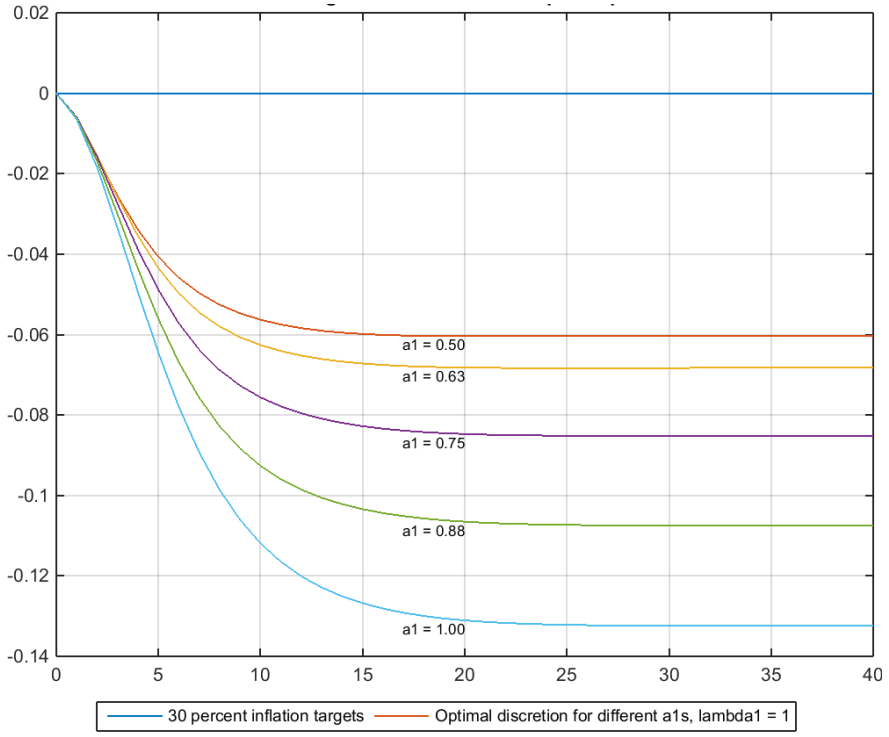
The number is within, but on the low side, of the range of estimates of sacrifice ratio estimated in the literature. Nevertheless, the range of values in the literature is wide reflecting varying empirical methodologies and samples that do not abstract from the possible simultaneous shocks that affect output during disinflation (Anderson and Wascher, Ball, 1994; 1999; Friedman, 1994; Sanchez, Seade, and Werner, 1999; Zhang, 2005). For example, Ball finds that the average sacrifice ratio is 1.4 for quarterly data and 0.8 for annual data for 28 episodes for nine countries. Cross-country comparisons in the literature conclude that the sacrifice ratio is lower when the starting point of inflation is higher. For starting inflation between 20 and 40 percent, Sanchez, Seade, and Werner find an average sacrifice ratio of 0.6.

12. **The stylized disinflation simulation also suggests four important observations**. First, disinflation has an adverse impact on economic activity, which peaks at about 1 year. Second, it will require high real interest rates, which will coincide with falling nominal interest rates and inflation. Third, it will likely be associated with a real exchange rate appreciation that peaks within the first year before gradually tapering off. Fourth, the disinflation effort would need to be supported by a declining path in money growth rates.

13. **Varying a few key parameters of the model may yield a higher sacrifice ratio.** In particular, with a lower *elasticity of inflation on the output gap* (a2) than our estimate, a higher contraction of economic activity would be needed to lower inflation to the desired targets, increasing the ratio. And with a higher *elasticity of aggregate demand on interest rates* (b2), higher real interest rates would have a more disruptive effect on economic activity, also increasing the ratio. Since staff estimates appears to be on the high side for the first parameter and on the low side for the second, it may well be that the low sacrifice ratio obtained by staff is somewhat underestimated.

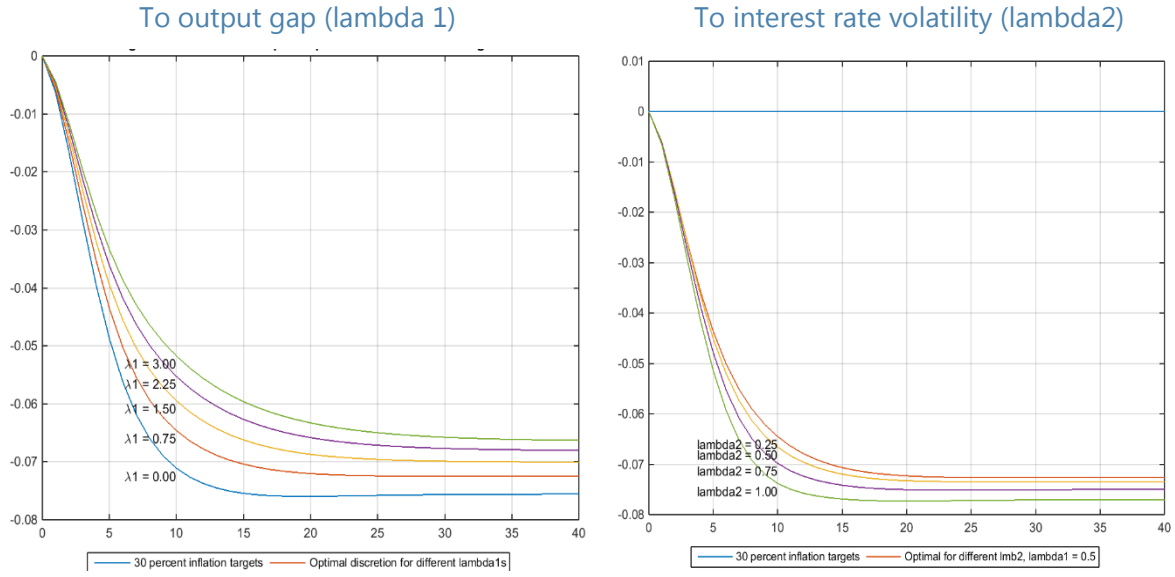
14. **Lowering the degree of inflation inertia reduces the sacrifice ratio**. The adoption of inflation targeting may tend to reduce the amount of inflation inertia. For the aggregate of five Latin American inflation targeting countries, Canales-Kriljenko and others (2009) found that the backward looking component of inflation was smaller than the forward looking component, a feature that was even more pronounced in the advanced economies mentioned in their study. The literature on endogenous credibility suggests that the output cost could fall significantly if the inflationary inertia could be reduced (Isard, Laxton, and Eliasson, 2001; Argov and others, 2007; Ali and others, 2009). To explore the gains coming from the expectations channel we perform a sensitivity analysis to the inflation inertia coefficient (a1) of the Phillips curve. A fully backward looking inflation dynamics (with an a1 parameter of 0.99) would result in almost twice as much the sacrifice ratio than the one described above (Figure 4). On the other hand, with a parameter value of 0.5, the short-term output cost of disinflation would fall to 6 percent of potential output, implying a sacrifice ratio of around 0.2.

Figure 4. Sensitivity of Potential Output Cost of Disinflation (Cumulative Output Gap) to Different Degrees of Inflation Inertia



15. **The sacrifice ratio also depends on the monetary policy authorities' relative tolerance for output gaps and inflation deviations from target.** In particular, and as it would be easy to expect, the sacrifice ratio falls as the relative weight of the output gap increases. Increasing the weight on interest rate volatility in the loss function, on the contrary, increases the sacrifice ratio. Such a higher weight may be motivated by concerns about the real sector effects of financial sector volatility, and the build-up of vulnerabilities that could result in costly disruptions in economic activity associated with financial crisis. While lower volatility in interest rates may have financial sector benefits, it may also have a cost in terms of economic activity during disinflation, as illustrated in Figure 5. This is because adjusting nominal interest rates more slowly during disinflation may result in higher real interest rates and a more appreciated currency, with an adverse impact on economic activity. Nevertheless, the literature warns that the effect of interest rate smoothing on the sacrifice ratio may depend on the specific form in which interest rates enter the authorities' loss function (Woodford, 2002). Once disinflation is achieved, attempting to reduce nominal interest rate volatility would tend to result in greater volatility in output and inflation (Honjo and Hunt, 2006).

Figure 5. Sensitivity of Potential Output Cost of Disinflation (Cumulative Output Gap) to Weights in Loss Function



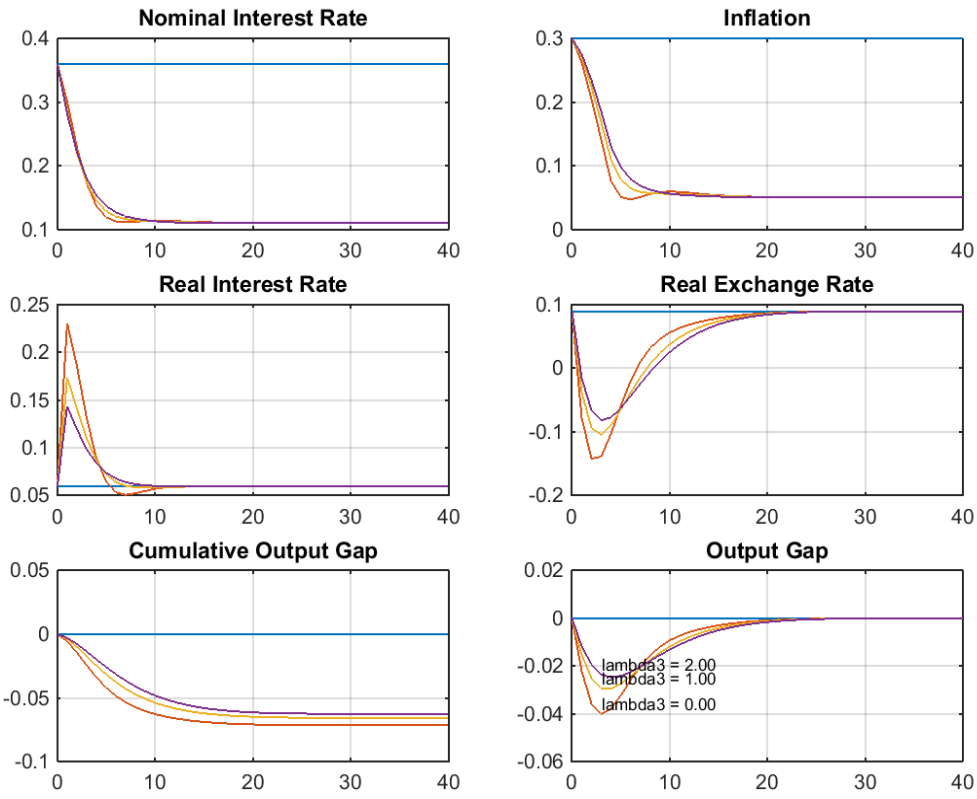
16. **The sacrifice ratio in the model falls if the authorities try to reduce exchange rate volatility**. Argentina's policy makers have been concerned about exchange rate volatility, at least to judge by their history of heavy foreign exchange intervention and exchange rate regimes with little exchange rate flexibility. To analyze the effects of these considerations on the monetary policy tradeoffs, we include in the loss function a concern for the real exchange rate volatility.

$$\sum_{t=1}^{\infty}\beta_t\begin{pmatrix}(\pi_t - t\arg et_t)^2 + lambda1(outputgap_t)^2 + lambda2*(R_t - R_{t-1})^2\\ +lambda3*(lz_t - lz_{t-1})^2\end{pmatrix}$$

where lz_t is the real exchange rate (in logs). In the context of perfect certainty such as the one envisaged in this paper, a concern about real exchange rate volatility can be justified based not only on the direct impact that the real exchange rate can have on economic activity and inflation, but also on its indirect impact, through the value of financial wealth in a highly dollarized economy. The corresponding optimal monetary policy rule implies that the monetary authority gets to influence both the exchange rate and interest rates, and that both exchange rate and interest rate policy decision respond to each other. Interest rates may rise to smooth exchange rate fluctuations, especially on occasions in which this helps achieve the other policy objectives. In the simulation, a higher weight on exchange rate volatility results in a smoother path for real exchange and interest rates, and a lower output gap during the transition to lower inflation (Figure 6). This is because in our model the real exchange rate plays a crucial role for both inflation and economic activity. Because the effect of the exchange rate prevails over that of the output gap in the inflation equation, a policy rule with no weight on exchange rate volatility would tend to rely more on real appreciation to reduce inflation at the expense of a stronger impact on economic activity, resulting

in a higher sacrifice ratio (Fischer, 1984). Along these lines, an additional instrument to influence the behavior of real exchange rates would arguably help in the authorities' objective of maintaining price inflation stability while minimizing the volatility in output fluctuations.

Figure 6. Simulations of Disinflation with Real Exchange Rate Volatility in Loss Function Varying Weights on Exchange Rate Volatility (lambda3)



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Annex I. The Model

A. Phillips Curve

The Phillips curve captures the short-term tradeoff between economic activity and inflation. When economic activity exceeds potential GDP, that is when the output gap ($lgdp\_gap_t$) is positive, it exerts inflationary pressure. The opposite is true when economic activity is below potential. But the curve also recognizes that inflation typically has significant inertia, and only partially reflects expectations of future inflation. The Phillips-type curve in this model also captures the fact that real exchange rate movements ($\overset{o}{z}_t$) have an impact on inflation in the form of a positive pass through. Finally, supply shocks can also influence the evolution of consumer prices independently of demand considerations, exchange rate pass through, or inflation dynamics ($\varepsilon \overset{o}{cpi}_t$).[1]

$$\overset{o}{cpi}_t = a_1 * \overset{o}{cpi}_{t-1} + (1-a_1) * \overset{o}{cpi}_{t+1} + a_2 * lgdp\_gap_t + a_3 \overset{o}{z}_t + \varepsilon \overset{o}{cpi}_t$$

B. Dynamic IS Equation

The dynamic IS equation captures the relationship between economic activity and monetary conditions as well as spillovers from trading partners. Higher real interest rates (rr_gap_t) lower economic activity while more depreciated currencies in real terms (lz_gap_t) tend to boost it. Real interest and exchange rates are measured relative to their equilibrium, time-varying levels. In addition, the equation encompasses the view that economic activity in trading partners have a direct impact on domestic economic activity through the foreign output gap ($lx\_gdp\_gap_t$), after recognizing that trading partners may have different long-term growth rates associated to among other things different demographic structures and dynamics. The dynamic IS equation reckons economic activity tends to move gradually and has a nontrivial backward looking component. Finally, the error term includes demand shocks (independent from monetary conditions, inertia, and foreign economic developments) that have an impact on economic activity. Autonomous fiscal developments would appear as shocks to domestic demand.

$$lgdp\_gap_t = b_l * lgdp\_gap_{t-1} - b_2 * rr\_gap_t + b_3 * lz\_gap_t + b4 * lx\_gdp\_gap_t + \varepsilon\_lgdp\_gap_t$$

C. Uncovered Interest Rate Parity and Exchange Rates

The model includes an uncovered interest rate parity equation expressed in real terms. It states that real interest rate differentials tend to be associated to changes in the real exchange rate in the long

[1] In all that follows, *l* before the variables means the variable is in natural logarithm, while the dot means the variable is in log-difference. The dot4 means log difference four quarters apart. Nominal interest rates (R) represent the natural logarithm of gross interest rates, for example, ln(1+R/100).

run, although short-term deviations (shocks) do take place. The real interest rate differentials are relative to each country's equilibrium real interest rate levels.

$$rr_t - \mathrm{rr}_{xt} = (1\text{-e})*lz^e - \mathrm{e}(lz_t) + (\mathrm{R}_t + \mathrm{R}_{xt})/4 + \varepsilon\_lz_t;$$

The model allows expectations of the real exchange rate to have a backward and a forward looking component. A sovereign spread is added to the version after estimation, to recognize the sharp relaxation in financial repression.

$$lz^e = \phi(lz_{t+1}) + (1\text{-}\phi)lz_{t-1}$$

Nominal and real exchange rates are linked by the following identity:

$$\mathrm{ls}_t = lz_t - l\mathrm{cpix}_{t-1} + l\mathrm{cpi}_{t-1}$$

D. Policy Reaction Function

The model includes a policy reaction function to set nominal interest rates. The equation is a crucial element going forward as it would guide the central bank in setting its operational variable. Nevertheless, it could be a controversial element for the estimation part because clearly Argentina did not explicitly target inflation or use interest rates to achieve that objective. The analysis will later include different policy reaction function, including by highlighting the policy frontier that depends on weights to a loss function in terms of inflation and economic activity.

The policy reaction function standard in FPAS-type models implicitly argues that to stabilize inflation to a given target, without undue disruptions in economic activity or financial distress, the central bank should set nominal interest rates (R_t) around a neutral level associated with the prevailing real interest rate (rr_t) and forward looking inflation ($\overset{o4}{cpi}_{t+4}$), but should increase them when the forward looking inflation exceeds the target or economic activity is above potential, that is if the output gap ($lgdp\_gap_t$) is positive. It also suggests that to avoid financial distress, the nominal interest rates should not be changed too frequently and would therefore display some inertia. In other words, the policy reaction function could take the following form:

$$R_t = \mathrm{g}_1 * R_{t-1} + (1-g_1)*\ldots$$
$$\ldots\left(rr_t + \overset{o4}{cpi}_{t+4} + \mathrm{g}_2 * \left(\overset{o4}{cpi}_{t+4} - target_{t+4}\right) + \mathrm{g}_3 * lgdp\_gap_t\right) + \varepsilon\_rn_t;$$

E. Money Market

Given the importance of the need for seigniorage to explain the relatively high level of inflation prevailing over the last decade, the model includes equations describing the behavior of monetary aggregates. Money has been included in GPM-type models in the cases of Kenya (Andrle and

others, 2013) and Uruguay (Portillo and Ustyugova, 2015). For Argentina, Basco, D'Amato, and Garegagni (2011) find that the introduction of the real money gap does not improve forecast accuracy for quarterly data, but it significantly adds predictive power at lower frequencies.

Following Portillo and Ustyugova (2015), the model in this paper includes an error correction specification for the evolution of the money aggregate M2. Changes in real money balances ($\overset{o}{M}2_t - \overset{o}{\text{cpi}}_t$) are related to changes in economic activity $\overset{o}{\lg dp}_t$ and interest rates R_t. In addition, real money balances can vary to gradually adjust toward a long-run relationship akin to a money demand equation ($mondem_{t-1}$) and may also reflect changes linked to movements in the velocity of money or shocks to the demand for money (v).

$$\overset{o}{M}2_t - \overset{o}{\text{cpi}}_t = \delta 1 * \left(\overset{o}{\text{g}}dp_t \right) - \delta 2 * \left(R_t - R_{t-1} \right) - \overset{o}{v}_t - \delta 4 * mondem_{t-1} + \varepsilon\_M2$$

where

$$mondem_t = \text{l}M2_t - lcpi_t - \delta 5 * \lg dp_t + \delta 6 * R_t + v_t$$

Shocks to money demand can be persistent and add a trend to the level of real money balances.

$$\overset{o}{v}_t = \rho_v \overset{o}{v}_{t-1} + (1-\rho_v) * ss\_\text{v} + \varepsilon\_v_t$$

ENHANCING THE EFFECTIVENESS OF INFLATION TARGETING IN ARGENTINA[1]

This note identifies key reforms to strengthen the effectiveness of inflation targeting in Argentina. The Central Bank of the Republic of Argentina (BCRA) launched inflation targeting in September 2016, with the objective of reducing inflation to 5 percent in 2019. The reforms involve strengthening the institutional underpinnings of monetary policy and adjusting its policy and operational framework.

A. Introduction

1. **Inflation in Argentina has been chronic throughout most of its modern history**. By the 1950s, Argentina already featured two-digit inflation and, from 1975 onward, it accelerated and reached three-digit rates. To cope with persistent inflation, successive stabilization plans—of a variety of nature—were put in place, but most of them eventually failed. Thus, inflation hit a record high of more than 3,000 percent by the late 1980s (see Box 1). The Convertibility Plan introduced in the early 1990s, which had a currency board arrangement (CBA) as anchor, defeated inflation. However, price stability lasted only a decade as the CBA was abandoned in the midst of a financial crisis and inflation re-emerged as a result of expansionary fiscal and monetary policies.

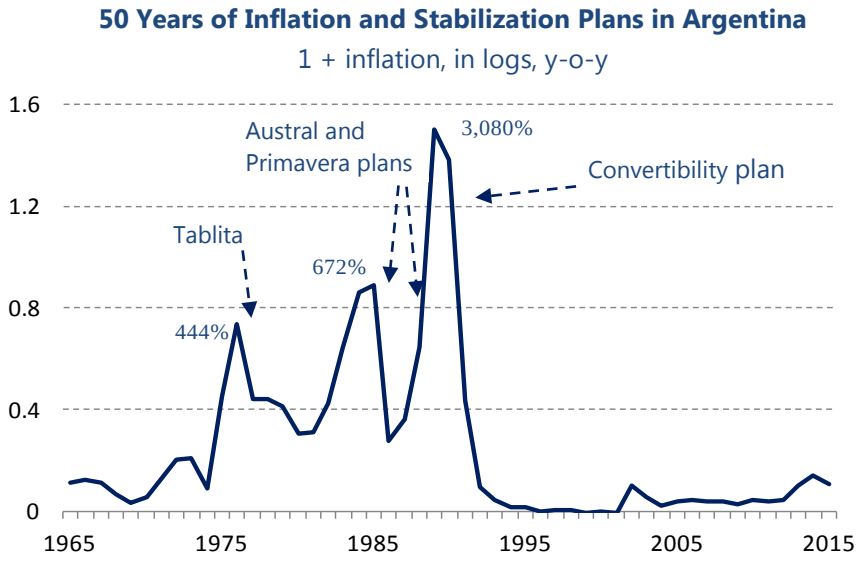
2. **The BCRA formally adopted inflation targeting in September 2016.** The BCRA confirmed the path of disinflation established at the beginning of the year, which aims at achieving 5 percent, with a tolerance band of +/- 150 bps, in 2019—the inflation targets for 2017 and 2018 were ratified at 12–17 percent and 8–12 percent, respectively. The BCRA also announced the adoption of a 7-day repo rate as a policy rate, that will substitute todays' 35-day Lebac rate. Policy decisions will be taken by a new Monetary Policy Council.

3. **This note identifies key reforms to enhance the effectiveness of inflation targeting in Argentina.** These reforms involve strengthening the institutional underpinnings of monetary policy and adjusting its policy and operational framework. The rest of this paper is organized as follows: Section B characterizes the transition to inflation targeting in Argentina and argues that the targets set for disinflation seem to be ambitious; Section C highlights key institutional reforms that may help to shift expectations forward; Section D identifies changes in the policy and operational framework to enhance the effectiveness of inflation targeting.

[1] Prepared by Luis Jacome.

Box 1. A Snapshot of Inflation and Stabilization Plans in Argentina in the Last 50 Years

Inflation has been a feature of the Argentinean economy since the 1940s. It started to climb after the Second World War, but surged in the mid-1970s to top 400 percent. After a short declining it soared to even higher levels by the 1980s before reaching record highs in the early 1990s. Argentina enjoyed price stability during most of the 1990s, but inflation rebounded when the currency board arrangement (CBA) collapsed in the early 2000s. Price stability was never achieved again. On the contrary, inflation has entrenched at levels of 20 to 30 percent in the last years.



Source: Great Buenos Aires CPI up to 2012 and City of Buenos Aires CPI thereafter.

Throughout these years several stabilization programs were implemented, but most of them were eventually ineffective. As inflation accelerated and became socially costly governments responded with a variety of stabilization plans. Often, stabilization efforts relied on the exchange rate to anchor inflation. The so-called "tablita" in the second half of the 1970s and the Convertibility plan that introduced the CBA in the early 1990s are cases in point.[1] Argentina also experienced alternative stabilization programs, which relied on income policies to tackle inflation inertia. The Plan Austral and Plan Primavera in the 1980s illustrate these heterodox adjustment programs.[2]

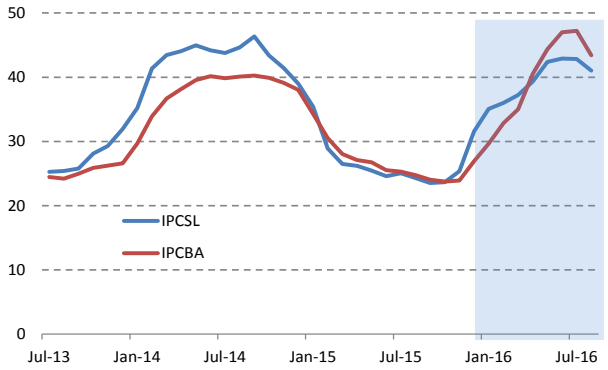
[1]/ For a discussion of these stabilization plans see, for example, Fernandez (1985) on the "Tablita" plan, and Galiani and others (2003) on the Convertibility Plan.

[2]/ Among others, heterodox economic programs are described and analyzed in Machinea and Fanelli (1988), and Heymann (1991).

B. The Road to Inflation Targeting

4. **Argentina has been living with moderate inflation during 2013–15.**[2] Central bank financing to the government—close to 5 percent of GDP during 2013–15—was a key source of persistent inflation. By the end of 2015, inflation accelerated due to the impact of the large currency depreciation that followed the liberalization of the foreign exchange market in December (Figure 1). Inflation gained momentum in April as a result of the adjustments in administrative prices decreed by the government. As of August 2016, inflation is above 40 percent y-o-y.

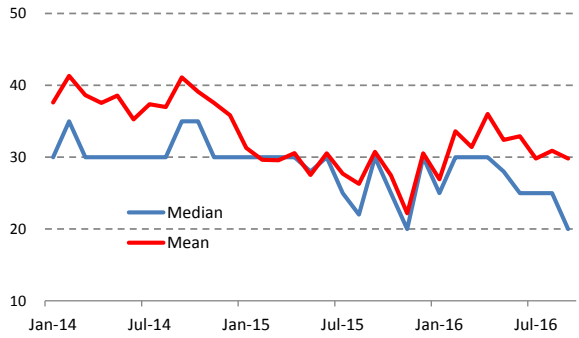
Figure 1. Moderate Inflation in Argentina
(Buenos Aires and San Luis indices, Percentage rate y-o-y)



Sources: Buenos Aires Ciudad Estadística y Censos and San Luis- Dirección Provincial de Estadística y Censos.

5. **After exiting the peg in December 2015, the BCRA briefly introduced a monetary-targeting regime, but soon abandoned it and started the transition to inflation targeting.** Under the monetary-targeting regime, base money became initially the new operational variable. The BCRA scaled up open market operations to reduce its rate of growth thus signaling a contractionary policy stance. Yet the BCRA did not identify any intermediate target as nominal anchor. In late February, the BCRA adopted the 35-day LEBAC interest rate as the new operational target, signaling a transition to inflation target (see in Appendix 1 a taxonomy of monetary policy regimes).[3] It also announced that as monetary aggregates will become endogenous, they will no longer be subject of policy targeting. At the same time, the BCRA kept the exchange rate flexible, although intervening with the implicit objective of maintaining the exchange rate within a 14–16 pesos/USD range.

Figure 2. Inflation Expectations
(12-months ahead, Percentage rate y-o-y)



Source: Universidad Torcuato Di Tella, Inflation expectations survey.

6. **The BCRA committed to reduce the monthly rate of inflation to about 1.5 percent or less in the last quarter of 2016.** This target is a variation of the 20–25 percent inflation target set for end-2016 by the Ministry of Economy at the beginning of the year. To achieve its policy objective, the BCRA initially tightened monetary policy. The policy rate was increased to 38 percent in March. Since May, however, the BCRA started to ease monetary policy by cutting the policy rate at

[2] The definition of moderate inflation varies slightly in the literature, referring to an increase in prices in the range of 10 to 40 percent (see Dornbusch and Fischer (1993), Cottarelli and Doyle (1999), and Frankel (2011)).

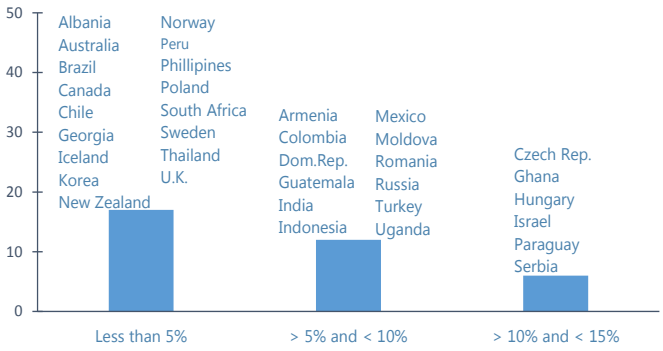
[3] BCRA conducts open market operations with its own paper, called LEBAC (Letras del Banco Central), which are issued at different maturities.

a gradual pace to 26.75 percent by mid-October. The BCRA has explained this policy relaxation as a response to a decline in inflation expectations (Figure 2). Simultaneously, the BCRA increased reserve requirements 1.5 percentage points (to 14.5 percent for time deposits) and 2.5 percentage points (to 19.5 percent for sight deposits) in June. A similar increase took place in July.

Ambitious inflation targets

7. **Argentina will launch inflation targeting from a much higher level than in other countries that followed a similar path in the past.** The experience of other countries shows that they preferred to introduced inflation targeting when the annual increase in prices was already close to 10 percent (Figure 3). Before adopting inflation targeting, many of these countries went through gradual disinflation, using alternative policy regimes. Some countries, like Chile, Colombia, Czech Republic, and Poland, used first the exchange rate as an intermediate target to fight moderate inflation and moved to inflation target only when prices were increasing less or slightly more than 10 percent year-on-year.[4] Mexico and Peru also implemented a gradual pace of disinflation but targeting monetary aggregates, before shifting to inflation targeting. In other countries like Turkey, the central bank announced a gradual transition to inflation targeting that lasted several years, before officially adopting the new monetary policy regime. During these years, the Central Bank of Turkey and the government laid the ground for introducing inflation targeting (see Appendix 2). Argentina is, thus, unique as it adopted inflation targeting when inflation was about 40 percent y-o-y, or near 20 annualizing monthly core inflation.

Figure 3. Inflation at Inception of Inflation Targeting
(Percentage rate y-o-y)



Source: IMF AREAER, 2015, Monetary Policy Framework Classification.

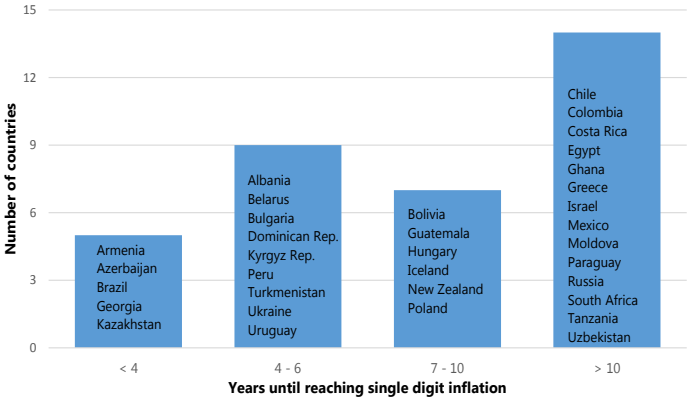
8. **With inflation at moderate levels, inflation targets in Argentina seem ambitious.** The experience of other countries shows that defeating moderate inflation lasted many years. Starting in 1980, some 35 emerging markets, primarily from Eastern Europe and Latin America, and some advanced economies, went through periods of moderate inflation—defined as episodes characterized by inflation rates in the range of 10–40 percent that followed three or more consecutive years of high or moderate inflation that created the incentives for indexing contracts.[5] In

[4] See Otker-Robe and Vavra (2007) on Chile, Czech Republic, and Poland, and Gómez and others (2002) on Colombia.

[5] The countries and the associated episodes are the following: Albania: 1993–99; Armenia: 1995–98; Azerbaijan: 1996–97; Belarus: 2002–06; Bolivia: 1986–92; Brazil: 1995–97; Bulgaria: 1998–2001; Chile: 1980–95; Colombia: 1980–2000; Costa Rica: 1983–2009; Dominican Republic: 1984–92; Egypt: 1980–94; Georgia: 1996–97; Ghana: 1985–2009; Greece: 1983–95; Guatemala: 1990–97; Hungary: 1991–99; Iceland: 1980–91; Israel: 1987–97; Kazakhstan: 1996–98; Kyrgyz Republic: 1995–2000; Mexico: 1989–2000; Moldova: 1995–2009; New Zealand: 1980–88; Paraguay: 1980–95; Peru: 1994–97; Poland: 1992–2001; Russia: 1996–2010; South Africa: 1980–93; Tajikistan: 1998–2004; Tanzania: 1980–99; Turkmenistan: 1998–2002; Ukraine: 1997–2001; Uruguay: 1994–99; Uzbekistan: 1998–2014.

30 of these countries, moderate inflation lasted four years or more before declining to single digit inflation, and in almost half of these cases it lasted more than 10 years (Figure 4). In Latin America, Chile reduced inflation from about 30 to 5 percent from 1985 to 1998, whereas in Colombia similar disinflation lasted from 1980 to 2003. In Mexico defeating inflation took 5 years following the "tequila" crisis. While convergence to low inflation may be shorter nowadays, as central banks have developed the technology to build credibility and arrest inflation, there are factors in Argentina that may hinder the achievement of the inflation targets.

Figure 4. Moderate Inflation Episodes and Convergence to Low Inflation



Source: IMF's International Financial Statistics and author's calculations.

9. **Wage indexation is currently at play in Argentina.** As it normally happens with moderate inflation, contracts in the economy—in particular wage negotiations—tend to be indexed backwards, thus generating inflation inertia.[6] Wage negotiations in Argentina, follow this rationale. The average increase in wages negotiated on a bi-annual basis for 2016 is 21 percent, and 34 percent for those negotiated for the whole year, above the inflation target for 2016—although below the level at which inflation may end this year.[7]

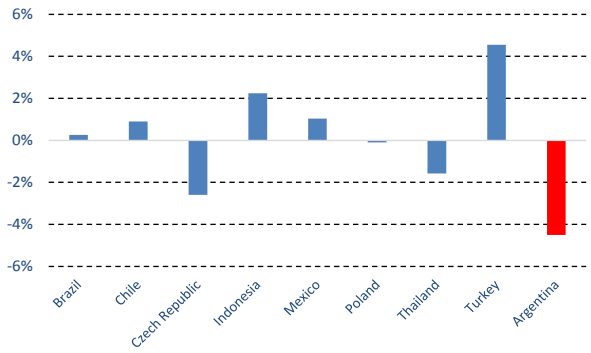
10. **Inertia may become a drag for the BCRA's anti-inflation efforts.** Inflation in Argentina appears to have an inertial component, comparable to that experienced by other Latin American countries when they had moderate inflation (see Box 2). Because wage negotiations tend to be set under backward-looking considerations, and given that inflation overshooting in 2016 reduced real wages, it is unlikely that wage negotiations for the new year will become forward looking and aligned with the BCRA's inflation target for end-2017.

[6] See for example Dornbusch and Fischer (1994).

[7] This increase in wages correspond to the "paritarias" negotiations, which cover 90 percent of the workers in the private sector (BCRA, 2016).

11. **The size of the fiscal deficit also cast doubts about the feasibility of achieving the inflation targets.** The primary deficit for 2016 and the one projected for 2017 are expected to be more than 4 percent of GDP. This is a sizable imbalance by international standards—when countries adopted inflation targeting (Figure 5). Moreover, the fiscal deficit is still partially financed by the BCRA—about two percent of GDP in 2016 and 1.5 percent of GDP in 2017. Central bank financing to the government not only tend to feed inflation pressures, but is a source of fiscal dominance, which reduces in practice the BCRA's operational independence and undermines its capacity to buildup credibility.

Figure 5. Primary Balance at Inflation Targeting Inception
(Sample of inflation targeting countries, Percent of GDP)

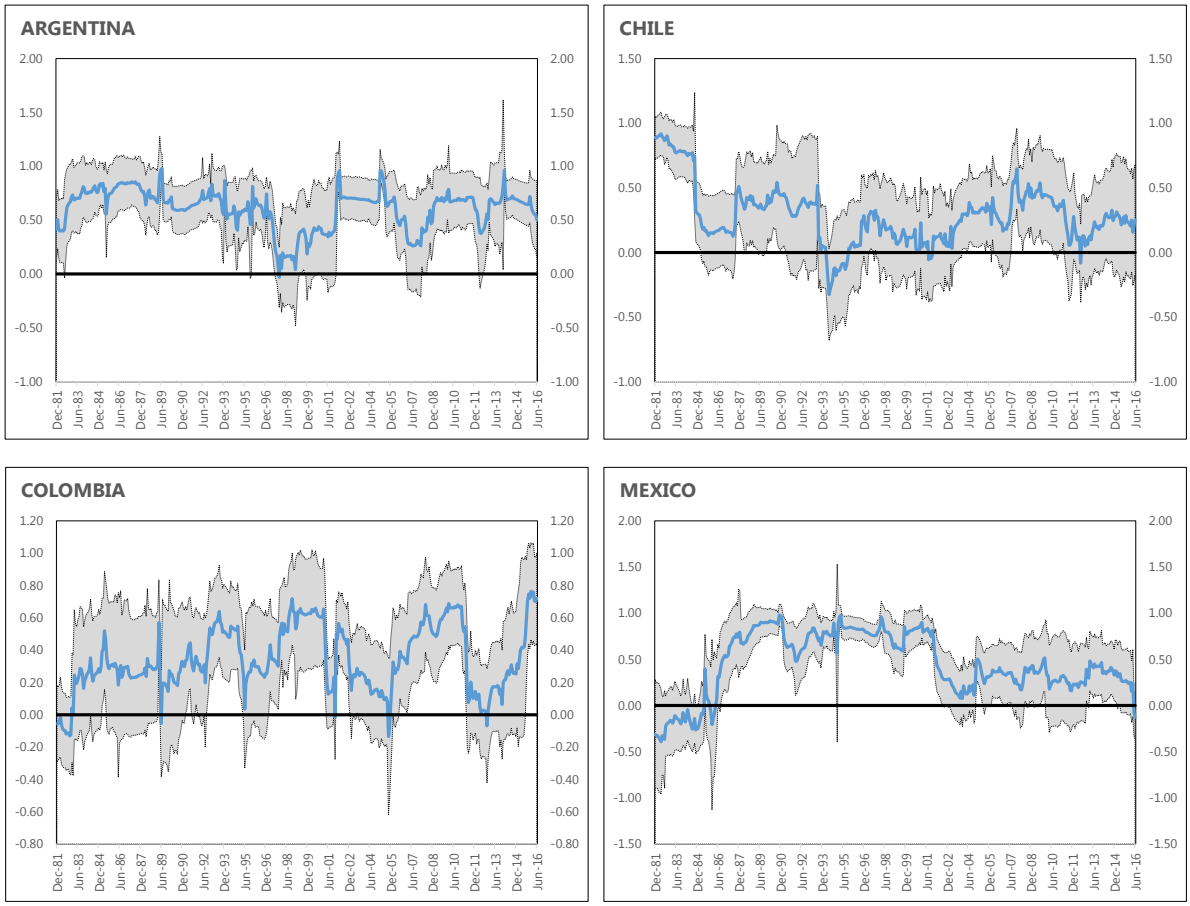


Sources: IMF World Economic Outlook, IMF WHD for Brazil, and Intelligence Unit for Thailand.

Box 2. Inflation Inertia in Argentina and Other Selected Latin American Countries

Inertial inflation seems to be entrenched in Argentina. A simple measure of inflation inertia suggests that inflation has been a constant feature in Argentina since 1980, except for the 1990s, when the currency board was in place and, to some extent. during the mid-2000s. Inertial inflation in the last five years has increased. It seems to be higher than in Chile and Colombia, and similar than in Mexico, at the time these economies featured moderate inflation—in the second half of the 1980s and most of the 1990s. In these countries, it took more than 10 years to achieve one-digit inflation as inertia declined.

Inflation Inertia in Argentina and Selected Latin American Economies



Note: The charts present estimates of inflationary inertia in Argentina, Chile, Colombia and Mexico using univariate rolling regressions. They plot estimated AR(1) coefficients of univariate regressions of monthly inflation rates using a 36-month rolling window and 95 percent confidence bands of the univariate regressions of month-on-month inflation rates.[1] Similar calculations have been used in the literature (see, for example, Edwards and Lefort, 2002).

1/ The CPI series were obtained from IFS statistics and were previously adjusted for seasonal effects using X-12-ARIMA. The series are not adjusted of structural breaks. Each data point date corresponds to the last month included in the rolling sample. For instance, December 2015 includes 36 months starting in January 2013 to December 2015.

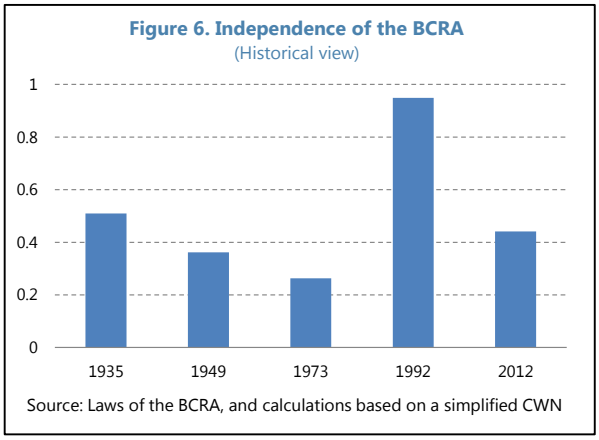
12. **As a result of inflation inertia and lax fiscal policy, dissinflation may not fall at the pace required to hit the 2017 target.** Reducing inflation to close to 20 percent by end 2017 may be feasible with the current policy stance—keeping the policy rate at 3–4 percent in real terms with respect to inflation expectations. However, this may not be enough to hit the 12–17 percent inflation target. Because of the inflation inertia and lax fiscal policy, the BCRA may be bounded to make an extra policy tightening and allow the peso to appreciate significantly to help disinflation, although at the cost hindering economic recovery. Moreover, if the exchange rate appreciation persists in an environment of lax fiscal policy, a future currency crisis cannot be ruled out, thereby undermining disinflation achievements and the BCRA's credibility.

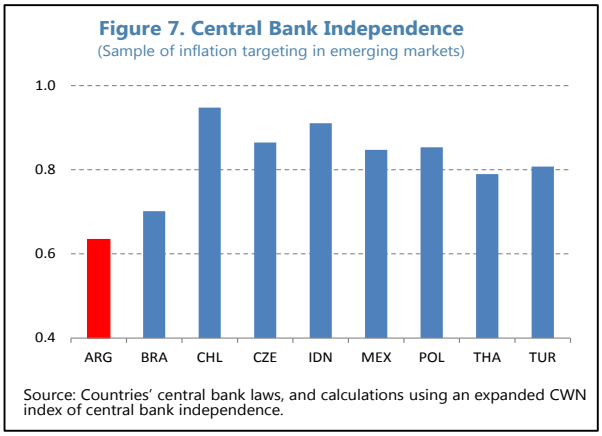
13. **Stronger institutional arrangements for monetary policy could help mitigate the negative effects induced by inflation inertia and years of fiscal dominance.** To the extent that this reform entrenches the BCRA's commitment to price stability and closes the door for central bank financing to the government, it can help inflation expectations to become increasingly forward-looking. Lower inertia will also make disinflation possible at lower interest rates than otherwise, requiring less sacrifice in terms of output and employment. In addition, the amplifier impact that inertia inflicts on inflation in response to shocks will fade over time, thus favoring a more stable declining path.

C. Strengthening the Institutional Foundations of Monetary Policy

14. **In recent years the BCRA lost its monetary policy independence and become subject to fiscal dominance**. The approval of the Organic Law 24.144 in 1992 had already strengthened the political and operational independence of the BCRA. However, following the collapse of the currency board arrangement in 2003, the approval of various reforms of the central bank law, in particular, Law 26.739 of 2012 reversed the BCRA's independence. Such reforms aimed at putting monetary policy under the government's influence with the view of helping to finance the fiscal deficit. Figure 6 illustrates this reversal by comparing central bank independence throughout the Argentinean history, using as a measure a slightly simplified version of the Cukierman, Webb, and Neyapti (CWN) index (Cukierman and others, 1992).[8]

[8] This slightly simplified CWN index of central bank independence is based on the legal provisions of central bank laws and related legislation. The overall value of the index fluctuates on a continuous scale from zero to one, with higher values indicating stronger legal central bank independence.





15. **Strengthening the BCRA's independence is likely to enhance the effectiveness of inflation targeting.**[9] Central bank independence is important to isolate monetary policy from political influence and give the central bank the means necessary to fight inflation. If market participants perceive there is no such independence, an inflation bias will remain, requiring interest rates to be higher to achieve the same inflation target. This is why most emerging market economies that adopted inflation targeting enhanced central bank independence and strengthened accountability. Argentina ranks well below other inflation target emerging markets in terms of central bank independence and accountability (Figure 7).[10] The BCRA's two main institutional weaknesses are its multiple mandate and the inappropriate relationship with the government.

16. **Narrowing the BCRA's mandate to focus monetary policy on achieving price stability is key to ensure consistency with the essence of inflation targeting.** This reform should be adopted as soon as possible. Today, Article 3 of the BCRA Law establishes that monetary and financial policies are subordinated to government policies and should also promote employment and the country's development with social equity. The way this mandate is structured overburdens the BCRA and leads to a number of distortions. Specifically:

- **subordinating the BCRA to government policies opens the door for time inconsistency.** The BCRA is legally vulnerable to make policy decisions that are contaminated with short-term political interests, which can induce market participants to have an inflation bias with respect to the BCRA's inflation targets, thus requiring a larger sacrifice ratio to keep inflation on target;

[9] Empirical evidence shows that central bank independence and inflation in Latin America are negatively correlated (see Jácome and Vázquez, 2008).

[10] The expanded version of the CWN index of central bank independence is also based on the legal provisions of central bank laws and related legislation and adds some categories such as accountability. It incorporates a broader view of political independence—to include all members of the central bank board and not only the Governor—, lender-of-last-resort provisions, central banks' financial independence (whether central banks have capital at all times), and their accountability and transparency. The overall value of the index also fluctuates on a continuous scale from zero to one, with higher values indicating stronger legal central bank independence.

- **promoting development and social equity does not respond directly to monetary policy.** Moreover, it can even be in conflict with the objective of price stability, thus making central bank accountability difficult in practice.

- **monetary policy should not explicitly promote employment either.** Unlike in advanced economies, employment in emerging markets are vulnerable to terms of trade and political development shocks. Thus, holding the BCRA responsible for creating employment risks undermining monetary policy credibility and makes it difficult to hold the BCRA accountable.

17. **The BCRA mandate should focus on its core functions.** On monetary policy, the BCRA should aim at preserving price stability while maintaining the objective of financial stability given that it has banking regulation and supervision responsibilities.

18. **To the extent possible, the central bank law should be amended to explicitly delink monetary policy formulation from government policies.** Governments are potentially more interested in pursuing short-term goals—sometimes associated with electoral calendars, at the expense of not preserving price stability. Article 3 in the 1992 Law illustrates how to phrase an alternative text that grants political autonomy to the BCRA.

19. **Eliminating fiscal dominance is critical to strengthen the operational independence of the BCRA and build up credibility.** While operational independence is typically about ensuring that the central bank manages its short-term interest rate without government interference, in Argentina it is mostly about restricting fiscal dominance under the form of central bank financing to the government. Article 20 of the central bank law includes a number of provisions that render a level of credit to the government—extended at a zero interest rate—that is large by international standards. Thus, a legal reform is warranted to eliminate all forms of central bank financing to the government. As a second best, the law could limit the sources of central bank financing to only transitory advances up to 10 percent of government revenues in the previous 12 months—as set in Article 20. However, this money should be paid back not later than in 180 days and charged a market interest rate. All other forms of government financing established in this article should be banned.[11] Good practices to rule central bank financing to the government are summarized in Box 3. As for the unrealized profits associated with currency depreciations, a legal reform is necessary to prevent these funds from being transferred to the government. They should be kept on a reserve account up to some relative level to be used whenever currency appreciations generate losses.

[11] Article 20 authorizes the BCRA to extend: (i) transitory advances up to an amount equivalent to 12 percent of base money; (ii) advances to the government up 10 percent of the government revenues in the last 12 months; and (iii) additional transitory advances for up to 10 percent of the revenues in cash obtained by the government in the last 12 months.

Box 3. Key Principles to Rule Central Bank Credit to the Government[1]

As a first best, central banks should not finance government expenditure. The central bank may be allowed to purchase government securities in the secondary market for monetary policy purposes. Restrictions to monetizing the fiscal deficit are even more compelling when countries feature fixed or quasi-fixed exchange regimes to avoid fueling a possible traumatic exit from the peg.

As a second best, financing to the government may be allowed on a temporary basis. Central bank lending to the government is warranted to smooth out tax revenue fluctuations. Therefore, they could be tolerated until either a tax reform permits a stable stream of revenues over time or markets are deep enough to smooth out revenue fluctuations. These loans should be extended on a short-term basis, up to six months and, in any case, they should be paid back within the same fiscal year.

Financing should be confined to the central government. Extending credit to other areas of the state, such as local governments and public enterprises, should be banned.

The terms and conditions of these loans should be established by law. Central bank financing should be capped at a small proportion of annual government revenues (on a case-by-case basis) and should be priced at market interest rates. Communication between the government and the central bank for the disbursement and cancellation of these loans is necessary to facilitate the central bank's systemic liquidity management.

Central bank credit to the government should be transparent. These transactions should be disclosed on a regular basis, including the amount and financial conditions applied to these loans.

1/ See Jácome and others (2012).

D. Further Refinements on the Monetary Policy Framework

20. **While the BCRA has recently made important strides to revamp their monetary policy framework, further progress is warranted to enhance the effectiveness of inflation targeting.** The BCRA could take monetary policy decisions in a more structured manner. It could establish more formal procedures to rule its key policy meetings. It could also refine its policy and operational framework to analyze, formulate, and support monetary policy decisions in an integrated fashion, thus providing a path for future interest rates that are consistent with achieving its policy objectives. A more integrated and structured monetary policy framework also facilitates a better central bank communication.

Improving decision making

21. **A key institutional arrangement of inflation targeting central banks is the policy meeting to decide about the policy rate.** There are no best practices for the design of an institutional arrangement for monetary policy decisions, but group decision making is the norm.[12] Compared to one-sided views of an individual central banker, group decision making is based on

[12] New Zealand and Israel are exceptions to this norm, since in those central banks the governor is the sole policy decision maker.

diverse views, and is likely to produce better interpretation of information, data, and results from considering alternative scenarios. In general, societies tend to be reluctant to delegate on a single person the adoption of policy decisions—such as the level of interest rates that have direct implications on inflation and economic activity—in institutions that enjoy political independence.

22. **The BCRA could better structure policy decision making by either instituting a regular policy meeting of its board or by creating a monetary policy committee (MPC).** This institutional arrangement will replace the current setup, where decisions on the policy rate are informally discussed by an ad-hoc committee, and are legally taken by the BCRA governor. In either arrangement, policy rate decisions would be the result of group decision making. There is no standard international practice that favors either of these arrangements. An MPC exists in some countries, while in others the central bank board is in charge of deciding about the policy rate (see Table 1). [13] The latter is the prevailing arrangement in Latin America (Brazil, Chile, Colombia, Mexico, Peru) as only in Guatemala an MPC exists. In the sample of inflation targeting countries in Table 1, the central bank board plays the role of the MPC in most cases, the decision-making body is comprised of 5 to 10 members and external members are appointed in some cases.[14] No consensus is required to take decisions, and the preannounced meetings take place either eight or 12 times in the year, except in Australia and Mexico.

[13] For an expanded discussion about why MPCs exist and how they work, see for example Blinder (2007).

[14] The size and composition of the MPC, and how its members are selected, vary across countries. For a discussion, see for example Berger and others (2006) and Vandenbussche (2006).

Table 1. Monetary Policy Decision-Making in Selected Inflation Targeting Countries

	MPC or Central Bank Board/Council	Number of members	External members	Decision-making process	Meetings per year
Australia	Board	9	6	Consensus	11
Brazil	Board	9	No	Vote	8
Canada	Board	6	No	Consensus	8
Chile	Board	5	No	Vote	12
Colombia	Board	7	No	Vote	12
Czech Republic	Board	7	No	Vote	8
Indonesia	Board	6-9	No	Consensus	12
Mexico	Board	5	No	Consensus	11
New Zealand	Governor	1	N/A	N/A	8
Peru	Board	7	6	Vote	12
Poland	MPC	10	9	Vote	12
Thailand	MPC	7	4	Vote	8
Turkey	MPC	7	1	Vote	12
United Kingdom	MPC	9	4	Vote	12

Source: Central Bank websites and Hammond (2009) and central bank websites.

23. **The BCRA Board, or the MPC, should meet regularly on a preannounced calendar.** Extraordinary meetings are warranted, in particular while the Argentinean economy is still on a stabilization mode—to decide on the policy rate. Meetings should be governed by well-established protocols for policy decisions, including their frequency, the quorum required to take decisions, whether they are taken by majority or unanimously, what the role of the chairman is, and how decisions are communicated. To take decisions, the BCRA Board or the MPC would need the support of the BCRA's divisions responsible for modeling, financial market analysis, monetary analysis, and domestic and international conjunctural analysis. The decisions would be immediately communicated and explained to the public in a clear and systematic fashion. In case an MPC is created, it should have a permanent and structured existence, and should be vested with legal powers to support policy rate decisions.

24. **Policy meetings should be less frequent than today.** Having an inflation rate of about 40 percent could make the case for having frequent meetings because of the instability such inflation levels inflict on the economy. However, it also suggests that policy decisions should not be taken frequently because data is unstable and often mostly reflect noise and not changes in underlying inflationary trends. Similarly, at least during the disinflation phase, inflation and inflation

expectations may be volatile. The possible ill effects stemming from this second consideration outweigh the likely benefits of the first.

The policy framework

25. **Building a forecasting and policy analysis system is important to support the inflation targeting regime.**[15] As a first step, the BCRA need to achieve a clear understanding of the transmission mechanism of monetary policy. Building on this understanding, the policy framework should consist of four interlinked blocks: (i) data monitoring and management; (ii) short-term forecasting; (iii) medium-term forecasting; and (iv) reporting. The picture of a transmission mechanism has to bring a solid idea about the way key variables react to monetary policy instruments, as well as to other shocks affecting the economy.

26. **Argentina needs to preserve and perfect the quality of inflation and output data.** Since the previous consumer price index (CPI) was widely manipulated, the new CPI may only gain credibility overtime. At the beginning, negotiations of contracts, in particular of wage increases, may be impaired by the lack of trust on the inflation data. Policymakers' analysis would also suffer from this deficiency as they face inconsistent data series and series that are not appropriately seasonally adjusted. Similar problems arise from GDP data weaknesses because of the limitations they impose for calculating the output gap.

27. **The BCRA needs to refine some of its monetary operations.** The BCRA may consider two alternatives for the term of the policy rate—an overnight rate and a seven-day rate—and either target a market rate or attach it to a central bank policy instrument.[16] As a tentative proposal, the BCRA could consider adopting a policy rate attached to a seven-day term deposit facility offered two times per week, which would provide an effective policy signal and anchor to short-term interest rates. The BCRA would also conduct ad hoc open market operations on any day when overnight rates deviated materially from the policy rate. While building its expertise in liquidity forecasting, the BCRA may rely on an interest rate corridor supported by standing facilities—deposit and lending—that are narrow enough to limit interest rate volatility, but at the same time wide enough to encourage interbank borrowing and lending.

28. **A clear strategy is also needed to deal with structural liquidity.** Market-based instruments are preferred to fully support development of the financial markets. Initial focus should be on 1-month, 3-month and perhaps 6-month maturities. The issuance method should change to fixed-volume auctions, using a multiple price method of allocation.

[15] This is a standard policy framework built by many central banks that adopted inflation targeting. Berg and others, 2006a and 2006b, provides a description of this framework and how it operates.

[16] An expanded discussion about the pros and cons of these two alternatives and its operational aspects was submitted to the BCRA authorities in August 2016.

Communication

29. **The CBRA should continue enhancing gradually its communication, explaining policy decisions largely based on forward-looking indicators.** The BCRA cannot become immediately as transparent as other inflation targeting central banks because it is still in the process of understanding how monetary policy is transmitted to the real sector. However, it should explain how monetary policy is formulated and implemented, highlighting potential downside risks for achieving the inflation target. This involves making available and disseminating the information and data used to take current policy decisions on a timely basis with emphasis on future or expected information. If economic agents understand the goals pursued by the BCRA and the policy instruments used to achieve such goals, the effectiveness of monetary policy is likely to increase. Enhancing communication and transparency is also a matter of good governance, which becomes particularly important should the BCRA is granted more political independence.

30. **By explaining its policy decisions and targets and by delivering on those promises, the BCRA would continue building credibility.** The BCRA would need to act consistently with respect to its reaction function. When central bank reactions are unpredictable or inconsistent, uncertainty leads to market volatility because economic agents do not know what to expect. As a result, market expectations about inflation may drift upwards from the central bank's target, thus requiring an extra tightening effort. Consistency between policy actions and communications is a necessary condition to buildup credibility, which would reinforce the effectiveness of monetary policy.

31. **Yet, communication should go beyond explaining the rationale for policy decisions and stress that low and stable inflation is welfare improving.** This should take the form of an educational campaign that reaches the society at large, with the view of building up support for an autonomous—from political pressures—and accountable BCRA. Reaching out the public at large is important in Argentina given its recent history of central bank independence reversal. Such initiatives will help the public understand the benefits of low and stable inflation toward fostering broad-based economic growth, and the rationale for providing a central bank with an appropriate degree of operational independence to carry out that mission. The BCRA can produce educational materials to inform students about basic elements of monetary policy, including the role of money, the concept of inflation, and the rationale for the anti-inflation mandate of the central bank. The BCRA can also engage in active outreach to business associations, labor unions, and various other types of community organizations.

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Appendix I. Monetary Policy

Taxonomy of Monetary Policy Regimes

Monetary policy formulation and implementation should be consistent with the policy regime in place. Central banks should make their monetary policy goal explicit and behave accordingly. They should identify clearly the intermediate target and the corresponding operational target they use as the key policy instrument in their reaction function. When central bank reactions are inconsistent or unpredictable, market uncertainty and volatility tend to be higher because market participants cannot understand monetary policy. In this environment, market expectations about inflation may drift from central banks' targets.

The taxonomy below shows the components of the main monetary policy regimes and the role they play in a consistent manner. For each policy regime there is a primary policy instrument, which is the key tool used to achieve the operational target or modify the operational variable. The operational target is expected to be correlated with intermediate target. Changes in the operational target signal changes in the stance of monetary policy. The intermediate target is the nominal anchor and is connected with the final objective. Finally, each policy regime has a main shock absorber.

Monetary policy regime	Main policy instrument	Operational target	Intermediate target	Final objective	Main shock absorber
Exchange rate targeting	OMOs/FX intervention	Short-term interest rate	Nominal exchange rate	Exchange rate stability/inflation	International reserves
Monetary targeting	OMOs	Base money/ bank reserves	Broad money	Inflation	Nominal exchange rate
Inflation targeting	OMOs	Short-term interest rate	Forecasted inflation	Inflation	Nominal exchange rate

Appendix II. Turkey's Transition to Inflation Targeting

Turkey spent almost four years building the blocks for the adoption of inflation targeting. During this transitory period (2002 to 2005) a new central bank law was approved, which set the institutional foundations of a more independent and forward looking monetary policy. In addition, the Central Bank of Turkey (CBT) built institutional capacity to implement inflation targeting. By end 2005, before launching inflation targeting, inflation had declined to single digits.

The CBT implemented what it called an "implicit inflation targeting." It announced a multiyear inflation target consistent with targets set in the stand-by program negotiated with the IMF, and used monetary aggregates—also negotiated with the IMF—as intermediate targets. However, the latter would be revised if an inconsistency emerged between the final objective and the intermediate target. The decision-making process, though, was discretionary and opaque as policy decisions were unpredictable and not well communicated (Kara, 2006). Behind the scenes, the central bank made important strides to improve data availability. It improved the methodology for the calculation of the consumer price index and started to conduct surveys, in particular of inflation expectations. As data improved, the central bank could improve the analysis of the monetary policy transmission mechanism, and was in a better position to forecast inflation.

In the wake of the financial crisis, Turkey approved a bold reform of the central bank law. The new law was aimed at building the blocks for a more independent monetary policy and, ultimately, at laying the ground for adopting inflation targeting. Key provisions of the 2001 legislation were the following: (i) clarifying the mandate of the CBT by stipulating that its primary objective is to achieve and maintain price stability. The central bank was also assigned the mandate of maintaining financial stability; (ii) granting political and instruments independence to the CBT by empowering it to formulate monetary policy at its own discretion, using autonomously monetary policy instruments; (iii) Banning central bank advances and credit to the government and the rest of the public sector, which brought to end the monetization of fiscal deficit that fueled in the past inflation; and (iv) Holding the central bank accountable. The governor of the CBT was required to submit twice a year a report to the Council of Ministers and the Planned and Budget Commission of the National Assembly on the operations of the bank and the monetary policy pursued. The CBT was also required to inform the public and disclose the reasons for not achieving the monetary targets.

Inflation was on target by 2005, thus exceeding all expectations. With the support of a disciplined fiscal policy, the annual inflation rate fell from 68 percent in 2001 to less than 8 percent by end 2005—the target set for this year. At the same time, exchange rate volatility declined and so did the country's risk premium, while nominal and real interest rates came down and the exchange rate pass-through weakened. These positive outcomes help strengthening the credibility of the CBT thereby creating a favorable environment for the introduction of a full-fledged inflation targeting at the beginning of 2006.

ARGENTINA'S EXPORTS AND COMPETITIVENESS: A SECTORAL VIEW ON TRENDS AND PROSPECTS[1]

A. Introduction

1. **Argentina's export performance has worsened markedly since 2012**. Overall export values contracted at an average of over 9 percent per year between 2012 and 2015, nearly four times faster than world exports (Chart).

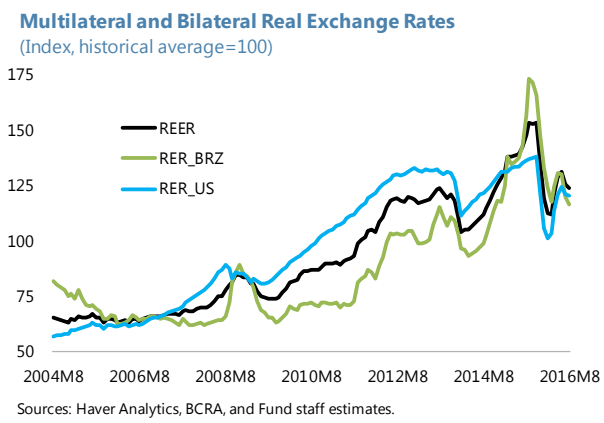
Source: Direction of Trade Statistics.
1/ Under/overperfomance indicates whether Argentina's export growth is lower/ greater than the world's export growth.

2. **This underperformance coincided with tighter trade and foreign exchange controls and an overvalued currency**. On the back of high inflation and a tightly managed exchange rate, Argentina's real effective exchange rate (REER) accelerated its upward trend after 2011, with staff estimates suggesting an overvaluation that peaked at over 50 percent by November 2015 (Figure 1, left chart). Export taxes on commodities, some as high as 35 percent, added a further wedge to the relative prices for Argentine exporters. A complex array of foreign exchange controls (the so-called "*cepo cambiario*"), led to a parallel foreign exchange market and further hindered external trade. External competiveness was also hampered by fast increasing unit labor costs (Figure 1, right chart), with wages growing well above productivity, a high tax and administrative burden, deteriorating infrastructure, limited access to markets and financing for exporters, and restrictions on intermediate and capital goods imports that disrupted production in exporting firms.

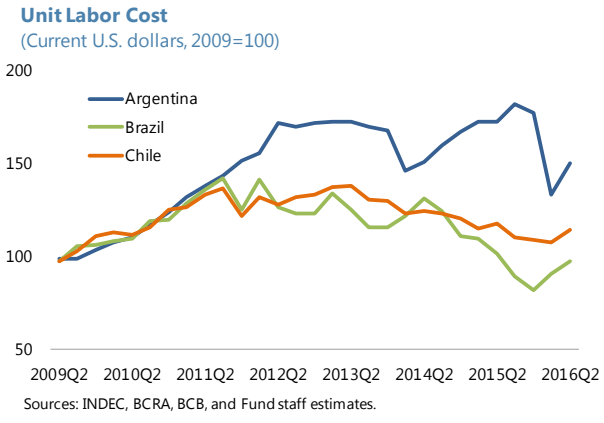
3. **With the removal of the "*cepo*", the free float of the peso, and the elimination of most export taxes, Argentina's export performance has the potential to improve**. The peso has depreciated over 50 percent in nominal terms since the foreign exchange controls were relaxed in December 2015, although, in real effective terms, it remained some 20 percent above its historical average by September 2016. In early 2016, export taxes were eliminated for all products except soybeans and soy derivatives (oil and meal), for which taxes were reduced by 5 percentage points. Also, quantitative restrictions (through a system of permits) on agriculture exports were removed, and there are signs that the producers started reacting to these changes: for example, the meat sector has begun to rebuild the breeding stock, while the cereal area is projected to increase sharply in the 2016/2017 agricultural season, potentially leading to higher production and exports in coming years.

[1] Prepared by Lusine Lusinyan and Mariano Ortiz Villafañe.

Figure 1. Argentina: Price Competitiveness



Sources: Haver Analytics, BCRA, and Fund staff estimates.



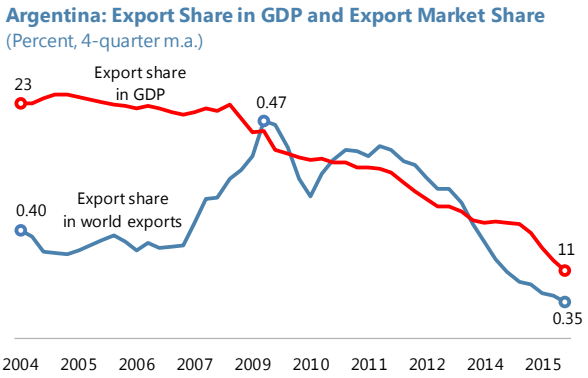
Sources: INDEC, BCRA, BCB, and Fund staff estimates.

4. **The main objective of this paper is to assess to what extent a more competitive exchange rate can boost Argentina's exports**. To do so, we estimate export demand equations at the product level as the structure of Argentina's trade means that estimating aggregate export equations may be subject to a specification bias. In particular, the product-level equations allow us to determine which price competiveness indicator is the most appropriate for a set of major Argentina's export products. We then aggregate up the product-level estimates of export price and demand elasticities, which can be compared with estimates based on aggregate exports to gauge the extent of the bias. We conclude with a discussion of a number of key non-price competitiveness factors that would need to be improved to sustain and broaden Argentina's export growth beyond the near-term horizon.

5. **The main conclusion of the paper is that while greater price competitiveness would boost the exports of a few products, its effect on overall export is likely to be modest**. Our estimates show that export elasticity to relative prices is high in some sectors (especially, automotive, machinery and equipment) but low in others (cereals, soybean). Overall, aggregating up the product-level elasticities suggests that a 10 percent real depreciation of the Argentine peso would boost overall export growth by less than one percentage point. For demand elasticity, we find that a one percent increase in trading partners' growth would increase overall export growth by about 2 percentage points. Improving non-price competiveness factors could help obtain more broad-based and permanent results.

B. Argentina's Exports Over the Last Decade: A Few Trends

6. **Argentina's export share, both in the world market and in its own economy, has declined since 2004** (Chart). By 2016, Argentina's exports were less than 0.4 percent of world's exports, falling more than 0.1 percentage points from the peak in 2009, close to its longer-term historical minimum. The share of exports in GDP also fell by nearly 13 percentage points since 2004 to about 11 percent in 2015, the lowest level among its peers in Latin America.

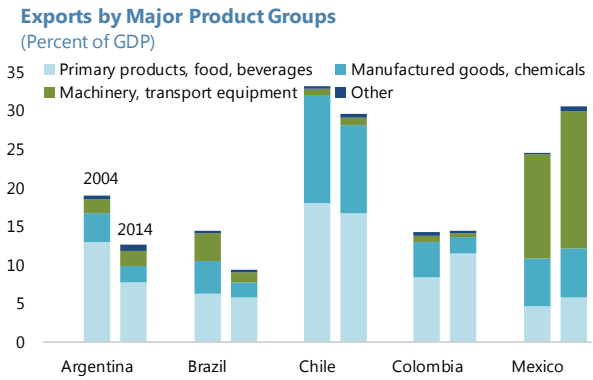


Sources: Direction of Trade Statistics and IMF World Economic Outlook database.

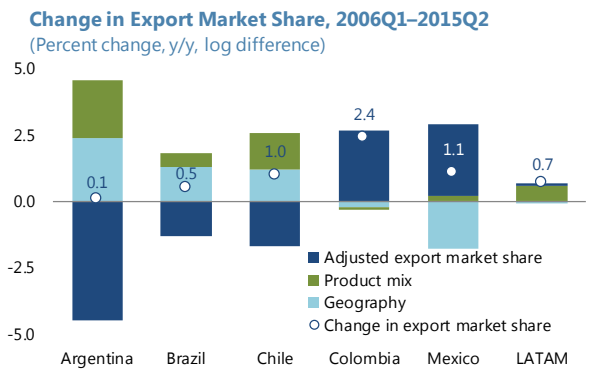
7. **The decline in export market share reflected a severe loss of external competitiveness**.

- During 2004–14, the composition of exports shifted toward agriculture and automotive products (Figure 2, left chart), while the destination shifted more toward Brazil, Venezuela, and the Asian EMs (except China) away from China, the United States, Chile, and Europe.
- A "shift-share" decomposition of Argentina's exports shows that these compositional changes had a positive impact on Argentina's exports (Figure 2, right chart), reflecting Argentina's greater exposure to more dynamic destination markets ('geography effect') and specialization in high growth sectors ('product mix effect').
- The decline in Argentina's export market share can therefore be attributed to a loss of competitiveness, that is, the residual in our decomposition (for details, see Gaulier and others, 2013).

Figure 2. Argentina's Exports: Changes in Composition and Market Share



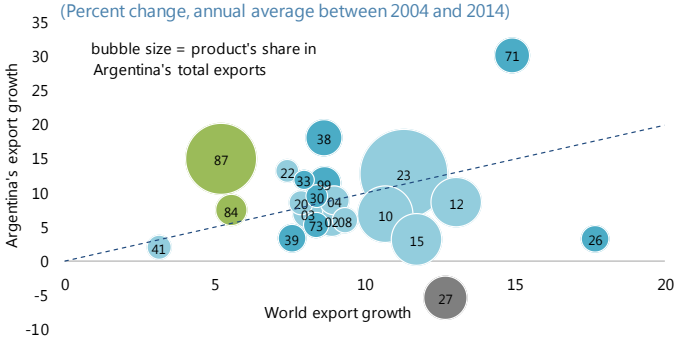
Sources: COMTRADE and Fund staff esimates.



Source: Measuring Export Competitiveness database, World Bank.

8. **Looking at a product level, however, suggests a more nuanced story**. The relative performance of Argentina's exports has varied by product, reflecting in part sector-specific circumstances. In 2004–14, nearly half of Argentina's top 22 export products (comprising about 90 percent of its total exports in 2014), grew faster than the world's exports of these products (Chart). For example, Argentina's exports of motor vehicles (about 12 percent of Argentina's total exports) increased on average 15 percent per year over this period, three times faster than the world's exports of motor vehicles. With 80 percent of this category destined for Brazil, this impressive growth mainly reflects the impact of a special trade agreement between the two countries.[2] Argentina's largest export item—soybean meal ("residues and waste from food industries" in the COMTRADE classification, comprising almost 20 percent of total exports)—grew largely in line with the world's exports of soybean meal. In contrast, its main primary products (cereals, soybeans) and energy products underperformed the world exports, being affected, among other factors, by high export taxes, export restrictions, and domestic policies of regulated prices and subsidies that discouraged investment and activity in these sectors.

Argentina vs. World: Export Growth by Product 1/
(Percent change, annual average between 2004 and 2014)



Source: COMTRADE.
1/ Numbers in the bubbles refer to product classification according to HS 2002: e.g., 23=residues and waste from food industries; 87=vehicles; 10=cereals; 15=animal/vegetable fats and oils; 12=oil seeds and oleaginous fruits; 27=mineral fuel; 38=chemical products; 71=precious/semi-precious stones; 26=ores, slag, and ash; 41=raw hides and skins.

C. Price Competitiveness: A Product-Level Analysis

9. **When looking at the sensitivity of exports to prices it is important to take into consideration the structure of Argentina's exports**. Estimating the elasticity of aggregate export volume to REER casts doubts on whether price competitiveness is a factor for Argentina's exports—changes in REER enter the export growth equations with the wrong sign and/or are not statistically significant (Appendix Table A1). Estimating the elasticity through panel data models allows to control for product-specific prices and foreign demand, and shows the expected negative and statistically significant relation between exports and prices (Appendix Table A2), although with little overall explanatory power and important sensitivity of the results to outliers. Failing to take into account that different products could respond to different price indicators may lead to model misspecification.[3]

[2] Since the early nineties, Argentina and Brazil have a special trade agreement for the auto sector which allows for duty-free bilateral trade in vehicles and auto parts within certain limits, defined by the so-called 'flex' coefficient. With the current 'flex' of 1.5, for each dollar of automotive products exported to Brazil, Argentine car makers can import US$1.5 from Brazil duty free. In June 2016, the pact was extended until June 2020, with a provision allowing for an increase of the 'flex' to 1.7 in June 2019 if certain conditions are met.

[3] For a discussion of other econometric issues that may complicate the estimation of trade elasticities, see IMF (2015).

10. **In this paper, we estimate export growth equations at product level, using different indicators of relative prices for each product**.[4] For example, *soybean meal* represents about 20 percent of Argentina's overall exports but very little of this product is exported to the top 10 trade partners of Argentina. This suggests that REER, which uses total export shares as the weights, may not be the best price competitiveness indicators for this product. Instead, the demand for this product is likely to depend more on its export price (in absolute terms, or relative to the prices in the export destination countries) and the cost structure relative to main competitors. Since both Argentina and Brazil have relatively large market shares in total world exports of soybean meal (36 and 22 percent, respectively), the demand for Argentina's export of this product could be particularly affected by its bilateral real exchange rate with Brazil (facing the same level of international prices, the country with a lower relative cost of production should be able to produce and export more). For *transport equipment*, Argentina's second largest export item, the bilateral real exchange rate with Brazil would be the most appropriate price indicator given that 80 percent of the exports of this product goes to Brazil, and large car manufacturers operating in both countries can potentially react to changes in their relative cost structure.[5]

11. **In particular, for each product p, we estimate the following equation**:

$$\Delta X_{p,t} = \beta_{p,0} + \beta_{p,1}\Delta \bar{Y}_{p,t} + \beta_{p,2}\Delta P_{p,t} + \varphi_{p,t} + \tau_{p,t} + \sigma_t + \epsilon_{p,t} \quad (1)$$

where $X_{p,t}$ is Argentina's export volume; $\bar{Y}_{p,t}$ is the demand for that product from Argentina trading partners (using export share as weights); $P_{p,t}$ are indicators of price competitiveness as described below; $\varphi_{p,t}$ is product-specific factors, such as harvest-related factors; σ_t is country-wide factors affecting exports, such as exchange rate uncertainty; $\tau_{p,t}$ are time dummies (where significant); and $\epsilon_{p,t}$ is the error term.[6] For the sources and description of the data, see Appendix 1. The variables denoted by Δ are growth rates calculated as quarterly year-on-year log differences. Eq. (1) is estimated with OLS with robust standard errors, or Prais-Winston GLS estimator to correct for the first-order error autocorrelation when such is detected in residual diagnostic tests. The sample period is 2004Q1–2016Q2, reflecting the availability of product-level export data. The choice of a proxy for price competitiveness or relative prices is not straightforward, and most studies simply use

[4] The differences among Argentina's main export products were emphasized in Catão and Falcetti (1999). In particular, they argued that, given the specific features of manufacturing trade within the South American common market (MERCOSUR), Argentina's exports comprise two different groups of products in terms of their economic determinants: while the price of exports of primary and lightly manufactured goods is largely determined at the world market, Argentina's industrial exports (to MERCOSUR) are mostly influenced by such factors as intra-bloc trade policies, income growth in the region, and geographical proximity. Consequently, they use two different specifications for the export functions—an export supply function for total exports excluding manufacturing exports to Brazil, and a two-equation, supply-and-demand system for manufacturing exports to Brazil.

[5] If both currencies appreciate and the bilateral real exchange rate remains unchanged, Brazilian importers would still find difficult to switch to non-Argentine products owing to the very high (up to 35 percent) tariffs in the auto sector.

[6] Note also that this specification differs from more standard export demand equations which use the level of real exports as a dependent variable. The aggregate product-level data from INDEC, which we would like to explore in this chapter, are available as indices (see Appendix 1).

the indicator with the best fit.[7] Ideally, the relative price would capture not only the relation between export prices of the home country and domestic prices of the trading partners, but also the export price of the home country relative to export price of potential competitors.[8] We use the following price indicators:

- *Real effective exchange rate (REER)*, CPI (or GDP deflator) based, defined as $\frac{e_t P_{Arg,t}}{\bar{P}^{\$}_{p,t}}$, where e_t is the nominal exchange rate (U.S. dollars per peso), $P_{Arg,t}$ is Argentina's prices (CPI or GDP deflator), and $\bar{P}^{\$}_{p,t}$ is product-specific export share-weighted foreign U.S. dollar prices (CPI or GDP deflator);
- *Bilateral real exchange rate* with respect to the Brazilian real, similar to REER but the denominator represents only the U.S. dollar prices in Brazil;
- *Export prices*, product-specific unit value prices of Argentina's exports in U.S. dollar, $P^X_{p,t}$;
- *Relative export prices* defined as $\frac{P^X_{p,t}}{\bar{P}^{\$}_{p,t}}$; and
- *Commodity exporter exchange rates*, a proxy of the relative prices faced by Argentina's exporters. calculated as $\frac{P^*_{p,t}(1-\tau_{p,t})}{e_t P_{Arg,t}}$, namely the ratio of the international price of a given product, $P^*_{p,t}$, adjusted for Argentina's (time-varying) export tax rate, $\tau_{p,t}$, to Argentina's domestic prices in U.S. dollars. An increase in this ratio as a result of higher international price, lower tax rate, lower domestic inflation, or nominal depreciation of the peso would imply more favorable relative prices for the Argentine commodity exporters.

12. **The results confirm that different products tend to react to different indicators of price competitiveness** (Appendix Table A3). The final specification for each product has been selected based on its fit (measured through R^2 and RMSE), which in most cases also matches the characteristics of trade. The fit of the estimated equations for six largest export products (which comprise about two-thirds of Argentina's total exports) is shown in Appendix Figure A2.[9] Among the main results we find that:

[7] See, for example, Senhadji and Montenegro (1998) and Catão and Falcetti (1999).

[8] Furthermore, as a measure of domestic price of importers, it would be more preferable to use producer price indices (PPIs), which however are not readily available for all the countries in our sample, and we use CPI or GDP deflator indices instead. However, IMF (2015) finds that using CPI instead of PPI does not significantly impact the estimated trade elasticities.

[9] For products for which Argentina enjoys a large export market share, such as soybean oil, a system of export supply and demand equations is also estimated (not reported here) which yields largely similar results.

- For exports of *automotive sector*, *chemicals*, and *machinery/equipment*, the relative price that matters is the RER with the Brazilian real with an estimated elasticity of about -0.3.

- Exports of *soybean meal* depend on international export prices and the bilateral real exchange rate with the Brazilian real, in line with our expectations. For soybean oil (fats and oils in Appendix Table A3), export depend on international prices only, reflecting the fact that Argentina has the largest market share in the world (40 percent of total world exports) and is therefore a price setter. Exports of *cereals* (mainly corn) depend on the commodity exporter exchange rate (though less robustly), consistent with the hypothesis that export taxes particularly affected the export of this product which (unlike soybean meal) is also consumed domestically.

- Export sensitivity to trading partner growth appears to be particularly high for automotive, machinery/equipment, and soybean. For soybean meal, partner demand does not appear to be very robust, which in part can reflect the fact that some countries (like the Netherlands) are among the main importers of this product but part of the imports is being re-exported to the markets of final consumptions.

- Rainfall is a key determinant of export supply for all agriculture products, while a negative downward trend is detected for export growth in basic metals and meat. Export regressions, not surprisingly, perform relatively poorly for the energy sector, reflecting distortions introduced by the domestic energy policies.

- Exchange rate uncertainty, proxied by the unconditional three-quarter moving standard deviation of REER (but also nominal or parallel exchange rates) does not appear to be robust in export equations (unlike Catão and Falcetti, 1999, who however cover a much earlier period).

13. **The export elasticity to REER derived from aggregating up these product-specific elasticities is relatively low**. To gauge the aggregate export elasticity to REER, we perform a simple simulation exercise. First, we calculate export growth rates for each product using the elasticity estimates from the regressions and the forecast of the determinants (relative prices and trading partner growth) from the latest (October 2016) *World Economic Outlook* projections. Then, we derive the projected growth rate for the overall exports, as the weighted sum of product-level projections, using export shares as weights.[10] Third, we re-calculate export growth rates for those products for which the price indicator depends on the exchange rate using a modified path of the nominal exchange rate, which implies a 10 percent depreciation in real effective terms in 2017 relative to the baseline, and aggregate again to get a projection of overall export growth. The difference between the two projected overall export growth rates yields an approximate elasticity of total exports growth to the change in REER. We use a similar approach to estimate the demand elasticity of the aggregate exports. Our findings suggest that that 10 percent real depreciation of the Argentine

[10] The assumption of unchanged export shares following exchange rate devaluation appears appropriate for deriving aggregate export growth projections over a short-term horizon given that sectoral restructuring will likely to take time, the changes to export shares observed in the first half of 2016 (mainly favoring cereals and soybean/oil), and the evidence from Argentine exports' reaction following the 2002 devaluation.

peso would boost total exports growth by less than one percentage point, and a one percent increase in trading partner growth is associated with about 2 percentage points higher total export growth. While price elasticity of exports appears on the lower side of estimates found in the literature, our estimate of demand elasticity is close to the average for a number of other emerging market economies (see, for example, IMF, 2015).

D. Non-Price Competitiveness: A Few Considerations

14. **Interventionist policies over the past years contributed to the weak export performance, suggesting that their removal could help improve external competitiveness**. Quantifying the potential gains to exports from the removal of the restrictions associated with the *cepo cambiario* is not straightforward, mainly as the *cepo* came on top of other restrictions that had already been in place for much of the last decade (for example, exports of meat, cereals and other agricultural products, have been subject to quotas since 2006). Still, our product-level regressions over-estimate actual export growth after 2012 for a series of products with relatively higher import content, such as chemicals, machinery and equipment, and plastic products—suggesting that import restrictions affecting industrial inputs disrupted production and exports of these manufactured goods (Appendix Figure A3). Focusing on these products, our simulations suggest that the annual average growth in total exports could have been ½ percentage points higher in 2012–15 without the restrictions imposed by the *cepo*.[11]

15. **While potential gains from price competitiveness appear to be modest for Argentina's exports, non-price factors could play a significant role in enhancing its external competitiveness**. External competiveness and the evolution of global market shares can be explained only partially by looking at changes in price competiveness (Benkovskis and Worz, 2013). A series of non-price factors could have a substantial positive impact on export performance, including improving the quality of infrastructure, reducing tax pressure and administrative burden, easing access to financing, and pursuing trade policies that facilitate market access.

- **Tax regime**. At 34 percent of GDP (in 2015), the tax burden in Argentina is one of the highest in the region and among emerging market economies. In the food industry, the key export sector, taxes and social security contributions comprised an estimated 58 percent of the value added (COPAL, 2015). Immediately after taking office, the current government started to address this issue by eliminating or reducing export duties,[12] thus improving the effective exchange rate the

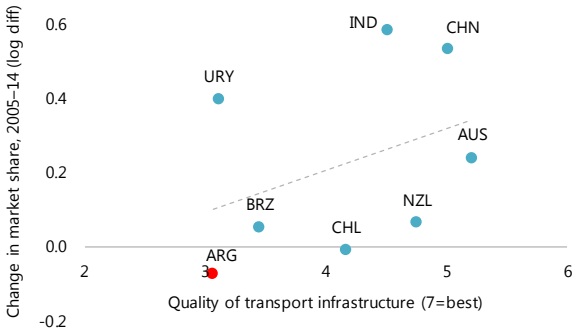
[11] In this simulation, we assume that the difference in the actual and fitted values of growth in exports of chemicals, machinery and equipment, and plastic products in 2012–15 is fully attributed to the effects of restrictions, and that the exports of these products (which together comprise about 13 percent to total exports) grew as projected by the model after 2012. The choice of these sectors has also been confirmed through a t-test on the equality of means of regression residuals before and after 2012Q1, showing that the average residuals after 2012Q1 (included) were significantly different and smaller than the average residuals before 2012.

[12] In mid-December 2015, the new administration eliminated export duties on most products except for soybeans and soy derivatives, which were reduced by 5 percentage points. The system of export permits for agricultural exports was also removed.

exporters perceive. However, there is still room for improvement, as corporate income taxation is not designed to stimulate investment, while the large tax wedge makes labor expensive.

- **Infrastructure and logistics**. Although infrastructure access in Argentina is above the regional average, infrastructure quality has declined steadily over the past years. The World Economic Forum (WEF) ranking of infrastructure quality shows that between 2006 and 2015 Argentina lost 62 positions, falling from 61 to 123. Over the past 15 years, public investment grew much less than other types of spending, such as subsidies to energy and transportation, while private financing of infrastructure was very limited (World Bank, 2015). Access to appropriate infrastructure in terms of roads, railways, ports and energy is especially important for exporting firms outside the central region and metropolitan areas, which tend to be the most vulnerable to REER appreciation. The logistic cost of exporting a 40-foot container by land is US$1,842 in Argentina compared to US$1,000 in Brazil, with data as of 2014 (World Bank, 2015). According to the World Bank Logistics Performance Index (LPI), Argentina's gap with the best performing OECD country is about 1 point and 0.3 points with the average of its peers,[13] and improving the LPI score by 1 could increase labor productivity by close to 35 percent on average (OECD, CAF, and ECLAC, 2013).

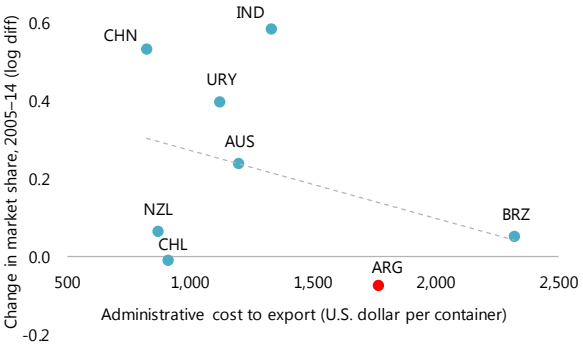
Change in Export Market Share and Transport Infrastructure



Sources: Direction of Trade Statistics and Global Competitiveness Report (2014).

- **Administrative procedures**. Excessive bureaucracy, lack of coordination between government agencies, and inefficient customs systems undermine export competitiveness by increasing transaction costs. Argentine exporters face comparatively high costs to export, according to the World Development Indicators (WDI) index that measures the fees associated with completing the export procedures (Chart).[14]

Change in Export Market Share and Administrative Costs



Sources: Direction of Trade Statistics and World Development Indicators (2014).

- **Trade policy**. A dynamic and ambitious trade policy can substantially improve export performance by expanding market access for domestic exporting firms and facilitating their integration into global value chains. As part of the MERCOSUR trade bloc, in recent years Argentina has lagged behind other regional peers, such as the members of the Pacific Alliance (Chile, Mexico, Colombia and Peru), which have been

[13] The LPI has a scale of 1 to 5, where 5 represents the best logistics performance.

[14] The fees covered include costs for documents, administrative fees for customs clearance and technical control, customs broker fees, terminal handling charges and inland transport, but does not include tariffs or trade taxes.

more aggressive in securing new export markets.[15] More recently, seeking closer relationships with the Pacific Alliance and advancing the trade negotiations between MERCOSUR and the EU might mark a shift in trade policy.

- **Access to financing**. Recent studies confirm that access to bank credit is important for the decision to enter export markets. And access to foreign financing helps firms to reach more developed and more distant markets, increasing also the number of destinations and of products exported (Castagnino, D'Amato, and Sangiácomo, 2013). The underdevelopment of the Argentina's financial system, which is small and mostly transactional, combined with limited access to international capital markets, has affected export competitiveness of local firms in recent years. The recent resolution of the holdouts conflict, following the settlement with the Paris Club in 2014 marked a crucial step in the financial normalization process that will likely pave the way to increase external trade financing to Argentine exporters.

[15] Argentina currently has trade agreements with 43 countries, while Chile has agreements with 91 countries.

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Appendix I. Data Sources and Description

Argentina's exports: Argentina's export volume data are based on the monthly export volume indices available from INDEC for 39 groups of products.

Argentina's prices: The CPI is constructed using the official INDEC GBA index until 2006M12, appended by the private estimates of inflation until 2012M8, and the City of Buenos Aires CPI thereafter.

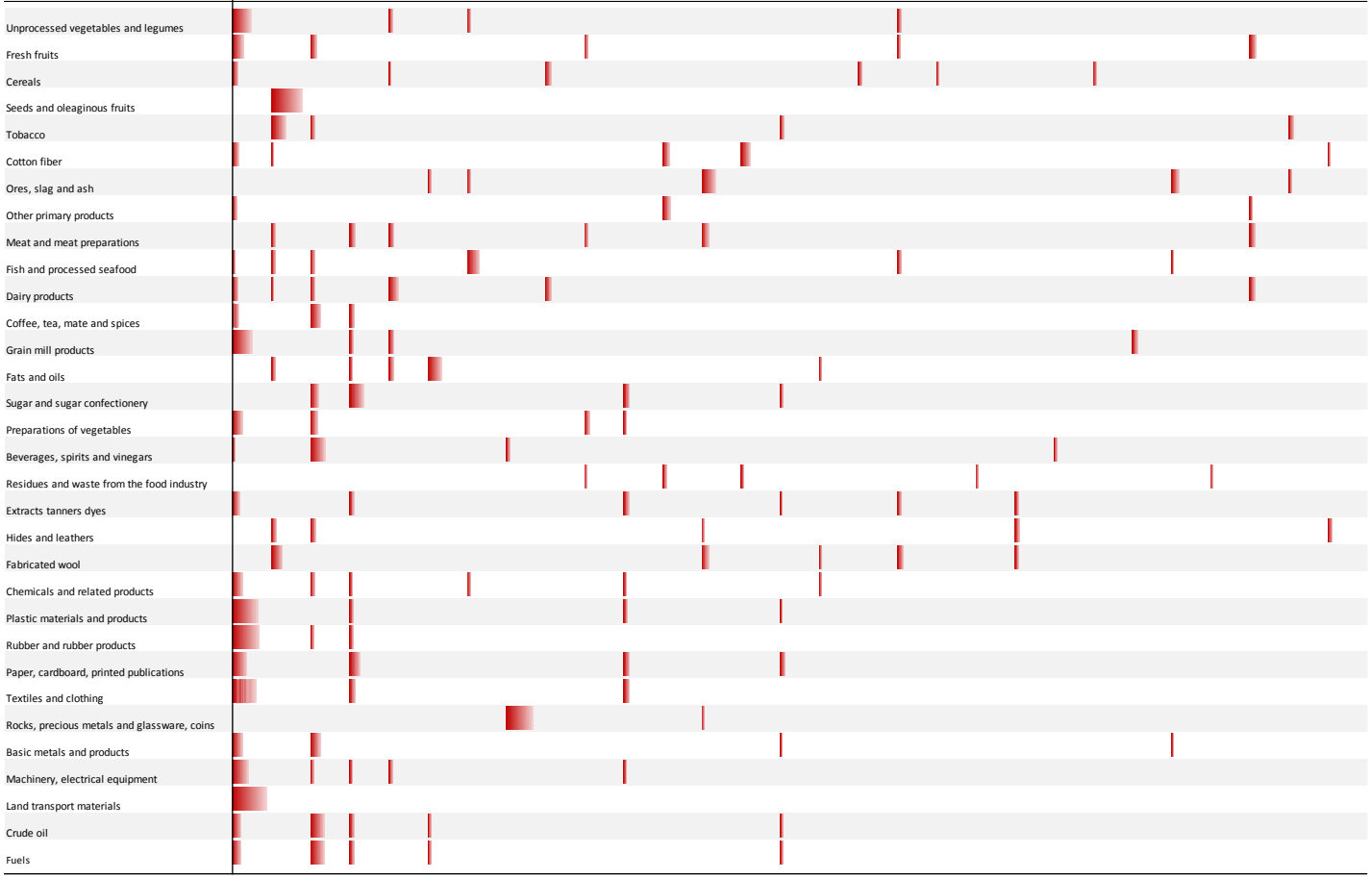
Product-specific trading partner weights: The weights are derived from the COMTRADE exports data for 2014. To obtain the weights consistent with the exports according to INDEC product classification, the COMTRADE HS2002 level-2 product classification, which includes 97 product categories, is mapped to the INDEC classification. Export data for Argentina vis-à-vis 182 partner countries/areas are presented as 32 individual partner countries, which comprised about 83 percent of Argentina's total exports in 2014, and a group of other countries/areas.

Trading partner demand: External demand is proxied by the real GDP of the trading partners, using the quarterly data (in constant 2010 prices and exchange rate) available from the WEO dataset. For each product, total foreign demand is calculated as the product-specific export share-weighted average of real GDP of the 32 partner countries.

Foreign U.S. dollar prices: Foreign price indices are the quarterly CPI data (2010 base year) available from the WEO database. For each product, foreign U.S. dollar prices are calculated as the product-specific export share-weighted average of the CPI of the 32 partner countries.

Rainfall: The indicator is constructed using data on monthly rainfall in a group of five weather stations representing the main grain production area of the country. The indicator for each period reflects the relevant rainfall for the corresponding harvest, taking into account the crop annual cycle for oilseeds and cereals.

Figure A1. Argentina: Product-Country Export Matrix 1/



1/ For a given product, the bars indicate the share Argentina's exports to a column-country in its total exports of the product in 2014.
Sources: COMTRADE and Fund staff calculations.

Appendix II. Empirical Results and Robustness Analysis

Table A1. Aggregate Export Growth Equations: Time Series Models

(All variables are in year-on-year log differences)

	Dependent variable								
	Total exports					Primary products	Agriculture manufact.	Industrial manufact.	Fuels and energy
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
External demand 1/	3.31***	3.30***	3.44***	3.36***	3.42***	9.25***	1.28	5.22***	-7.10***
	(3.08)	(2.89)	(3.34)	(3.03)	(3.69)	(3.65)	(0.92)	(4.78)	(-3.64)
REER, CPI-based 1/	0.06								
	(0.33)								
REER, GDP deflator-based 1/		0.03							
		(0.15)							
Relative export price 2/			-0.25						
			(-1.17)						
REER WEO, CPI-based 3/				0.08	0.11	0.75	-0.14	-0.12	0.10
				(0.49)	(0.91)	(1.67)	(-0.62)	(-0.65)	(0.35)
Constant	-10.13**	-9.93**	-10.41***	-10.49**	-9.68**	-30.96**	-1.11	-14.84***	9.41
	(-2.22)	(-2.11)	(-2.73)	(-2.19)	(-2.45)	(-2.66)	(-0.19)	(-3.32)	(1.23)
Number of observations	46	46	46	46	50	46	46	46	46
R^2	0.29	0.28	0.31	0.29	0.36	0.31	0.05	0.42	0.33

Notes: OLS estimator; robust t-statistics in parentheses; *** (**, *) = significant at the 1 (5, 10) percent level.
Columns (1)–(4) and (6)–(9): exports from monthly INDEC trade data; column (5): real exports from national accounts.
1/ Trade-weighted with the weights derived from the COMTRADE exports data for 2014; see Appendix 1 for further details.
2/ Ratio of the total export unit price in U.S. dollars to trade-weighted foreign GDP deflator.
3/ Trade-weighted with the weights according to the IMF INS database.

Table A2. Export Growth Equations: Panel Data Models

(All variables are in year-on-year log differences)

	Fixed-effects model		Random-effects model 1/					Mean group estimator 2/			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
External demand 3/	0.75	1.48**	1.15**	1.06*	1.39***	1.32***	1.16**	0.68	1.05	2.04**	1.95***
	(1.27)	(2.35)	(2.03)	(1.90)	(2.69)	(2.60)	(2.02)	(0.78)	(1.29)	(2.27)	(3.12)
REER, CPI-based 3/	-0.26**	-0.25**	-0.25**					-0.14	-0.25**		
	(-2.19)	(-2.13)	(-2.26)					(-1.16)	(-2.54)		
REER, GDP deflator-based 3/				-0.36***							
				(-2.80)							
Relative export price, with foreign CPI 4/					-0.32***						
					(-2.85)						
Relative export price, with foreign GDP deflator 4/						-0.33***				-0.31*	-0.45***
						(-2.92)				(-1.81)	(-5.89)
REER WEO, CPI-based 5/							-0.15				
							(-1.31)				
Constant	-1.00	-3.74	-2.76	-2.41	-4.44**	-4.38**	-3.27	-2.37	-2.35	-7.81***	-5.77**
	(-0.45)	(-1.57)	(-1.36)	(-1.23)	(-2.29)	(-2.26)	(-1.57)	(-1.04)	(-0.98)	(-2.68)	(-2.49)
Time dummy for 2009Q2	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Outlier robust means								no	yes	no	yes
Number of observations	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472	1,472
Number of product groups	32	32	32	32	32	32	32	32	32	32	32
Overall R^2	0.01	0.01	0.01	0.01	0.02	0.02	0.01				

Notes: t-statistics in parentheses; robust errors in columns (3)–(7); *** (**, *) = significant at the 1 (5, 10) percent level.
1/ Hausman test suggests that random-effects estimator is consistent.
2/ Mean group estimator allows for heterogeneous slope coefficients across product groups; columns (8) and (10): coefficient averages computed as unweighted means; columns (9) and (11): coefficient averages computed as outlier-robust means.
3/ Product-specific export share-weighted with the weights derived from the COMTRADE exports data for 2014; see Appendix 1 for further details.
4/ Ratio of product-specific export unit price in U.S. dollars to product-specific export share-weighted foreign CPI or GDP deflator.
5/ Trade-weighted with the weights according to the IMF INS database.

Table A3. Export Growth Equations by Product

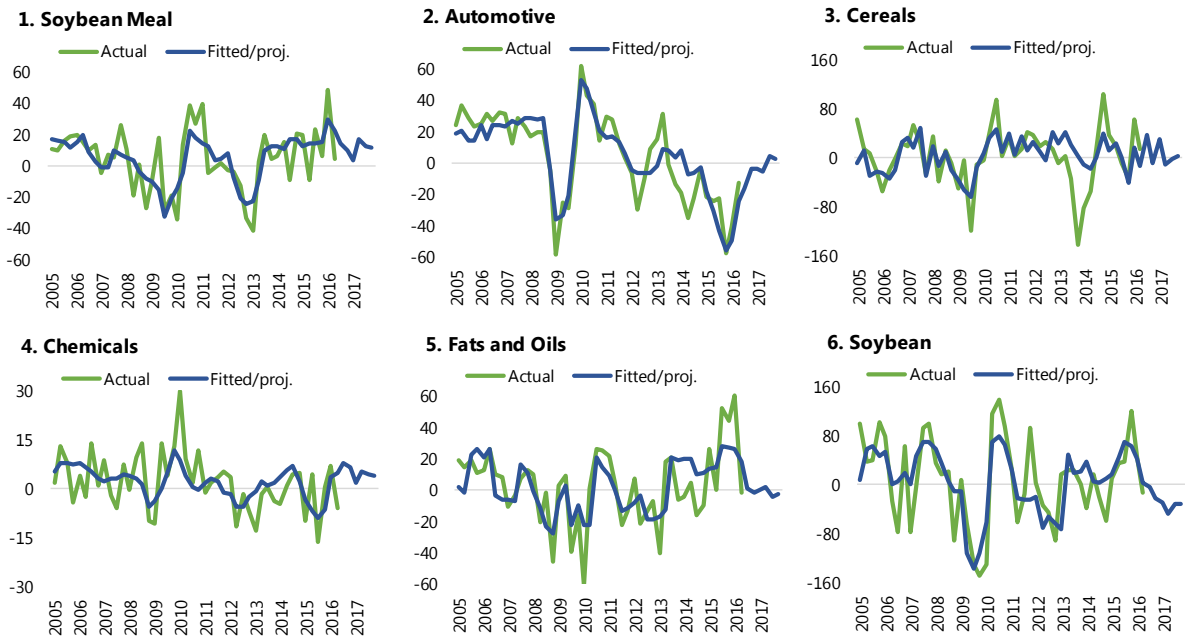
(Variables are in year-on-year log differences unless otherwise indicated)

	RER_Brazil	RER_Brazil_lag1	REER, CPI based	REER, CPI based_lag1	REER, CPI based_lag2	Exporter ER with tax_lag2 1/	Export price_lag1	Relative export price (defl)	Foreign demand	Foreign demand_lag1	Foreign demand_lag2	Foreign demand_lag3	Foreign demand_lag4	Rainfall_soy	Rainfall_soy_lag1	Rainfall	Rainfall_lag2	Trend	R-sq.
(1) Soybean meal	-0.24**							-0.37***			2.31				0.06***				0.54
(2) Automotive		-0.43**							5.70***										0.80
(3) Cereals						0.37*						5.98	-4.12			2.07***	1.99***		0.35
(4) Chemicals	-0.27***								-0.22										0.28
(5) Fats and oils								-0.36***	6.35***						0.11***				0.51
(6) Soybean							-1.03*				17.90***			0.30***					0.56
(7) Fuels								-0.17		3.35*									0.09
(8) Basic metals			1.43***	-2.49***	1.41**				-7.40***	6.60***								-0.52***	0.44
(9) Precious metals				-1.70**					-2.78										0.17
(10) Meat				-0.45						-6.91***								-0.71**	0.27
(11) Machinery and equipment	-0.30***									6.77***									0.63
(12) Crude oil								-0.38**		-13.69***									0.40
(13) Dairy products					1.00***				-1.85										0.59
(14) Unprocessed vegetables and legumes			0.69	-1.78**					0.95	-7.90									0.62
(15) Fresh fruits			-0.36	-0.14					2.98	-0.01									0.25
(16) Tobacco			-0.62	-0.59					-2.11	2.97									0.05
(17) Cotton fiber			1.81	0.00					25.72	-50.25*									0.10
(18) Ores, slag and ash			-1.67**	2.03*					-4.52	-0.31									0.25
(19) Other primary products			0.15	-0.95					13.73*	-5.49									0.17
(20) Fish and processed seafood			-0.67**	-0.06					5.72	-7.13*									0.45
(21) Coffee, tea, mate and spices			0.21	-0.04					0.71	0.95									0.15
(22) Grain mill products			-0.14	-0.04					0.34	0.26									0.31
(23) Sugar and sugar confectionery			-0.22	0.36					-2.88	-3.44									0.07
(24) Preparations of vegetables			-0.69*	0.84*					4.84*	-0.36									0.19
(25) Beverages, spirits and vinegars			0.17	-0.06					0.34	2.53*									0.27
(26) Extracts tanners dyes			-0.02	1.85					-5.57	8.11									0.09
(27) Hides and leathers			-0.06	-0.35					12.77**	-10.15**									0.45
(28) Fabricated wool			-0.36	-0.40					9.34***	-5.00*									0.48
(29) Plastic materials and products			-0.45**							-2.94**	-1.32	2.88***							0.44
(30) Rubber and rubber products			-1.19***	0.22					-1.86	3.61									0.44
(31) Paper, cardboard, printed publications			-0.08	-0.53**					0.27	0.92									0.41
(32) Textiles and clothing			-0.57***	-0.21					2.18**	0.62									0.75

Notes: OLS or GLS estimates; robust t-statistics (not reported); *** (**, *) = significant at the 1 (5, 10) percent level.
Number of observations=46; time dummies and constant term are not reported. Rainfall variables are in levels.
Total share of products (1)–(13) is about 82 percent of total Argentina's exports; products (14)–(32) each comprise 2 or less percent of total exports.
1/ Exporter exchange rate with tax is defined here as the ratio of international price of corn adjusted for Argentina's export tax to Argentina's CPI in U.S. dollars. See the main text for the definition of the price variables.

Figure A2. Exports by Product: 2005Q1–2017Q4

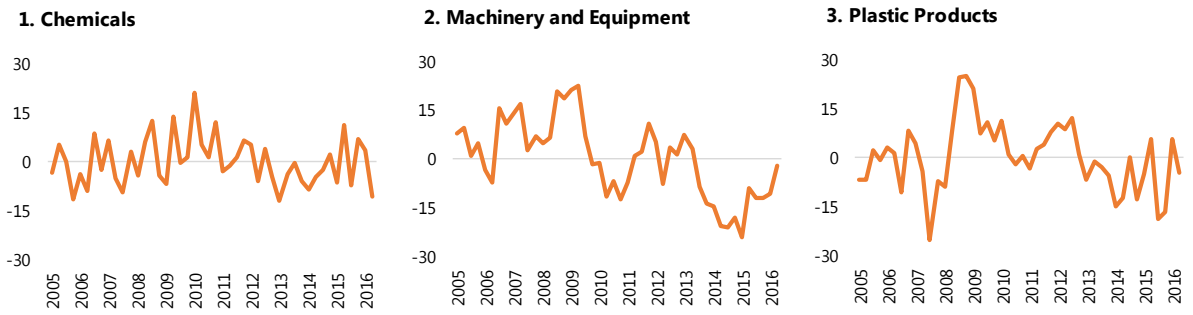
(Percent change, y/y, log differences)



Sources: INDEC and Fund staff estimates.

Figure A3. Residuals from Product-level Regressions: 2005Q1–2016Q2

(Percent change, y/y, log differences)



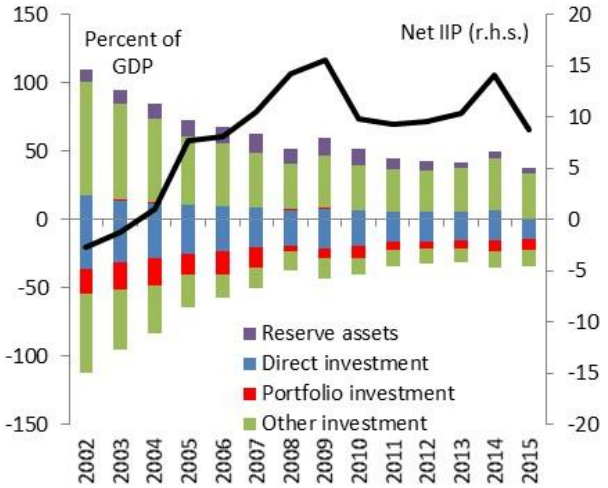
Source: Fund staff estimates.

MEDIUM TERM PROSPECTS FOR ARGENTINA'S EXTERNAL BALANCE SHEET[1]

A. Introduction

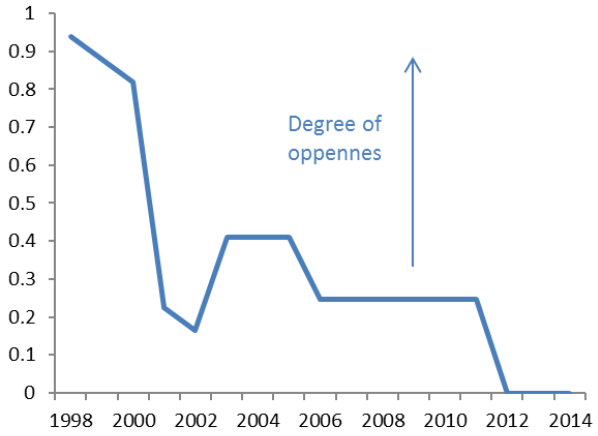
1. **Following the 2001/2 crisis, Argentina has experienced a steady contraction in its external balance sheet**. After a build-up of external imbalances in the late 1990s, the 2001/2 crisis precipitated a collapse in the currency, sovereign default and large scale private sector debt restructuring: all of which led to significant external deleveraging (Figure 1). This trend of external balance sheet contraction continued for the proceeding decade, as capital account openness declined (Figure 2). An improvement in the terms of trade and a current account surplus meant that liabilities declined at a faster rate than assets, leading to the net International Investment Position (IIP) becoming positive and reaching 9 percent of GDP in 2014.

Figure 1. IIP by Asset and Liability Type, 2002–15



Source: IMF BoP Database

Figure 2. Capital Account Oppeness Index, 1997–2014



Source: Chinn and Ito (2016)

2. **Argentina's external balance sheet looks set to expand in coming years, with important implications for the economy.** The new administration has undertaken a number of measures that should allow greater integration into global financial markets. This includes—i) removing significant capital and current account restrictions; ii) reaching a settlement with sovereign holdout creditors; and iii) allowing the exchange rate to float. These measures are likely to generate an expansion of Argentina's external assets and liabilities, as foreign capital is used to fund domestic investment and support consumption, and to a lesser extent, domestic savers seek to diversify their portfolios abroad. In fact, there is already evidence of this balance sheet expansion in 2016—most

[1] Prepared by Alex Pienkowski and Jose Luis Saboin.

notably, significant general and local government international debt issuance. As of end-September 2016, gross external debt issuance has been US$37.5 billion (7 percent of GDP), and this is likely to set the stage for greater private sector involvement in the future.

3. **The objective of this is to SIP is to analyze how Argentina's external balance sheet might look like in the medium term.** To do so, an econometric model based on a panel of emerging markets is estimated that yields the external asset, liability and net external position that is consistent with the long-term values of their determinants. Once we have estimated the potential expansion of Argentina's balance sheet, we look for countries that have experienced a similar transition over the last three decades. This event analysis identifies how these external balance sheet transitions have occurred, and considers potential risks associated with these events.

4. **The results of the analysis are twofold:**

- First, Argentina's external balance sheet has the potential to change dramatically in coming years. External assets and liabilities have the potential to double in size relative to GDP; and the net IIP position is likely to become negative.

- Second, while this poses significant benefits in terms of investment funding and risk diversification, the event study analysis suggests that a balance sheet expansion of the size envisaged for Argentina could lead to a decline in external competitiveness and greater financial sector vulnerabilities.

B. The External Balance Sheet Today

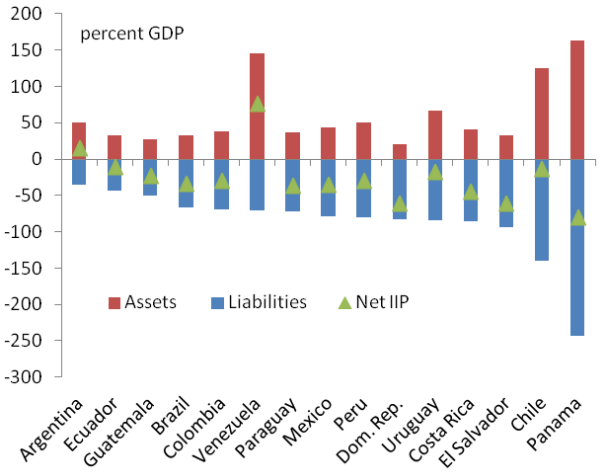
5. **Compared to its regional peers, Argentina stands out as having both a small gross external balance sheet and a positive net position**. Figure 3 shows that Argentina's external liabilities as a share of GDP is the smallest of all Latin American EMs. Assets as a share of GDP are closer to the Latin America EM average, and hence the net IIP is positive. This positive net position is unusual for an EM, where typically a high marginal product of capital relative to advanced economies attract net inflows. It is important to note, however, that some caution is required when considering data on the external balance sheets. Some balance sheet components are derived from accumulated flows data, which may be inaccurate or subject to subsequent valuation changes. This is particularly the case for Argentina's external assets, where private financial wealth may have been converted to less liquid real assets or consumed abroad. This could mean that Argentina's external assets may be overestimated in size.[2]

6. **Leverage ratios are not high, and most external debt is issued by the official sector.** Around one-third of liabilities are in the form of equity, which is typically viewed as safer than capital-flight-prone debt instruments. This is similar to the ratio for other Latin America EMs. Similarly, Argentina's reserve assets-to-liabilities ratio (16 percent) is close to the regional average.

[2] For instance, Argentina's IIP statistics suggest that it has 'other investment assets' from the non-bank private sector of around US$200 billion. To put this in perspective, this is equivalent to 10 percent of all external 'other investment liabilities' of the US banking system.

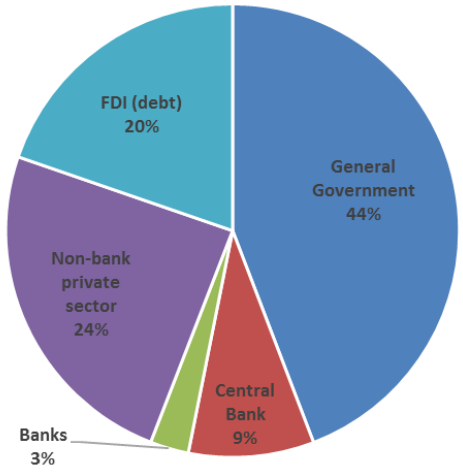
Such leverage ratios, along with Argentina's overall positive net IIP position, suggests that at present the economy is not overly reliant on debt financing to fund investment and consumption. The general government and central bank account for over 50 percent of external debt. In contrast, the banking sector has borrowed very little from abroad, implying very little intermediation through the banking sector. Part of this is due to strict regulatory controls imposed on the cross border operations of banks, including limits on overall exposure. Instead, the non-bank private sector seems to borrow directly from abroad (Figure 4). This borrowing is concentrated in the petroleum and industrial manufacturing industries; and predominately associated with credit lines for import financing. Given that the non-bank private sector makes up over 70 percent of GDP, its share of overall external debt is relatively small.

Figure 3. IIP Relative to Regional Peers, 2014



Source: IMF BoP Database

Figure 4. Sectoral Breakdown of External Debt, 2015Q2

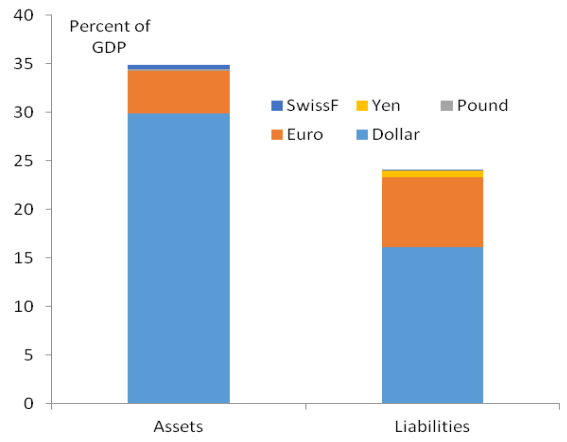


Source: Quarterly external debt database (SDDS)

7. **The external balance sheet is robust to currency risk, but is more vulnerable to liquidity risks.** Estimates of the currency composition suggest that virtually all external assets and liabilities are denominated in foreign currencies (Figure 5). Given the positive net IIP position, a currency depreciation will, all things being equal, boost the net wealth of residents. This provides a natural buffer to external shocks. There may, however, be currency mismatches within particular sectors or agents within the economy, whereby exchange rate shocks could still cause balance sheet problems that affect the real economy. In terms of maturity risks, around one-third of total external debt is short-term.[3] Furthermore, this short-term debt seems to be concentrated in the non-bank private sector (Figure 6). This result is perhaps not surprising, given that such borrowing is often associated with import financing. However, the reliance on this form of financing still has the potential to increase liquidity risks for the non-bank private sector.

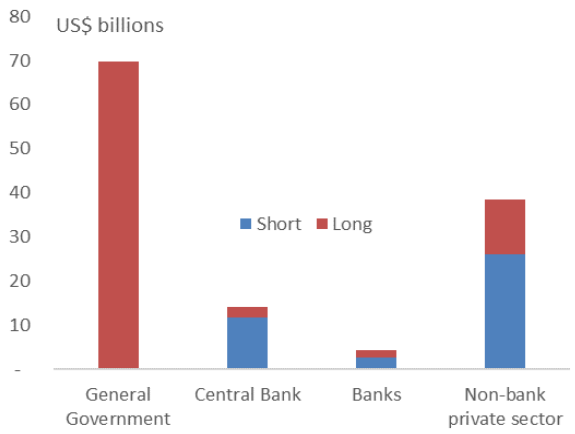
[3] Defined as remaining maturity of one year or less.

Figure 5. Currency Composition of External Assets and Liabilities, 2012



Source: Benetrix, Lane and Shambaugh (2015)

Figure 6. Maturity Structure of External Debt, 2015Q2



Source: Quarterly external debt database (SDDS)
Note: No breakdown available for FDI debt

C. Estimating the Medium-Term Position

8. **Argentina has the potential to substantially increase the size of its external balance sheet in coming years**. The removal of virtually all capital and current account restrictions, the settlement with sovereign holdout creditors and perceived improvements in the investment climate will all contribute to greater capital flows, and a build-up of asset and liability stocks. In order to "predict" the external position that Argentina could reach over a medium-term horizon, we estimate a reduced-form model of the determinants driving the net IIP, external assets and external liabilities. By speculating on the medium-term values of the explanatory variables in the model, medium-term projections of the external balance sheet are derived.

9. **Panel regression models are constructed to estimate the net IIP position and the gross level of assets and liabilities.** Lane and Milesi-Ferretti (2001)[4] were the first to systematically estimate external assets and liabilities for a large sample of countries through time. This analysis explored trends in gross and net positions, and the composition of balance sheets, but did not attempt to estimate predicted values based on a range of explanatory variables. Instead, the analysis presented here draws upon the methodology used in the IMF's External Balance Assessment. This predicts 'current account norms' based on country specific characteristics—many of which should also apply to the *stock* position of external capital flows. In the analysis employed here, a sample of 43 EMs over the period 1991–2014 is used to estimate three models to explain the net IIP position, and gross assets and liabilities. A range of estimation strategies and explanatory variables are tested, with a random effects model (corrected for AR(1) disturbances) chosen for the final specification.

[4] *The external wealth of nations: measures of foreign assets and liabilities for industrial and developing countries*, Journal of International Economics

These equations include the following explanatory variables (see Appendix for a summary of the model):

- *GNDI per capita*[5]—richer countries should be able to sustain higher levels of gross saving and borrowing, as agents in such economies have greater disposable income to save or service debt. As incomes rise, the marginal product of capital should decline, leading to less *net* borrowing i.e. the net IIP should increase with incomes. In addition, this variable should capture a number of 'omitted variables' related to aspects of financial development or institutional capacity, not captured below.

- *Real per capita GNDI growth*—stronger growth is typically associated with a larger current account deficit, as residents borrow to consume and invest. This suggests a negative relationship between growth and the net IIP position. The relationship with gross assets and liabilities is more ambiguous.

- *Public debt*—A higher public debt to GDP ratio is likely to imply larger external liabilities and hence a smaller/negative net IIP position.[6] The impact on assets is ambiguous.

- *Global interest rates*—global interest rates influence the cost of borrowing and the opportunity cost of saving, and so should influence the stock of external assets (positively) and liabilities (negatively). An increase in global rates should improve the overall IIP position.[7]

- *Savings rate*— A higher national savings rate will likely increase the net IIP position (i.e. through current account surpluses), and have an ambiguous impact on gross external assets and liabilities.

- *Old age dependency ratio*—the ratio of dependents to workers is likely to influence the saving rate. A high ratio would suggest a greater tendency to run down savings or borrow, therefore the relationship with the net IIP position is likely to be negative.

- *Financial development*—A more developed financial market[8] is likely to increase the ability to intermediate cross border capital flows, and thus increase the size of external balance sheets. The impact on the net position is not clear.

[5] This variable is denoted in real U.S. dollars, and is calculated relative to the cross-country average to ensure stationarity.

[6] While it is acknowledged that some public debt will take the form of external liabilities, the variable is included because the drivers of government borrowing are likely to be very different from those that drive private sector borrowing and lending decisions. The results are robust if this variable is excluded, but the model fit declines. Lane and Milesi-Ferretti (2001) find a strong inverse correlation between public debt and the net IIP.

[7] The global interest rate is proxied by the U.S. T-bill rate deflated by U.S. GDP deflator minus its fitted time trend estimate, which ensures stationarity.

[8] Based on an index from '[Introducing a New Broad-based Index of Financial Development]', Svirydzenka (2016).

- *Investor protection*—Countries with strong investor protection[9] are more likely to attract capital inflows (external liabilities), but should not have a direct impact on external assets.

- *Currency and sovereign debt crises*— Currency crises will have an immediate impact through the exchange rate by increasing foreign currency denominated assets and liabilities relative to GDP. Sovereign debt crises can have a direct effect of reducing external liabilities following a default or restructuring.[10]

10. **The model predicts that the external balance sheet will double in size, and the net IIP position will become negative**. Using the model estimated coefficients, medium-term levels are derived for gross assets, gross liabilities and the net IIP. For most variables, WEO projections for 2021 are used to characterize the 'medium-term'.[11] Where this is unavailable (financial development, dependency ratio, investor protection), the current growth trend is extrapolated (see Table A1). The implied level of assets for Argentina is estimated to be around 90 percent of GDP, compared to 50 percent of GDP today. Liabilities are estimated to increase by even more—from 35 percent in 2014 to 105 percent in the medium term (Figure 7). Combined, this implies a shift in the net position to -15 percent of GDP (from +9 percent in 2015). The net IIP model predicts a medium term level of -10 percent of GDP, very similar to the estimates derived from gross assets and liabilities (Figure 8).

11. **The estimated net IIP can also be used for the 'external stability' component of the exchange rate assessment.** Annex I considers Argentina's current exchange rate relative to its equilibrium level. One of the approaches used to assess exchange rate valuation is the 'external stability' approach, which considers whether the current account is consistent with a sustainable net IIP. This analysis provides a consistent and robust means to estimate this 'steady-state' net IIP position, and implies a current account of [-2.5] percent of GDP to reach this level over the medium term.

[9] This is proxied by the 'Index of Economic Freedom' published by the Heritage Foundation.

[10] Dummy variables for currency and sovereign debt crises are included from 'Systemic Banking Crises Database: An Update', Valencia and Laeven (2012).

[11] While the year 2021 is used as a benchmark for the medium-term, Section D will consider the pace and characteristics of a potential transition in more detail.

Figure 7. External Assets and Liabilities

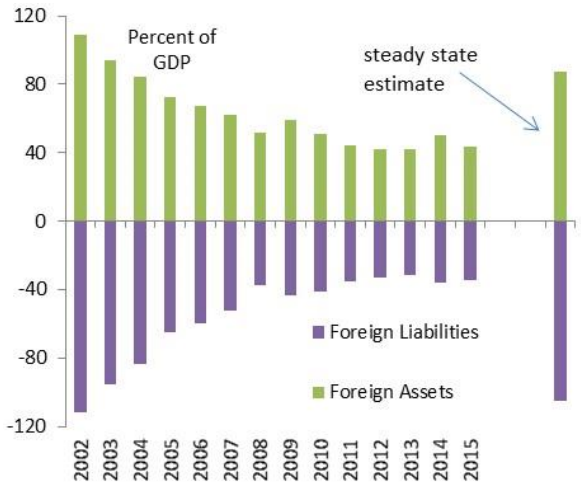
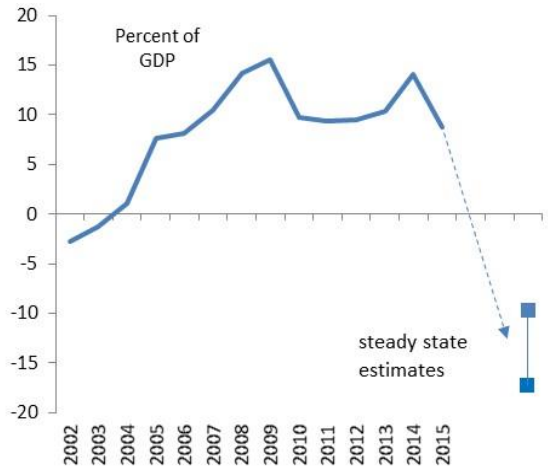


Figure 8. Net IIP



Transition and risks

12. **The analysis above implies significant changes to the balance sheet positions of residents over the medium term, but does not provide insight into the pace and characteristics of any potential transition**. This will be considered below.

13. **Event study analysis is used to consider the experience of other EMs that went through large external balance sheet transitions.** The parameters of this analysis balance the need to match Argentina's transition characteristics with the need to have an adequate sample coverage. As such, events are identified if they meet two criteria – i) the absolute size of the external balance sheet (gross external assets plus liabilities) grows by than 50 percentage points of GDP or more, over a 5-year period, and; ii) the net IIP position declines by 20 percentage points of GDP, also over a 5-year period.[12] Countries that experienced a currency crisis and those that are major oil exporters are excluded. The event analysis considers the macroeconomic characteristics during the 5 years of external balance sheet expansion, and the period following the expansion episode (5 years after, where data is available). In the charts and tables below, time 't' refers to the point in time when the 2 criteria for the event analysis were first met. From the sample of 43 EMs, 17 event episodes are identified—these are listed, along with the initial external balance sheet characteristics, in Table 1. Seven of these countries received IMF supported programs during this external balance sheet expansion (Armenia, Bulgaria, Croatia, Georgia, Jordan, Romania, and Ukraine). And virtually all countries experienced an increase in capital account openness during the balance sheet expansion episodes (Figure 9).

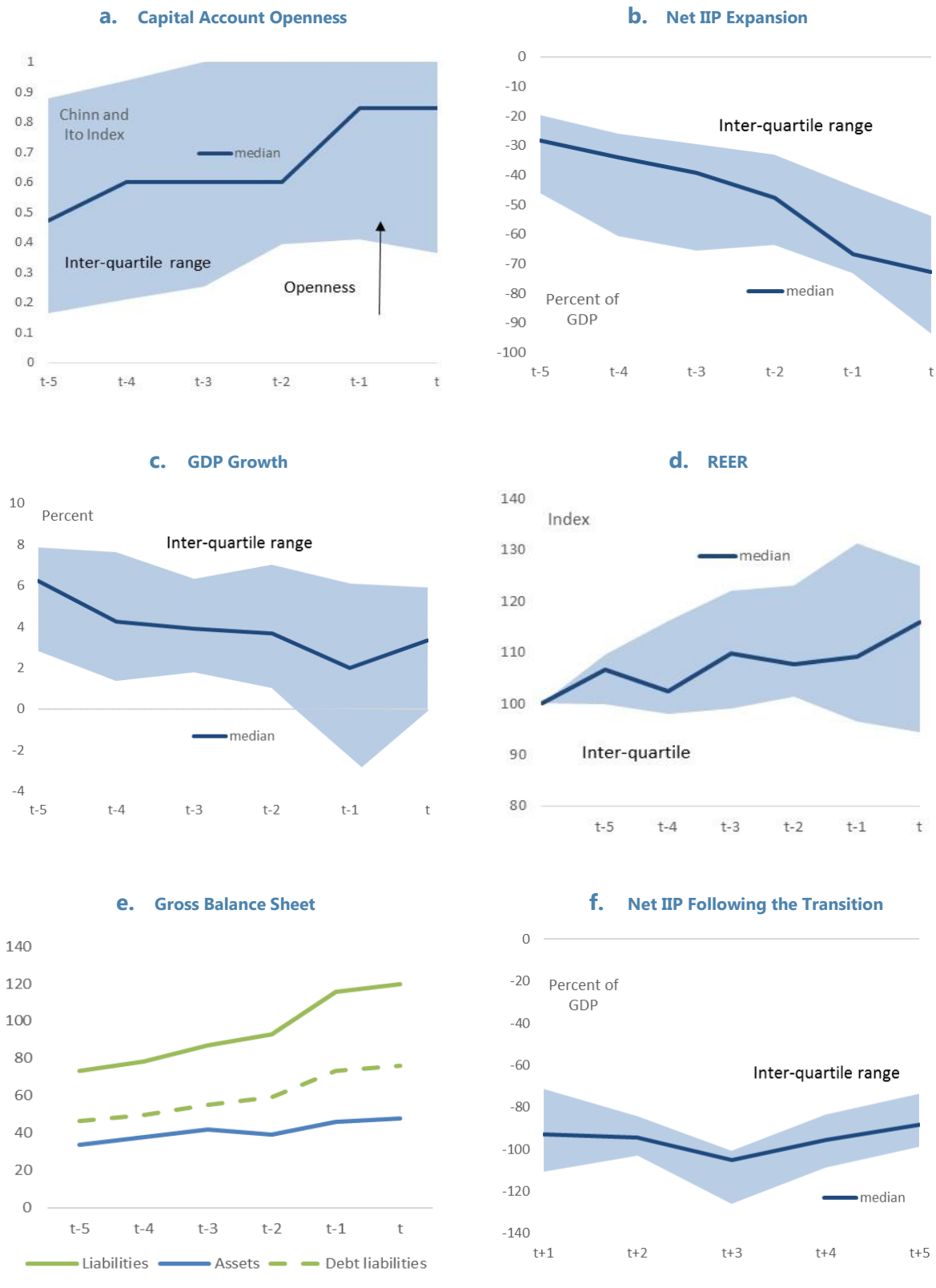
[12] Such criteria often lead to several sequential events being identified in the overall sample. Only the first episode for each country is used in this analysis.

Table 1. Initial Conditions for Event Analysis Episodes

	Date = t-5	Net IIP	Assets	Liabilities
		percent of GDP		
Albania	2007	-20.3	33.8	54.0
Armenia	1996	-19.6	21.2	40.8
Armenia	2005	-39.9	21.2	61.1
Azerbaijan	1995	-12.1	16.1	28.2
Bulgaria	2002	-29.0	59.6	88.7
Croatia	1999	-28.3	36.3	64.5
Fiji	2005	-21.6	28.2	49.9
Georgia	2004	-66.6	21.1	87.6
Hungary	2001	-66.4	43.4	109.9
Jordan	1999	-65.5	99.8	165.3
Mauritius	2006	1083.7	1169.0	85.3
Paraguay	1991	-4.4	29.9	34.3
Poland	2008	-46.1	27.3	73.4
Romania	2005	-29.3	29.3	58.6
Serbia	2008	-63.0	40.5	103.5
Trinidad and Tobago	2008	-3.3	79.4	82.7
Ukraine	2008	-21.7	56.2	78.0

14. **The decline in the net IIP tends to be prolonged and is accompanied by slowing growth**. The median decline in the net IIP position over the 5-year expansion period is 45 percentage points of GDP, and this typically occur gradually over this time horizon (Figure 9b). This transition is also associated with a decline in the pace of GDP growth (Figure 9c). A possible explanation is that the episodes identified here tend to be associated with a loss of external price competitiveness caused by an appreciation of the REER. Across the sample median, the REER appreciated by around 15 percent during the balance sheet expansion (Figure 9d), perhaps driven by high capital inflows. Investment rates also decline over this period. These results are consistent with analysis of capital flows surges by Cardarelli, Elekdag and Kose (2009). They find that such events are associated with an initial acceleration of growth, followed by weaker activity, associated with real exchange rate appreciation. Median holdings of reserve assets remained largely constant for the event analysis sample, at around 20 percent of GDP. However, given that Argentina is below its optimal level of reserves (see Annex I), the accumulation of such assets could help mitigate any loss of exchange rate competitiveness and provide buffers in case capitals inflows suddenly stop.

Figure 9. Selected Indicators from External Balance Sheet Expansion Episodes



15. **The expansion of external liabilities does not imply an overreliance on debt financing**. The median increase in external liabilities is 45 percentage points of GDP within the event analysis sample, while assets grew by an average of 15 percentage points of GDP. Given the parameters of event analysis, it is not surprising that liabilities grow at a faster pace than assets (Figure 9e).[13] More interesting, however, is that the proportion of debt as a share of overall liabilities remains very close to the sample average (60 percent of total liabilities) during the entire balance sheet expansion process i.e. equity finance expands at the same pace as debt accumulation. This suggests that residents typically do not need to resort to excessive debt financing in order to access capital markets during expansion episodes. Following the balance sheet expansion 'event', the growth of assets and liabilities stabilizes, and the net IIP remains largely stable (Figure 9f).

16. **The increase in liabilities during the expansion is largely driven by the private sector.** During these external balance sheet expansions episodes, average public-debt-to-GDP ratios actually decline from around 47 to 41 percent of GDP, implying that this expansion was primarily driven by the private sector. Perhaps not surprisingly, therefore, two countries subsequently experienced banking crises (Hungary 2008 and Ukraine 2015) following the expansion—a much higher incidence than the sample average (12 percent compared to 2 percent overall). A *further* three countries received IMF supported packages during the subsequent two years (Armenia 2010, Croatia 2004 and Romania 2011). Following these episodes, growth fell, liabilities increased and the net IIP worsened (presumably due to valuation effects). The small sample size means that inferences from this result need to be approached cautiously. However, Cardarelli et al (2009) find that around one-third of capital inflow surges end in a 'sudden stop' or currency crisis. And it is clear that any rapid expansion of external balance sheets, especially from a low base, poses risks to financial stability.

D. Conclusion

17. **After a decade of isolation from international capital markets, Argentina's has a small external balance sheet with few vulnerabilities.** With the smallest external liability-to-GDP ratio of all Latin American EMs and a positive net IIP, Argentina is broadly resilient to external shocks, especially exchange rate risk. However, there may be pockets of vulnerability from short-term debt in the non-bank private sector.

18. **External assets and liabilities have the potential to grow substantially in coming years, and the net position is likely to turn negative**. Cross country panel regression analysis implies that the external balance sheet has the potential change dramatically. Gross assets and liabilities could more than double in size; and the net IIP position is likely to become negative.

19. **The expansion is likely to be gradual, but dominated by the private sector, increasing vulnerabilities in this area**. Event study analysis suggests that this transition may occur at a gradual pace, and does not need to be overly dependent on debt finance. However, the expansion is likely

[13] When the event analysis parameters are solely determined by an expansion of the balance sheet (and not the decline of the net IIP position), then the growth of assets and liabilities is broadly proportional.

to be driven by the private sector, which implies the need for vigilance in this sector. The authorities should be particularly focused on an overly rapid expansion of the currently small banking sector, which has little experience in intermediating international capital flows.

20. **Policy considerations from this analysis include:**

- Is the concentration of short-term debt in the non-bank private sector a risk to the real economy? As balance sheets grow, what prudential measures could be used to prevent liquidity risks growing?

- What measure can be taken to avoid an overvalued exchange rate as the net IIP position grows? Potential policy measures include – i) reserve accumulation to lean against real appreciation and build buffers; ii) fiscal consolidation to limit external financing and reduce crowding-out; iii) supply side policies to improve non-price competitiveness.

- How can the 'right sort' of capital flows be attracted? Given that long-term, local currency or equity based finance provides for more resilient balance sheets, what policy can be pursued to *attract* such inflows? Could measures (including capital controls) be needed to *prevent* riskier inflows?

- Is the banking sector ready to scale-up its external balance sheet? What prudential measures could be used to ensure that banks are not overly exposed to currency and liquidity risks, whilst allowing them to access international markets? What structural and institutional reforms can be adopted to build long-term resilience to external shocks?

Appendix

I. This appendix provides more details on the empirical strategy used to panel regression models used to predict 'steady-state' values for the net IIP, assets and liabilities. $Y_{i,t}$ denotes the dependent variable which is modeled as:

$$Y_{i,t} = \alpha + bX_{i,t} + \mu_{it}$$

II. Where $X_{i,t}$ includes exogenous (and in some cases endogenous and/or predetermined) covariates for country i at time t, b is a relative coefficient, and μ_{it} is a mean zero error term that incorporates unobserved heterogeneity. Three equations are modeled using this approach to estimate – i) the net IIP; ii) gross external assets, and iii) gross external liabilities. All three are expressed as a ratio of GDP.

III. In line with previous literature[1], we include the following variables as regressors for a *baseline* model specification:

- demeaned log of real per capita disposable income (GNDI) (IMF WEO database)
- real growth rate of per capita GNDI (IMF WEO database)
- public debt to GDP ratio (IMF WEO database)
- trend-demeaned global interest (IMF WEO database)
- old age dependency ratio (World Bank WDI database)

IV. At a second stage, this set of regressors is complemented by other variables, namely:

- gross national savings rate (IMF WEO database)
- financial development index (Index number from X to X –from Introducing a New Broad-based Index of Financial Development', Svirydzenka, 2016)
- inflation (a bounded, 0 to 1 indicator) (IMF WEO database)
- percent change in terms of trade (IMF WEO database)
- current account openness (measured as exports and imports over GDP) (IMF WEO database)
- index of capital account openness (a bounded, 0 to 1 from Chinn and Ito, 2015)
- financial crisis event time dummies ('Systemic Banking Crises Database: An Update', Valencia and Laeven, 2012)
- an index of political risk (from X to X – International Country Risk Group database)
- an index of economic freedom (as proxy for investor protection) (from X to X, from 'Index of Economic Freedom' database published by the Heritage Foundation), and
- an increasing time trend from the first to the last year of the sample.

[1] Lane and Milesi-Ferretti (2001), IMF EBA (2013).

V. All variables rejected the null hypothesis of non-stationarity using the panel unit root tests for unbalanced datasets of Im Pesaran Shi (2003) and Choi (2001).[2] We then proceeded to estimate a series of static models. First, we estimate a static model using ordinary least squares (OLS) applied to both a cross-section sample of country averages for the time of the sample and a pooled panel sample, correcting standard errors for heteroskedasticity and autocorrelation. Results are shown in columns 1 and 2 of Tables A2, A3 and A4. As OLS estimations suffer from potentially severe econometric problems (omitted variable bias due to absent country- and time-fixed effects, endogeneity of the variables, lack of dynamics, etc.) we then estimated fixed and random effects models (columns 3 and 4 in the tables). Hausman tests were performed to the three specifications and results indicated that, for the Net IIP, the random effects model was more appropriate, while for the stocks the coefficients of the fixed effects and random effect models were not statistically different from each other.

VI. As the random effects model was preferred, a Breusch-Pagan test was performed to test the null hypothesis of no panel effect. The test's results revealed that in all cases the null hypothesis was rejected, indicating the viability of the random effects estimator as our baseline model. Such baseline models were also tested and corrected for heteroskedasticity and autocorrelation (column 5) as well as for common time effects (column 6). Finally, column 7 shows our preferred model, which is the same model as in column 6 but eliminating the statistically insignificant regressors' coefficients.

Table A1. Medium-Term Estimates

Variable	Steady state value	Contribution to Predicted Value			Note
		Net IIP	Assets	Liabilities	
Global real interest rate (%)	1.3	9.9	2.2	-7.9	WEO forecast
Real GNDI per capita (index)	140	15.8	16.4	6.7	WEO forecast (2.1% pa average from 2015-2021)
GNDI growth (%)	2.9	-1.0	-2.1	-1.2	WEO forecast
Public debt to GDP (% GDP)	46	-15.1	8.0	23.6	WEO forecast
Dependency ratio (%)	20	-78.3	-30.6	48.0	Extrapolation of existing growth rate
Financial development (index)	36	-15.6	23.9	39.8	Extrapolation of existing growth rate
Investor protection (index)	51	-38.4	1.3	41.0	Extrapolation of existing growth rate
Savings rate (%)	16	2.2	1.3	-1.0	WEO forecast
Currency crisis	0	0	0	0	
Sovereign crisis	0	0	0	0	
Constant	1	110.8	67.3	-44.0	
Predicted value		**-9.7**	**87.7**	**105.0**	

[2] We acknowledge that this results can be tested for robustness as their alternative hypotheses call for some panels to have unit roots. However, the rejection of the null allows us to continue with stationary analysis in a reduced form model.

Figure A1. Model Fit: Net IIP

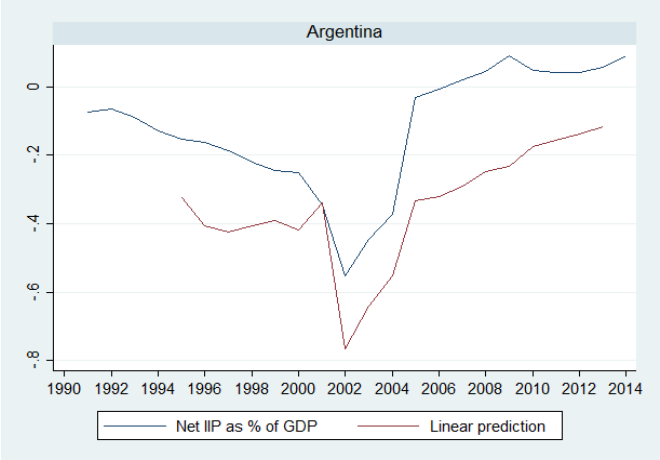


Figure A2. Model Fit: External Assets

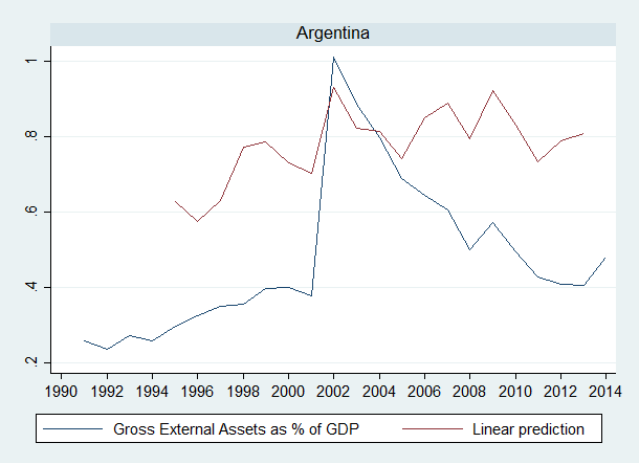


Figure A3. Model Fit: External Liabilities

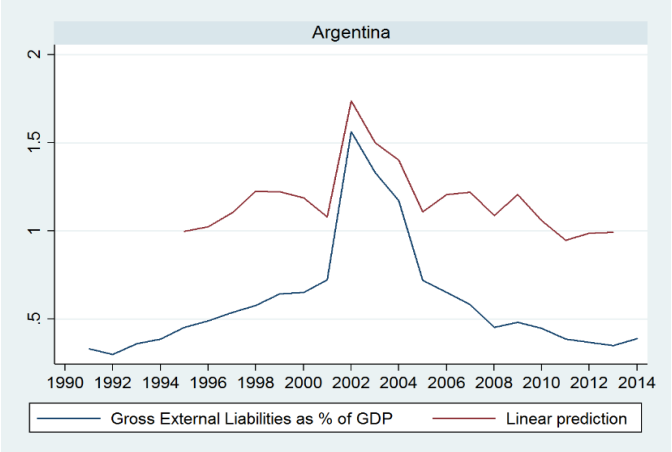


Table A. Model Result: Net IIP

	Dependent variable: Net IIP						
	OLS	Pooled OLS	FE	RE	RE_AR	TWO_WAY	PREFERRED
r_ln_rgndi_pc_usd	0.420***	0.392***	0.109	0.307***	0.225***	0.271***	0.154**
	(0.140)	(0.031)	(0.095)	(0.074)	(0.064)	(0.068)	(0.062)
dln_rgndi_pc_usd	0.727	-1.142***	-0.400***	-0.394	-0.423***	-0.539***	-0.331***
	(1.429)	(0.331)	(0.134)	(0.279)	(0.098)	(0.109)	(0.069)
pubdebt_gdp	0.263	-0.135	-0.393***	-0.308**	-0.331***	-0.307***	-0.327***
	(0.505)	(0.090)	(0.069)	(0.153)	(0.075)	(0.077)	(0.067)
dtot	5.434	0.232	-0.126	-0.128*	-0.092*	-0.082	
	(5.237)	(0.224)	(0.085)	(0.072)	(0.052)	(0.054)	
infl	3.139	-0.046	-0.047	-0.112	0.028	-0.118	
	(2.641)	(0.419)	(0.194)	(0.281)	(0.169)	(0.186)	
us_rint_d	0.000	0.285	0.693	0.723	0.258	11.554**	22.628*
	(.)	(1.284)	(0.486)	(0.640)	(0.500)	(5.044)	(12.444)
save_rate	3.204*	2.980***	0.686***	0.572	0.512***	0.483***	0.141
	(1.621)	(0.263)	(0.180)	(0.367)	(0.177)	(0.181)	(0.102)
old_dep	-4.711**	-2.167***	0.947	-2.783*	-3.609***	-3.604***	-3.989***
	(2.067)	(0.385)	(1.816)	(1.503)	(0.919)	(0.927)	(0.860)
ca_open	-0.172	-0.307***	0.031	0.041	-0.006	-0.072	
	(0.252)	(0.056)	(0.079)	(0.134)	(0.069)	(0.075)	
fd_index	-0.589	-0.339**	-1.054***	-0.969***	-0.562***	-0.557***	-0.433***
	(0.816)	(0.171)	(0.171)	(0.325)	(0.158)	(0.166)	(0.143)
free	-0.007	-0.010***	-0.009***	-0.009***	-0.008***	-0.009***	-0.007***
	(0.022)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
int_conf	0.024	-0.009	0.017**	0.017	0.005	0.004	
	(0.073)	(0.012)	(0.007)	(0.015)	(0.007)	(0.008)	
TT		0.008	0.012***	0.018***	0.013***		
		(0.006)	(0.004)	(0.006)	(0.004)		
bnk_cri	0.949	-0.122	-0.051	-0.063	-0.048	-0.052	
	(4.423)	(0.122)	(0.047)	(0.052)	(0.034)	(0.035)	
cur_cri	-4.828	-0.303*	-0.228***	-0.246***	-0.115***	-0.104**	-0.074**
	(4.537)	(0.158)	(0.061)	(0.072)	(0.041)	(0.042)	(0.030)
sov_cri	-1.687	0.162	0.153***	0.157**	0.083**	0.084**	0.049*
	(1.855)	(0.138)	(0.052)	(0.062)	(0.037)	(0.037)	(0.029)
L.bnk_cri		-0.050	-0.001	-0.004	-0.051	-0.050	
		(0.135)	(0.052)	(0.056)	(0.036)	(0.036)	
L.cur_cri		-0.327**	-0.181***	-0.191***	-0.094***	-0.091**	-0.049*
		(0.136)	(0.052)	(0.068)	(0.035)	(0.036)	(0.026)
L.sov_cri		-0.028	0.020	0.022	0.021	0.025	
		(0.132)	(0.052)	(0.052)	(0.035)	(0.036)	
ka_open	0.149	-0.015	-0.211***	-0.180*	-0.070	-0.088	
	(0.379)	(0.075)	(0.051)	(0.108)	(0.053)	(0.055)	
Constant	-0.419	0.331	0.327	0.602*	0.691***	0.993***	1.108***
	(1.729)	(0.310)	(0.228)	(0.348)	(0.226)	(0.237)	(0.194)
r2	0.650	0.569	0.398				
r2_a	0.456	0.552	0.320				
N	43.000	541.000	541.000	541.000	541.000	541.000	789.000

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

Table A3. Model Result: External Assets

	Dependent variable: External Assets						
	OLS	Pooled OLS	FE	RE	FE_AR	TWO_WAY	PREFERRED
r_ln_rgndi_pc_usd	1.071***	0.776***	-0.141	0.310*	-0.335	-0.548	0.160
	(0.336)	(0.084)	(0.207)	(0.165)	(0.290)	(0.356)	(0.145)
dln_rgndi_pc_usd	4.560	-0.748	-1.056***	-0.982***	-0.568**	-0.490*	-0.701***
	(3.425)	(0.895)	(0.291)	(0.296)	(0.240)	(0.281)	(0.148)
pubdebt_gdp	-0.716	0.207	-0.078	0.084	0.232	0.240	0.173
	(1.209)	(0.244)	(0.150)	(0.147)	(0.195)	(0.206)	(0.142)
dtot	-20.716	-0.634	-0.097	-0.113	-0.087	-0.017	
	(12.548)	(0.606)	(0.184)	(0.188)	(0.119)	(0.122)	
infl	2.980	-2.022*	-0.685	-0.854**	-0.201	-0.149	
	(6.328)	(1.134)	(0.422)	(0.429)	(0.449)	(0.488)	
us_rint_d	0.000	2.771	2.627**	2.569**	2.447**	14.583	4.960
	(.)	(3.475)	(1.056)	(1.077)	(1.159)	(19.543)	(26.219)
save_rate	2.362	-1.126	0.439	-0.138	0.282	0.381	0.081
	(3.884)	(0.711)	(0.391)	(0.378)	(0.469)	(0.496)	(0.215)
old_dep	-2.114	-4.606***	16.759***	2.415	16.626**	14.775*	-1.556
	(4.953)	(1.041)	(3.947)	(2.476)	(7.901)	(8.120)	(2.079)
ca_open	1.885***	1.880***	0.015	0.326**	-0.469**	-0.481**	
	(0.603)	(0.151)	(0.173)	(0.166)	(0.193)	(0.206)	
fd_index	-0.165	-1.452***	0.929**	0.822**	1.004**	1.055**	0.662**
	(1.956)	(0.462)	(0.371)	(0.366)	(0.411)	(0.435)	(0.304)
free	0.022	0.019*	-0.006	-0.004	-0.004	-0.004	0.000
	(0.052)	(0.010)	(0.006)	(0.005)	(0.006)	(0.007)	(0.004)
int_conf	-0.356*	-0.154***	-0.046***	-0.037**	-0.043**	-0.046**	
	(0.175)	(0.033)	(0.015)	(0.015)	(0.018)	(0.018)	
TT		0.026*	-0.015*	0.004	-0.001		
		(0.016)	(0.008)	(0.007)	(0.014)		
bnk_cri	-0.973	-0.140	0.085	0.025	-0.010	-0.016	
	(10.597)	(0.330)	(0.103)	(0.105)	(0.083)	(0.084)	
cur_cri	-16.072	-0.219	-0.054	-0.073	-0.002	-0.014	-0.015
	(10.870)	(0.427)	(0.133)	(0.136)	(0.098)	(0.098)	(0.063)
sov_cri	3.106	0.434	0.029	0.044	-0.003	0.033	-0.022
	(4.444)	(0.373)	(0.114)	(0.116)	(0.084)	(0.084)	(0.062)
L.bnk_cri		0.098	0.213*	0.174	0.085	0.059	
		(0.366)	(0.113)	(0.115)	(0.083)	(0.083)	
L.cur_cri		-0.186	0.045	0.021	0.025	0.009	0.008
		(0.368)	(0.113)	(0.116)	(0.084)	(0.086)	(0.055)
L.sov_cri		0.294	0.105	0.103	0.046	0.060	
		(0.356)	(0.113)	(0.116)	(0.082)	(0.083)	
ka_open	0.031	0.036	0.013	0.090	0.124	0.103	
	(0.908)	(0.202)	(0.110)	(0.111)	(0.138)	(0.143)	
Constant	1.081	0.382	-0.300	0.565	-0.473*	-0.124	0.673
	(4.144)	(0.838)	(0.495)	(0.499)	(0.275)	(0.316)	(0.433)
r2	0.620	0.475	0.159				
r2_a	0.409	0.455	0.050				
N	43.000	541.000	541.000	541.000	498.000	498.000	789.000

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

Table A4. Model Result: External Liabilities

	Dependent variable: External Liabilities						
	OLS	Pooled OLS	FE	RE	FE_AR	TWO_WAY	PREFERRED
r_ln_rgndi_pc_usd	0.651*	0.384***	-0.249	0.092	-0.089	-0.311	0.065
	(0.318)	(0.080)	(0.202)	(0.154)	(0.290)	(0.352)	(0.144)
dln_rgndi_pc_usd	3.833	0.395	-0.657**	-0.592**	-0.226	-0.170	-0.397***
	(3.242)	(0.848)	(0.284)	(0.290)	(0.232)	(0.282)	(0.147)
pubdebt_gdp	-0.979	0.343	0.315**	0.425***	0.639***	0.606***	0.512***
	(1.145)	(0.232)	(0.146)	(0.144)	(0.192)	(0.207)	(0.140)
dtot	-26.150**	-0.866	0.029	0.015	-0.015	0.069	
	(11.879)	(0.575)	(0.180)	(0.185)	(0.120)	(0.124)	
infl	-0.159	-1.976*	-0.638	-0.771*	-0.271	-0.113	
	(5.991)	(1.076)	(0.412)	(0.421)	(0.455)	(0.496)	
us_rint_d	0.000	2.486	1.934*	1.866*	2.444**	31.135	-17.982
	(.)	(3.296)	(1.031)	(1.056)	(1.170)	(21.060)	(25.993)
save_rate	-0.841	-4.106***	-0.247	-0.769**	-0.438	-0.267	-0.065
	(3.677)	(0.675)	(0.382)	(0.368)	(0.462)	(0.499)	(0.213)
old_dep	2.597	-2.439**	15.812***	3.671	12.048*	12.925	2.445
	(4.689)	(0.988)	(3.854)	(2.263)	(6.698)	(7.899)	(2.075)
ca_open	2.057***	2.187***	-0.016	0.322**	-0.368*	-0.332	
	(0.571)	(0.144)	(0.169)	(0.160)	(0.195)	(0.208)	
fd_index	0.424	-1.113**	1.983***	1.780***	1.573***	1.695***	1.102***
	(1.852)	(0.438)	(0.362)	(0.356)	(0.406)	(0.439)	(0.301)
free	0.028	0.029***	0.003	0.005	0.004	0.003	0.008*
	(0.049)	(0.010)	(0.005)	(0.005)	(0.006)	(0.007)	(0.004)
int_conf	-0.380**	-0.146***	-0.063***	-0.054***	-0.049***	-0.052***	
	(0.166)	(0.031)	(0.014)	(0.015)	(0.018)	(0.018)	
TT		0.019	-0.027***	-0.011*			
		(0.015)	(0.008)	(0.007)			
bnk_cri	-1.922	-0.018	0.137	0.080	0.041	0.049	
	(10.032)	(0.313)	(0.100)	(0.103)	(0.084)	(0.085)	
cur_cri	-11.244	0.085	0.174	0.167	0.091	0.069	0.058
	(10.291)	(0.405)	(0.130)	(0.134)	(0.099)	(0.100)	(0.063)
sov_cri	4.793	0.271	-0.123	-0.109	-0.082	-0.052	-0.071
	(4.208)	(0.354)	(0.111)	(0.114)	(0.085)	(0.086)	(0.061)
L.bnk_cri		0.148	0.214*	0.175	0.150*	0.127	
		(0.347)	(0.110)	(0.113)	(0.084)	(0.084)	
L.cur_cri		0.140	0.226**	0.208*	0.108	0.094	0.057
		(0.349)	(0.111)	(0.114)	(0.085)	(0.088)	(0.055)
L.sov_cri		0.322	0.085	0.081	0.015	0.027	
		(0.338)	(0.111)	(0.113)	(0.083)	(0.084)	
ka_open	-0.118	0.052	0.223**	0.284***	0.166	0.179	
	(0.859)	(0.192)	(0.108)	(0.108)	(0.138)	(0.143)	
Constant	1.500	0.050	-0.626	0.067	-0.491*	-0.334	-0.440
	(3.923)	(0.794)	(0.484)	(0.478)	(0.275)	(0.328)	(0.430)
r2	0.568	0.436	0.263				
r2_a	0.327	0.414	0.167				
N	43.000	541.000	541.000	541.000	498.000	498.000	789.000

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