Argentina

May 2019

BCRA balance sheet

A	L
E.NFA*	BM
NCG	CBB
NCOS	NW
Other	

E.NFA*: net foreign assets in local currency (E)

NCG: net claims on government

NCOS: net claims on other sectors

Other: fixed assets, capital, etc.

BM: base money

CBB: central bank bills

NW: net worth

BCRA net worth is the value of assets minus liabilities

$$NW = (E.NFA^* + NCG + NCOS + Other) - (BM + CBB)$$

Change in net worth is the change in assets minus liabilities, including valuation, plus net interest earnings:

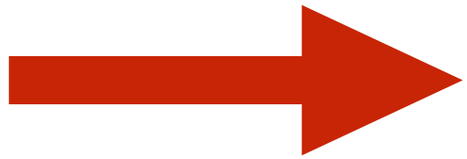
$$\Delta NW = E.\Delta NFA^* + \Delta E.NFA_{-1}^* + \Delta NC + \Delta Other - (\Delta BM + \Delta CBB) + i^*E.NFA_{-1} - iCBB_{-1}$$

Or, where the flow of assets and liabilities cancel, change in net worth is valuation adjustment plus net interest income:

$$\Delta NW = \Delta E.NFA_{-1}^* + i^*E.NFA_{-1} - iCBB$$

BCRA balance sheet analytical construct

A	L
E.NFA*	BM
NCG	CBB
NCOS	NW
Other	



A	L
E.NFA*	BM
NDA	
o/w NCG	
NCOS	
Other	
- CBB	
- NW	

Net domestic assets

$$\Delta BM = E.\Delta NFA^* + \Delta E.NFA_{-1}^* + \Delta NDA$$

$$\Delta NDA = \Delta NC - \Delta CBB - \Delta E.NFA_{-1}^* - i^*E.NFA_{-1} + iCBB_{-1}$$

$$\Delta BM = E.\Delta NFA^* + \Delta NC - \Delta CBB - i^*E.NFA_{-1} + iCBB_{-1}$$

Historical drivers of BCRA balance sheet (annual financial statements)

Table 1: BCRA net interest income (ARS billions)

	2011	2012	2013	2014	2015	2016	2017	*Estimate* 2018
Interest received on:	**3.8**	**3.3**	**3.0**	**3.2**	**4.5**	**24.1**	**29.2**	**48.9**
International reserves	0.3	0.3	0.2	0.1	0.2	0.8	2.2	14.1
Government securities	3.2	2.8	2.4	2.5	3.8	22.5	26.7	34.2
Loans	0.1	0.3	0.4	0.4	0.3	0.2	0.1	0.2
Other assets	0.2	0.1	0.1	0.1	0.2	0.6	0.2	0.3
Interest paid on:	**12.9**	**13.1**	**16.0**	**43.6**	**79.9**	**163.6**	**233.1**	**450.5**
BCRA securities	11.5	11.4	14.8	42.2	77.2	153.3	209.6	427.4
Loans from international agencies	0.0	0.1	0.1	0.0	0.2	3.7	0.3	1.4
Other transactions with financial system	0.9	1.7	1.0	1.0	2.3	6.1	23.0	21.4
Other liabilities	0.6	0.1	0.1	0.1	0.1	0.3	0.1	0.1
Set-up allowances	-0.1	-0.1	0.1	0.3	0.1	0.1	0.2	0.1
Net interest received	**-9.1**	**-9.8**	**-13.0**	**-40.5**	**-75.4**	**-139.5**	**-203.9**	**-401.6**
(%GDP)	*-0.4*	*-0.4*	*-0.4*	*-0.9*	*-1.3*	*-1.7*	*-1.9*	*-2.8*
Yield on reserves minus BCRA securities	-11.1	-11.1	-14.6	-42.1	-77.0	-152.6	-207.4	-413.3
Implied average interest on BCRA securities (%)		11.7	13.6	34.1	35.3	42.5	33.4	42.6
BCRA securities stock (year average)	96.7	109.0	123.9	218.9	361.2	627.3	1,004.0	1,091.1
BCRA securities stock (end-year)	84.2	99.9	110.5	282.1	416.6	698.8	1,160.3	735.1
Memo items:								
GDP (ARS, billions)	2179	2638	3348	4579	5955	8228	10645	14567
Reserve asset income from BOP	0.3	0.3	0.2	0.1	0.3	0.9	2.3	14.1
Model of interest on BCRA bills	11.1	13.0	15.9	38.1	79.4	153.1	209.4	427.4

Historical drivers of BCRA balance sheet (annual financial statements)

Table 2: Contributions to changes in BCRA capital and reserves (ARS billions)

	2011	2012	2013	2014	2015	2016	2017	2018
Capital, reserves, and retained earnings (eop)	**37.3**	**61.8**	**108.0**	**107.7**	**176.7**	**134.5**	**7.5**	**604.9**
o/w retained earnings	7.7	32.2	78.4	78.1	147.1	67.4	-67.0	597.4
capital and reserves	29.6	29.6	29.6	29.6	29.6	67.1	74.5	74.5
Change in capital and reserves		**24.5**	**46.2**	**-0.3**	**69.0**	**-42.2**	**-127.0**	**597.4**
Net income plus distribution of income	**-1.0**	**24.5**	**46.2**	**-0.3**	**69.0**	**-42.2**	**-127.0**	**597.4**
Net income	7.7	32.2	78.4	78.1	147.1	67.4	-67.0	597.4
Valuation adjustment	16.9	44.0	88.4	114.8	250.9	212.1	137.7	1,000.0
Interest income (net)	-9.1	-9.8	-13.0	-40.5	-75.4	-139.5	-203.9	-401.6
Other*	-0.1	-2.0	3.0	3.8	-28.4	-5.2	-0.8	-1.0
Distribution of income to government	-8.7	-7.7	-32.2	-78.4	-78.1	-109.6	-60.0	0.0
Memo items:								
Distribution to govn (%GDP)	*-0.4*	*-0.3*	*-1.0*	*-1.7*	*-1.3*	*-1.3*	*-0.6*	*0.0*
Capital and reserves/GDP (%)	*1.4*	*1.1*	*0.9*	*0.6*	*0.5*	*0.8*	*0.7*	*0.5*
GDP	2,179	2,638	3,348	4,579	5,955	8,228	10,645	14,567

* Includes net income on trading fx and other financial instruments, monetary issuance and general expense.

Historical drivers of BCRA balance sheet (annual financial statements)

Table 3 Contributions to change in BCRA base money (ARS billions)

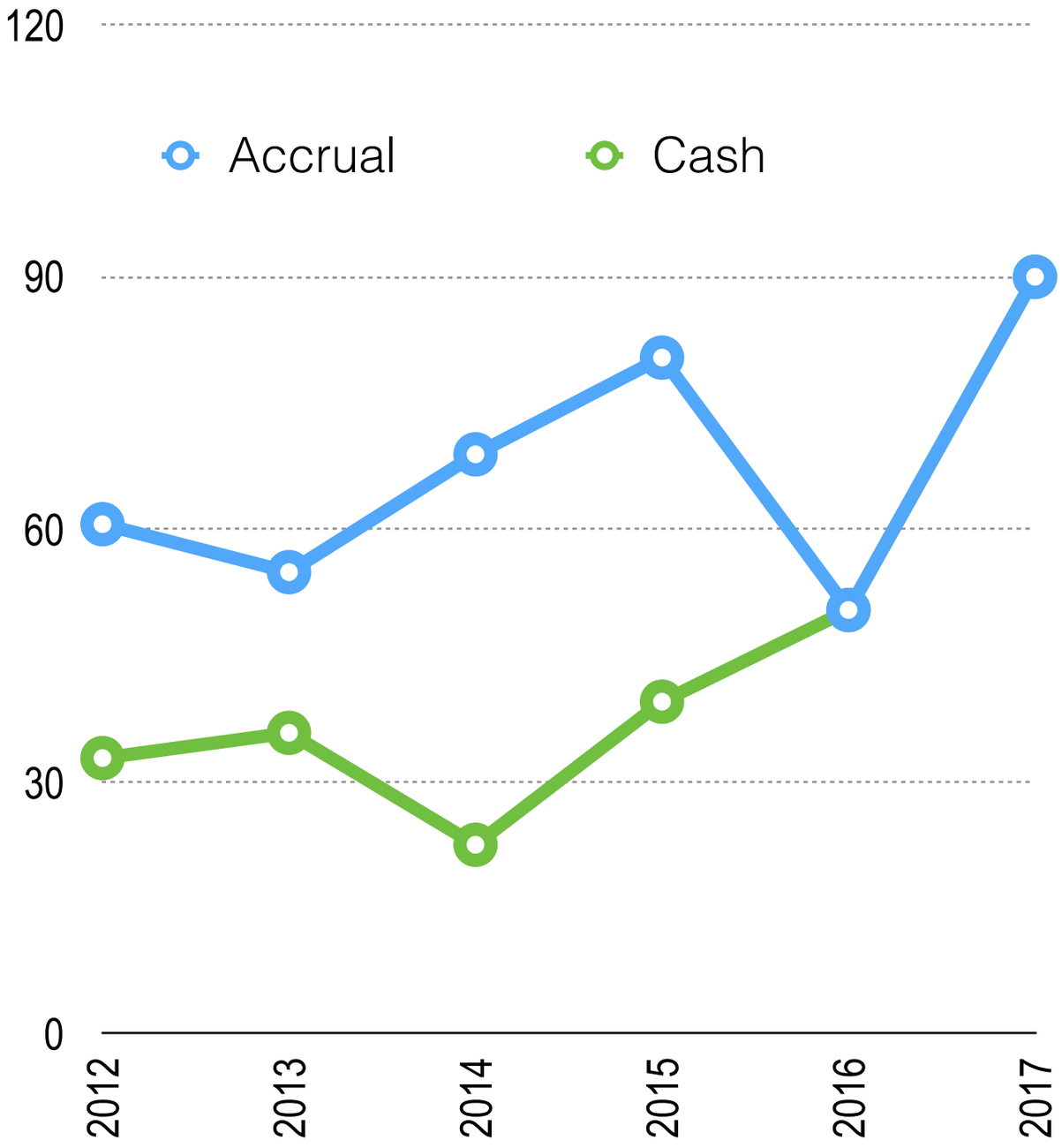
Contributions to change in monetary base:	2011	2012	2013	2014	2015	2016	2017	2018
Change in monetary base	**62.5**	**84.4**	**69.8**	**85.4**	**161.3**	**197.8**	**179.4**	**407.9**
Purchases of foreign currency (net)	13.3	41.5	-31.8	48.3	-39.9	57.8	-5.4	-413.1
For monetary regulation purposes	...	...	...	...	-91.7	31.1	...	
Decrease in fx deposits of financial institutions	...	...	...	...	21.3	17.8	...	
Purchase of fx from dealers	0.0	0.0	0.0	23.0	30.5	8.9	0.0	
Transactions on behalf of government	14.1	9.4	54.7	100.2	125.4	198.1	269.0	0.0
Foreign exchange purchases	...	...	...	...	...	160.3	271.7	
Deposit changes	...	...	...	...	...	37.8	-2.7	
Advances to government	20.0	40.8	44.3	62.5	66.3	123.2	150.9	34.0
Temporary advances to the govn.	18.0	32.8	35.8	22.5	39.5	50.4	90.0	34.0
Distribution of earnings to govn. (from BCRA capital)	1.9	7.7	8.3	39.7	26.3	72.1	60.0	0.0
Contributions to general revenue**	0.2	0.2	0.3	0.4	0.5	0.7	0.9	
Other	-2.4	-2.3	-3.4	-8.2	5.6	-32.4	-31.8	17.0
Loans to domestic financial institutions	1.7	2.0	7.4	0.7	-0.7	-1.8	-1.2	
Administrative and monetary issuance expense	1.3	1.9	2.3	3.3	4.4	6.0	6.9	7.0
Premiums paid for reverse repo transactions	0.8	1.6	0.9	0.9	1.7	3.6	15.2	30.0
IADB/IBRD loans, micro/SMEs program, "other"	0.7	0.2	-2.2	1.1	1.6	1.7	1.4	
Net liquidity from government security transactions	-2.0	-2.0	-4.8	-3.5	8.9	-15.0	-8.4	-10.0
Other financial institution deposits	-1.0	-1.1	-0.5	-2.6	-3.4	-16.4	-33.5	
Multilateral credit agreements (SML)	-3.9	-4.9	-6.5	-8.0	-6.9	-10.4	-12.2	-10.0
Liquidity management	17.4	-4.9	6.0	-117.5	3.9	-148.9	-203.1	770.0
Net BCRA securities	15.0	-3.3	-4.5	-95.9	-8.4	-100.5	-180.3	800.0
Reverse repos	2.5	-1.6	10.5	-21.7	12.2	-48.4	-22.8	-30.0
Memo items:								
Change in base money (%GDP)	*2.9*	*3.2*	*2.1*	*1.9*	*2.7*	*2.4*	*1.7*	*2.8*
Cashflow from transactions for/advances to govn. (%GDP)	*1.6*	*1.9*	*3.0*	*3.6*	*3.2*	*3.9*	*3.9*	*0.2*
GDP	2179	2638	3348	4579	5955	8228	10645	14567

* Under Communiqué "A" 5563 / 5822 / 5852

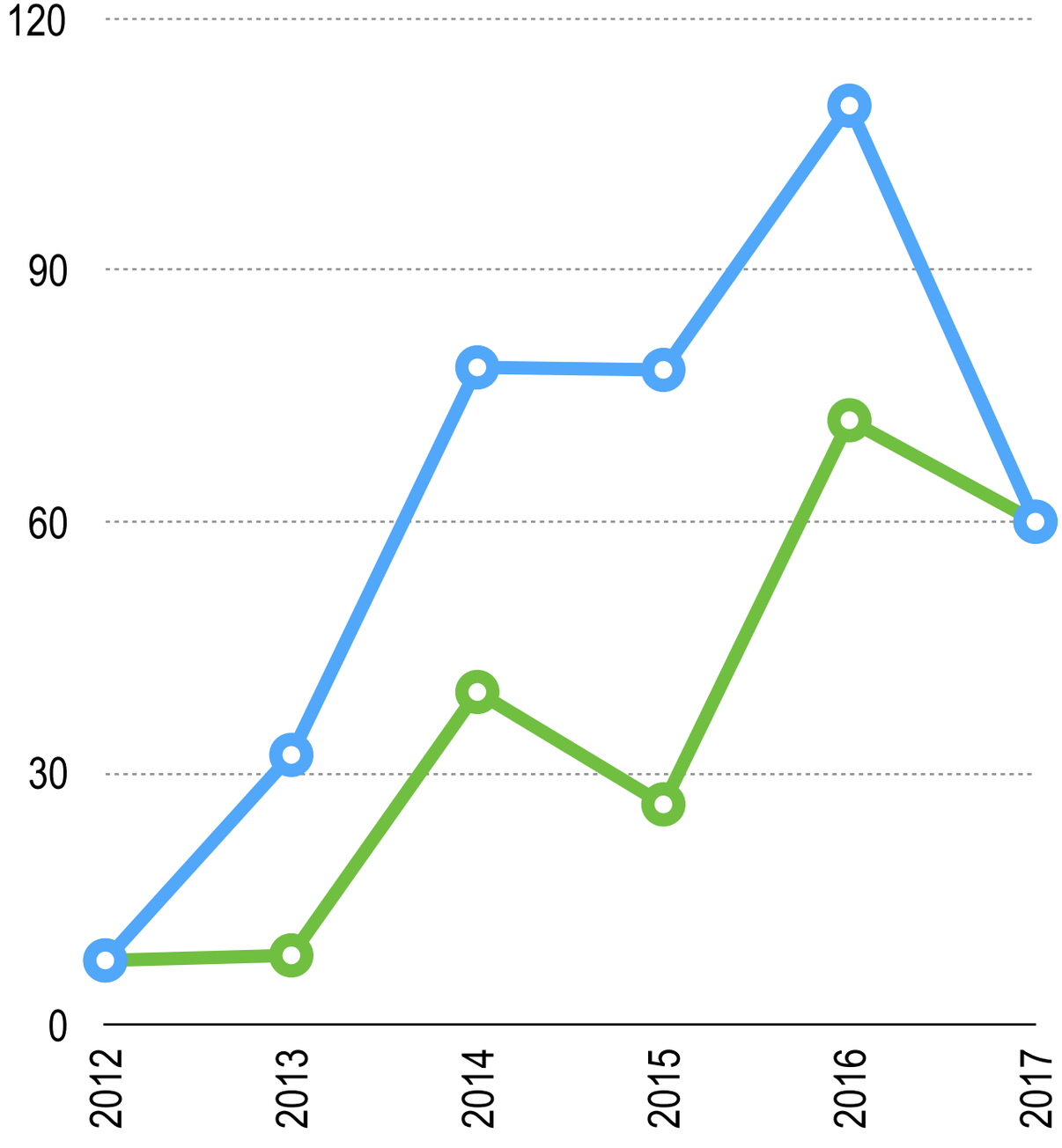
** Budget Law No. 26728 / Decree 1446/11 (2011-14) and Budget Law No.27.198 / 27.008 (2015-17)

Historical drivers of BCRA balance sheet (annual financial statements)

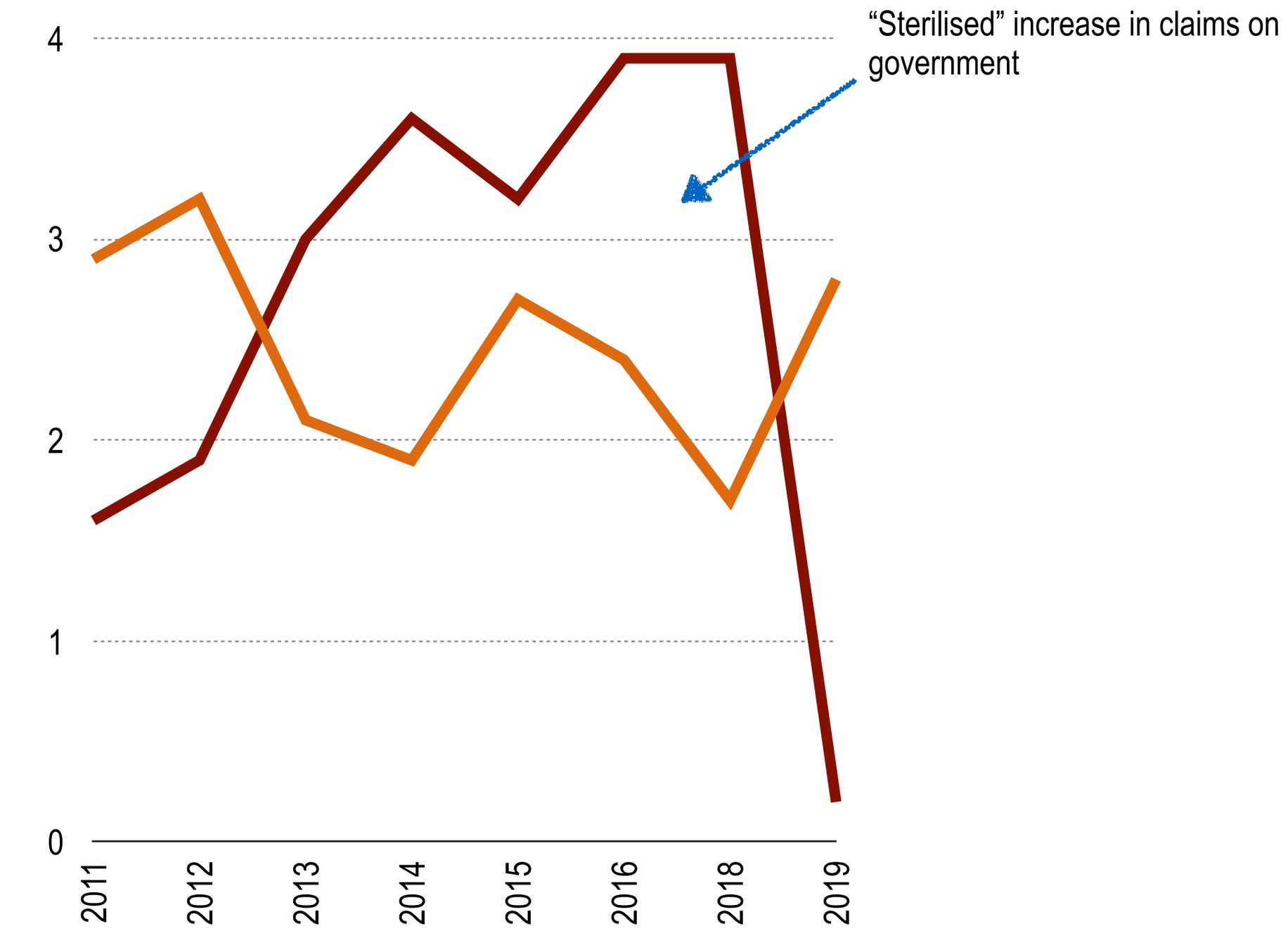
Change in temporary advances to government
(ARS billions)



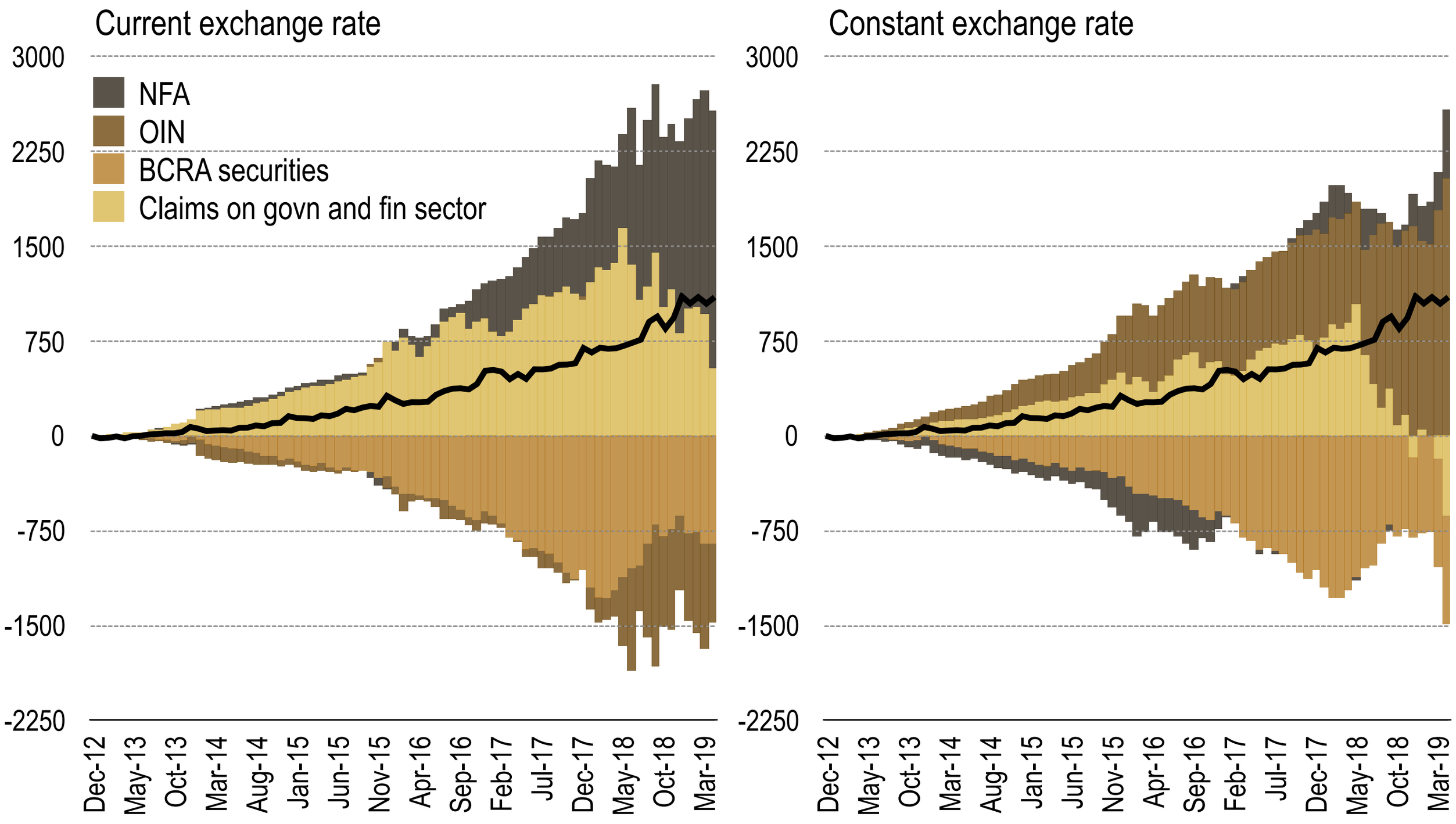
Distribution of BCRA income to government
(ARS billions)



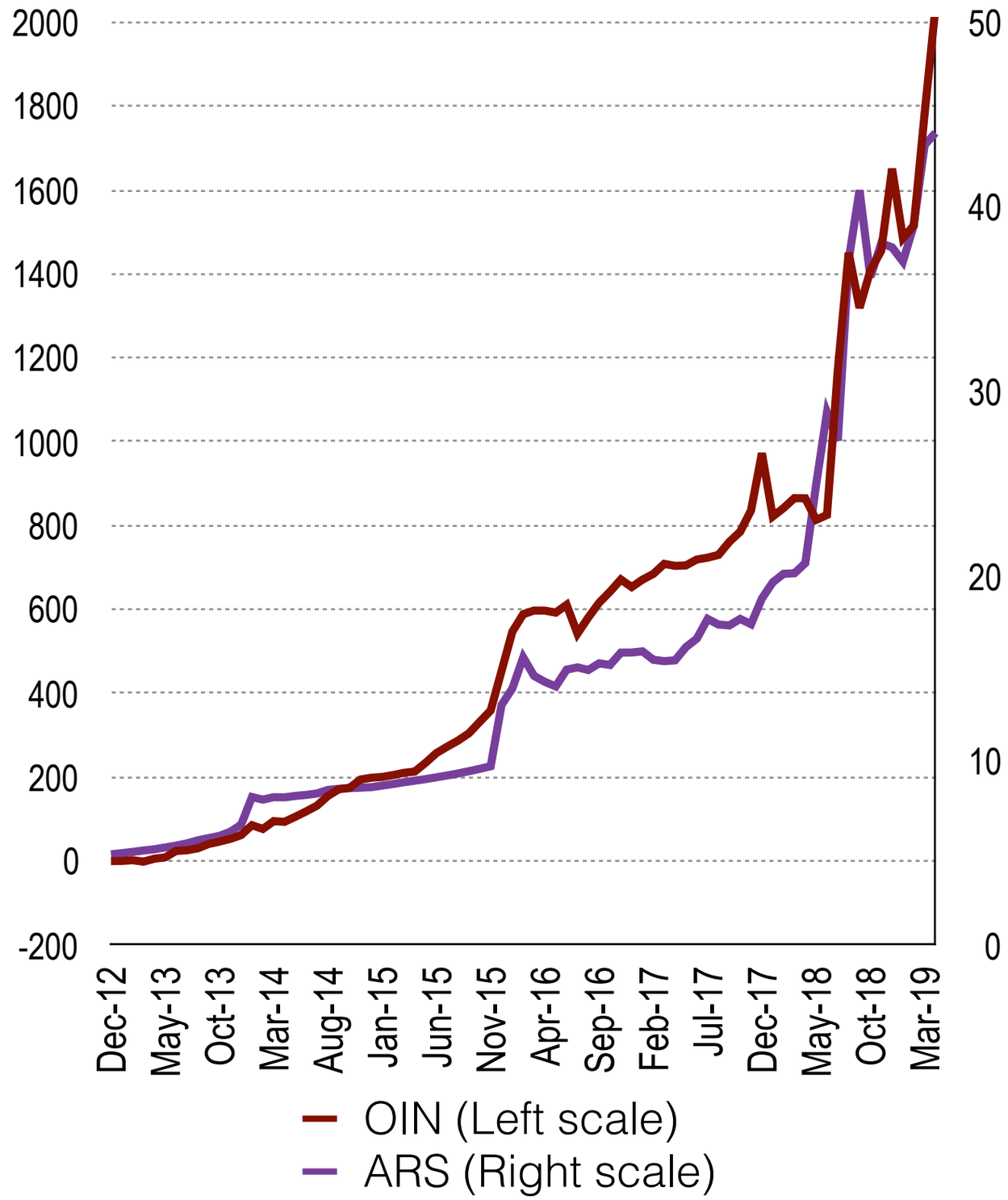
Historical drivers of BCRA balance sheet (annual financial statements)

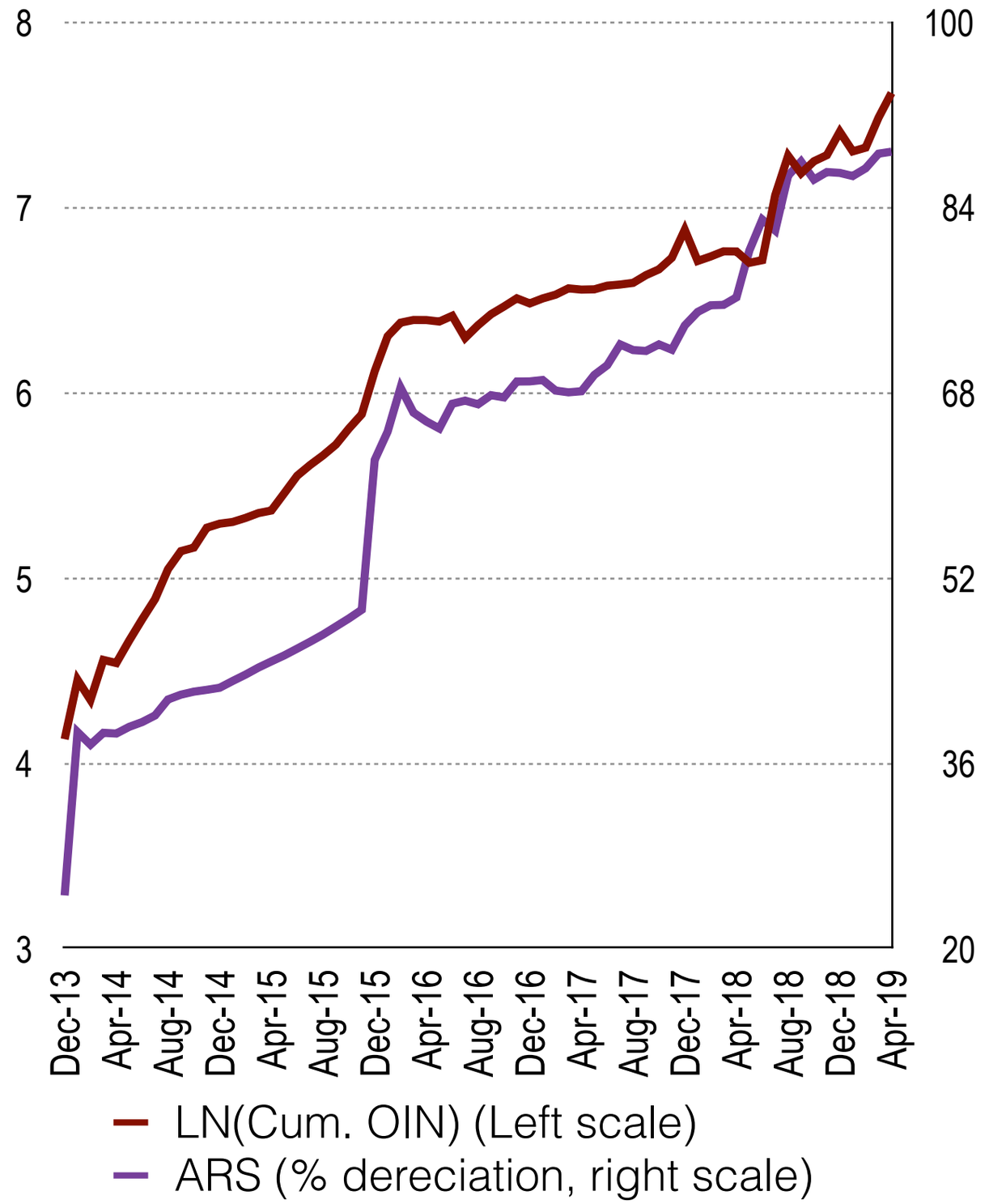


Contributions to cumulative change in base money (ARS billions)



Cumulative change in “other items net” at constant exchange rate (ARS billions)





E-mail response from IMF mission chief:

This is analytically wrong, means the monetary program is mis-specified with consequences for monetary stability ahead

OIN is the residual in the following equation: NDA = net credit to the government + net credit to financial sector (essentially negative of LELIQs) + OIN. We project NDA as the difference between MB (constant) and NFA (falling), which means NDA is rising. This increase is not matched by the rise in LELIQs which means that OIN increases over our projection period.

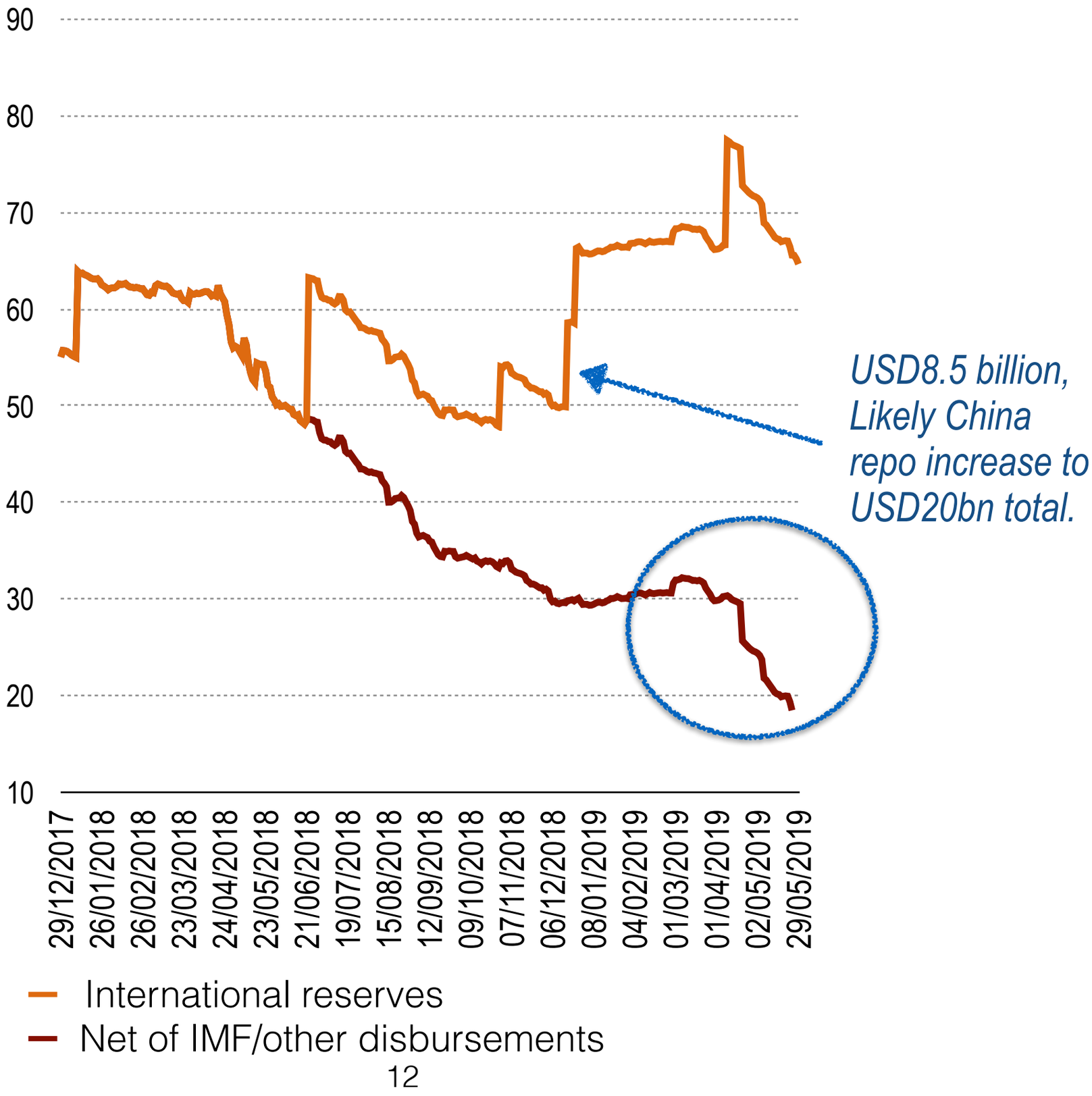
The program has a structural benchmark of recapitalization of central bank by end-2019. We will be working with the authorities to ensure that the target is met.

Fiscal implications are side-stepped, though this will be crucial for the needed public debt restructuring.

International reserves: Latest daily data (USD billions)

4 IMF purchases since June totally USD38.5 billion

NIR net of total China repo is about USD6.5bn



USD8.5 billion, Likely China repo increase to USD20bn total.

IMF 3rd Review monetary projections (Table 5c, page 35)

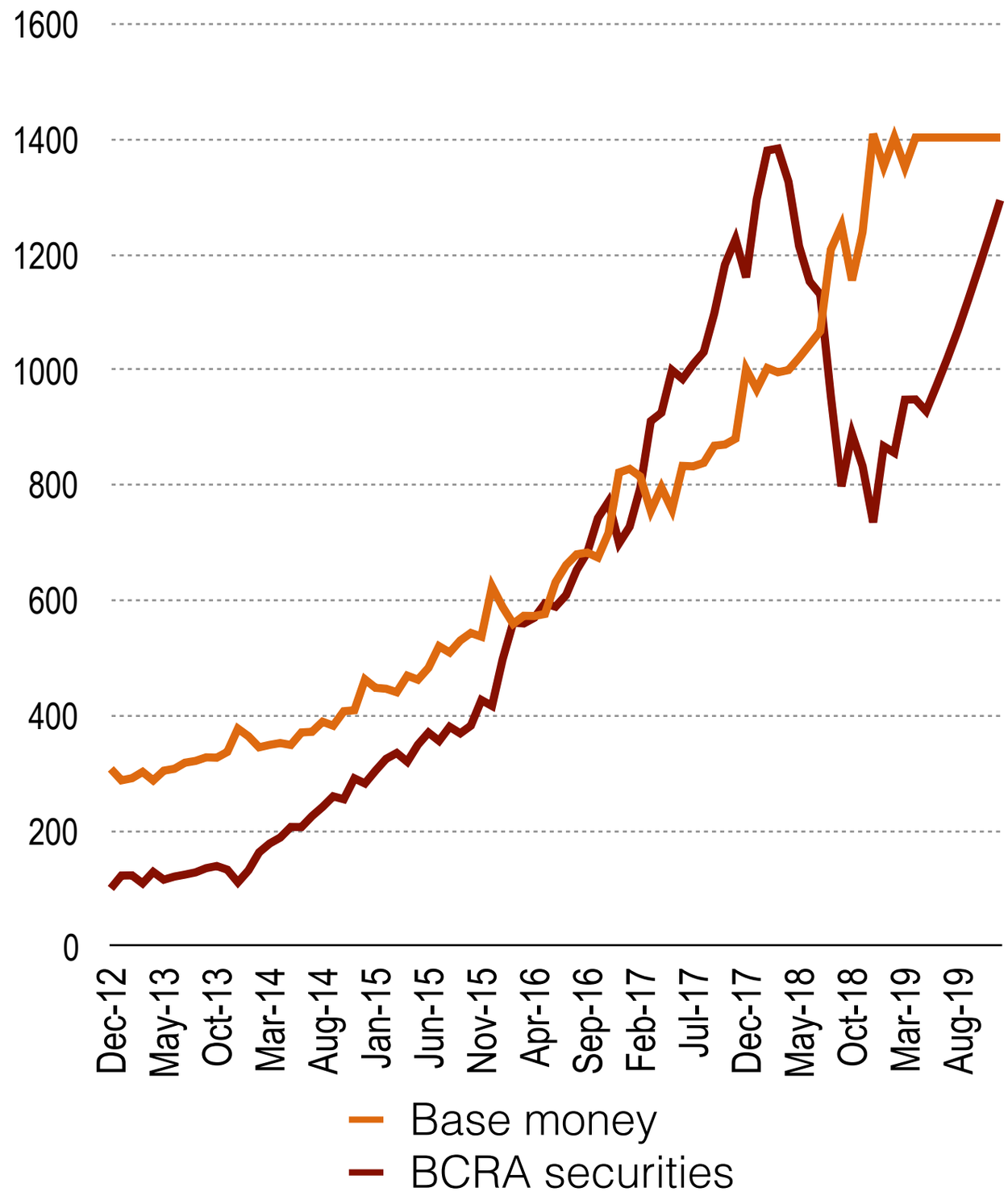
Using actual end-December 2018 outturn

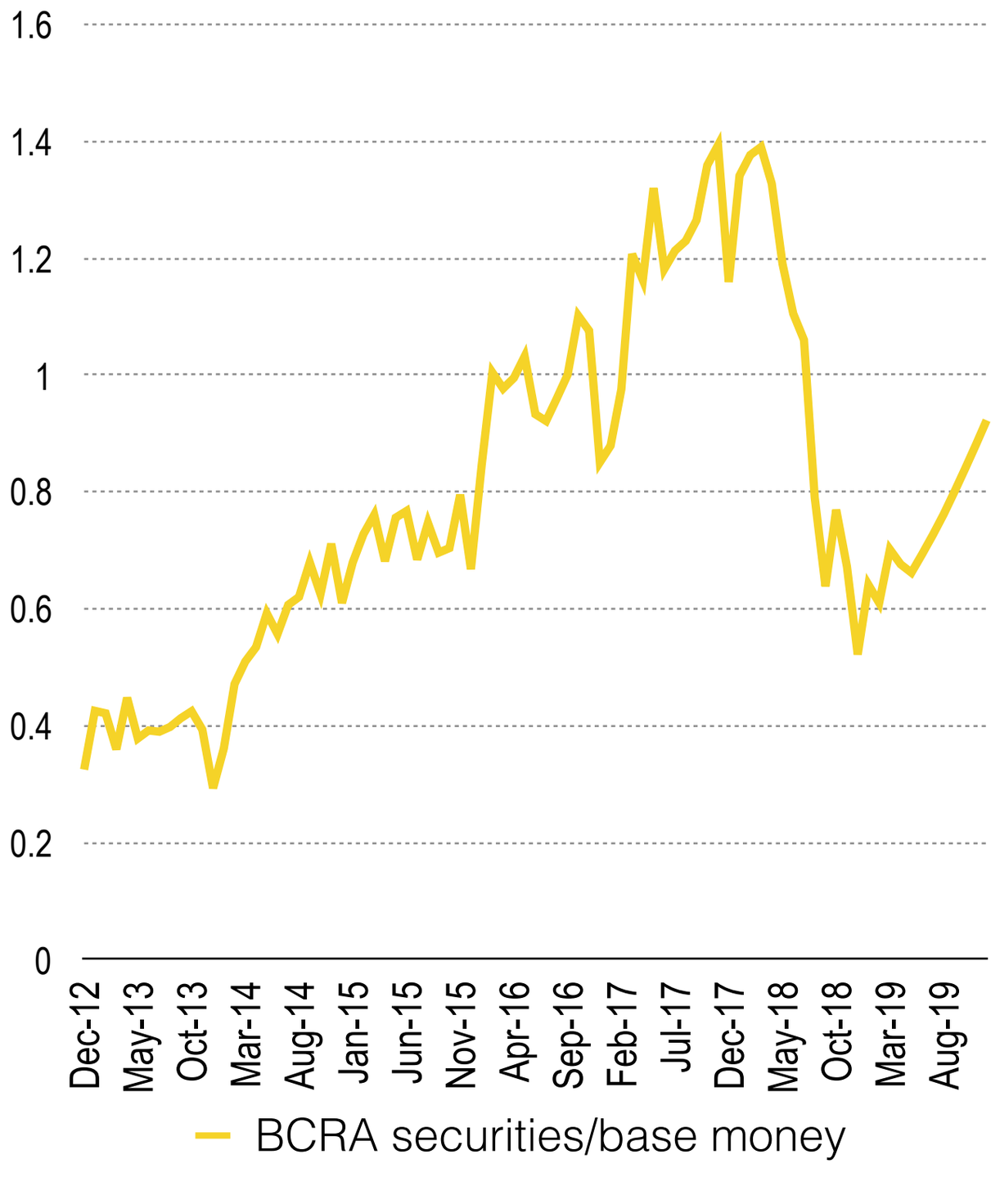
	Dec-18	Dec-19	Change	Valuation adjustment	Flow	Flow at year-average exchange rate
Net foreign assets	1704	1482	-222	605	-827	-19.7
Net domestic assets	-295	-8	287	-605	892	21.2
Credit to the public sector (net)	1632	1761	129		129	3.1
Credit to the financial sector	-537	-734	-197		-197	-4.7
BCRA securities	-735	-989	-254		-254	-6.0
Official capital and other items (ne	-655	-44	611	-605	1216	29.0
Monetary base	1409	1474	65		65	1.5
ARS (end year)	37.8	46.2				

Using actual IMF end-December 2018 numbers

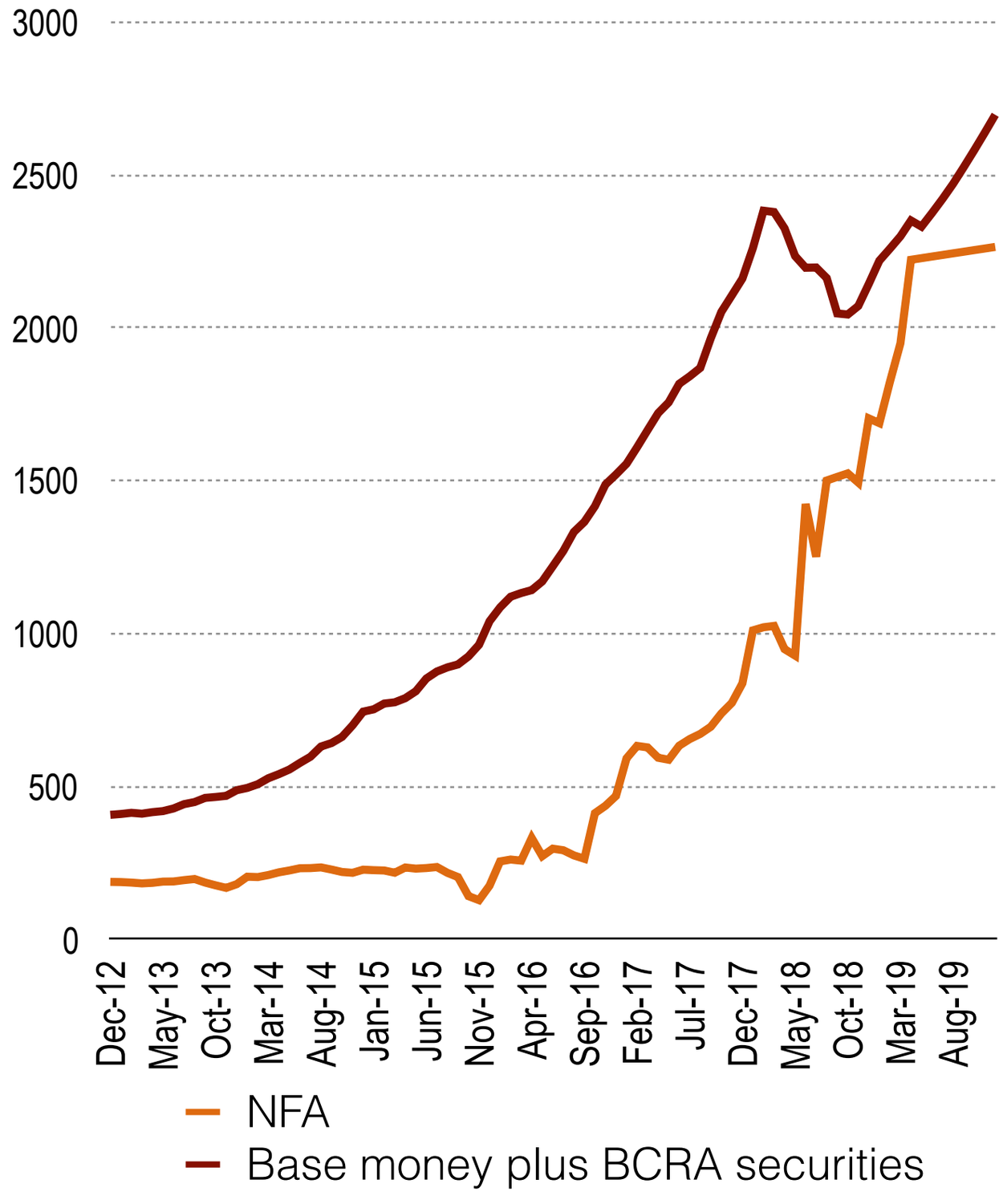
	Dec-18	Dec-19	Change	Valuation adjustment	Flow	Flow at year-average exchange rate
Net foreign assets	2031	1482	-549	1005	-1554	-37.0
Net domestic assets	-622	-8	614	-1005	1619	38.6
Credit to the public sector (net)	1632	1761	129		129	3.1
Credit to the financial sector	-537	-734	-197		-197	-4.7
BCRA securities	-735	-989	-254		-254	-6.0
Official capital and other items (ne	-982	-44	938	-1005	1943	46.3
Monetary base	1409	1474	65		65	1.5
ARS (end year)	37.8	46.2				

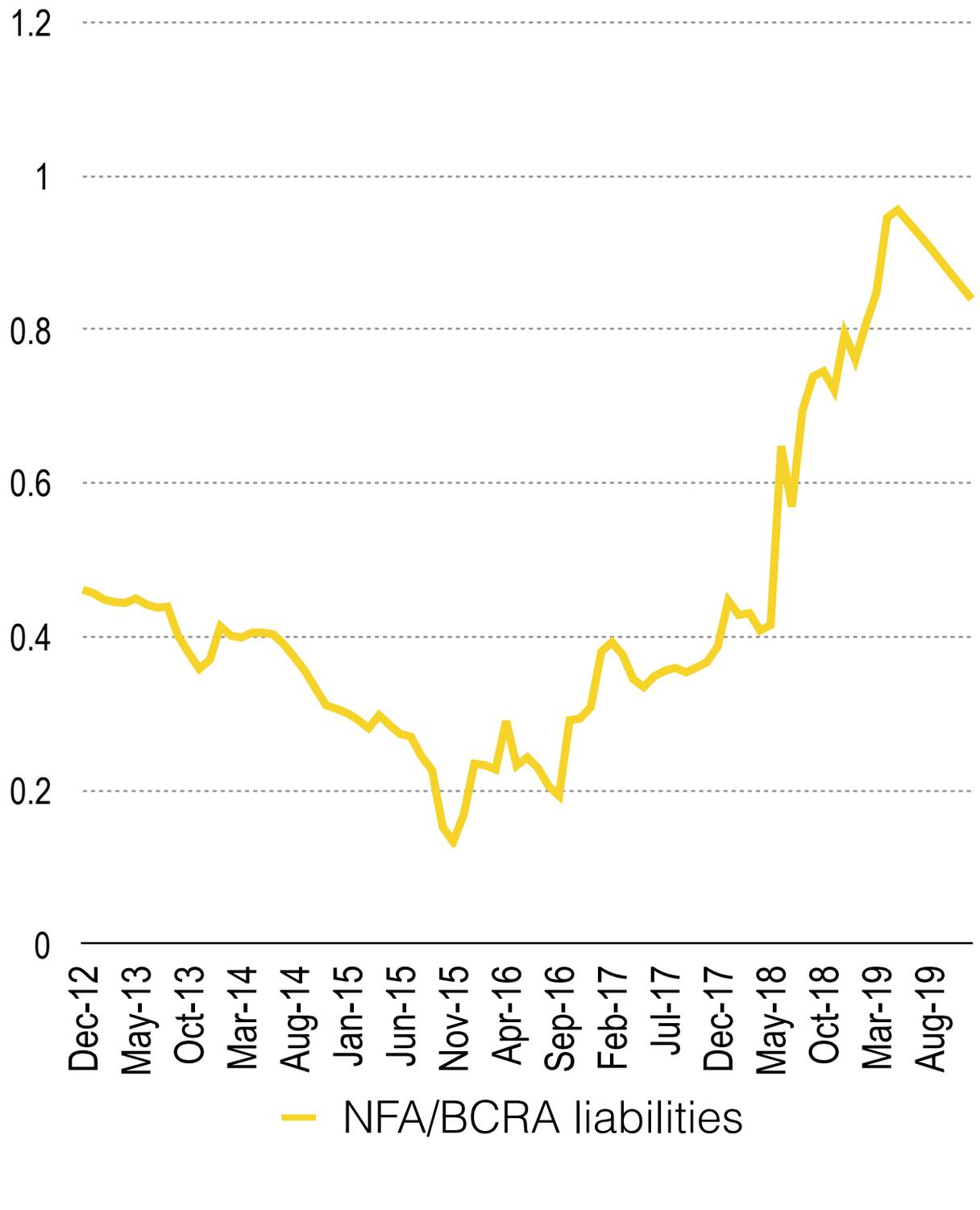
BCRA securities: simple forecast (ARS billions)



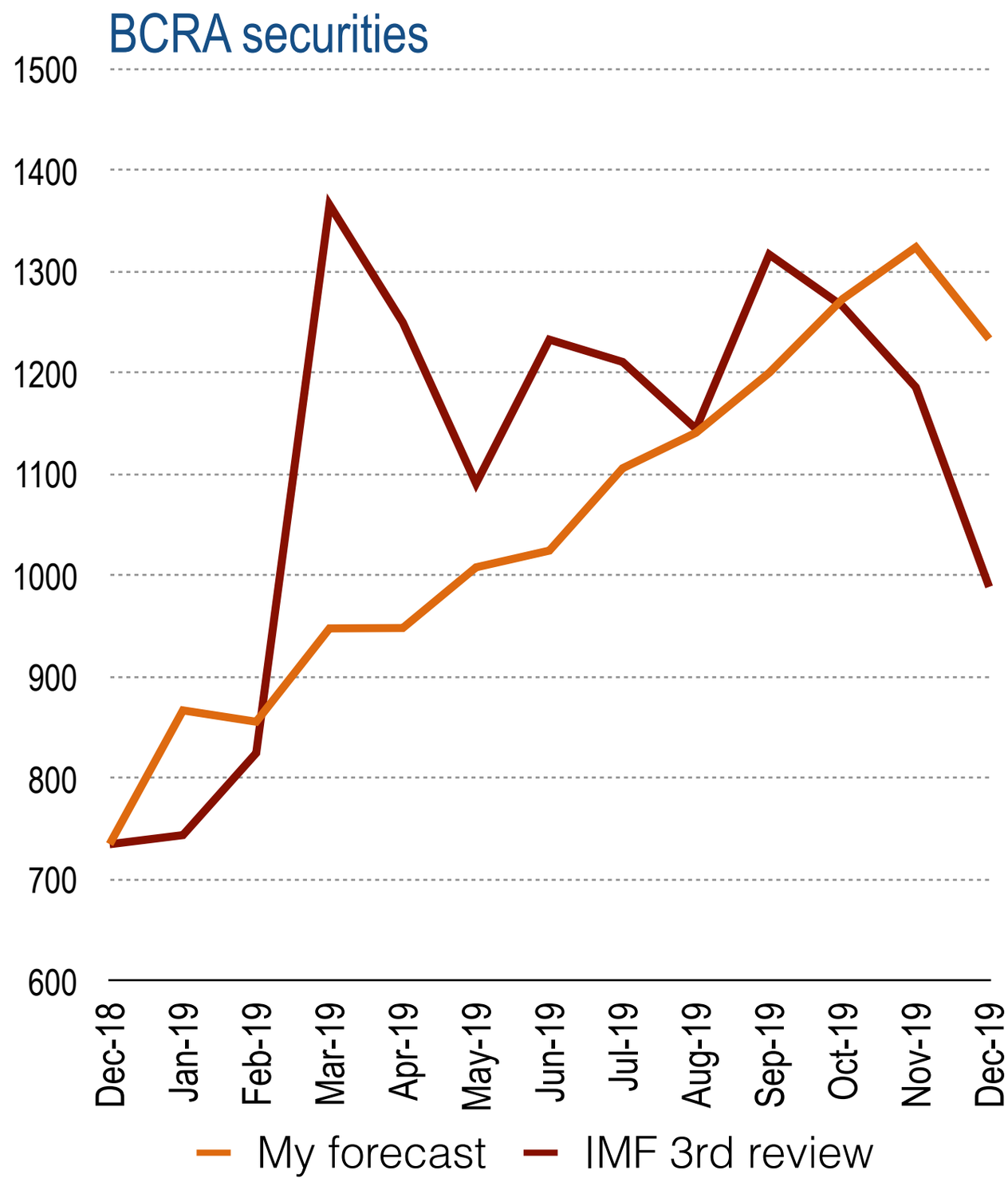


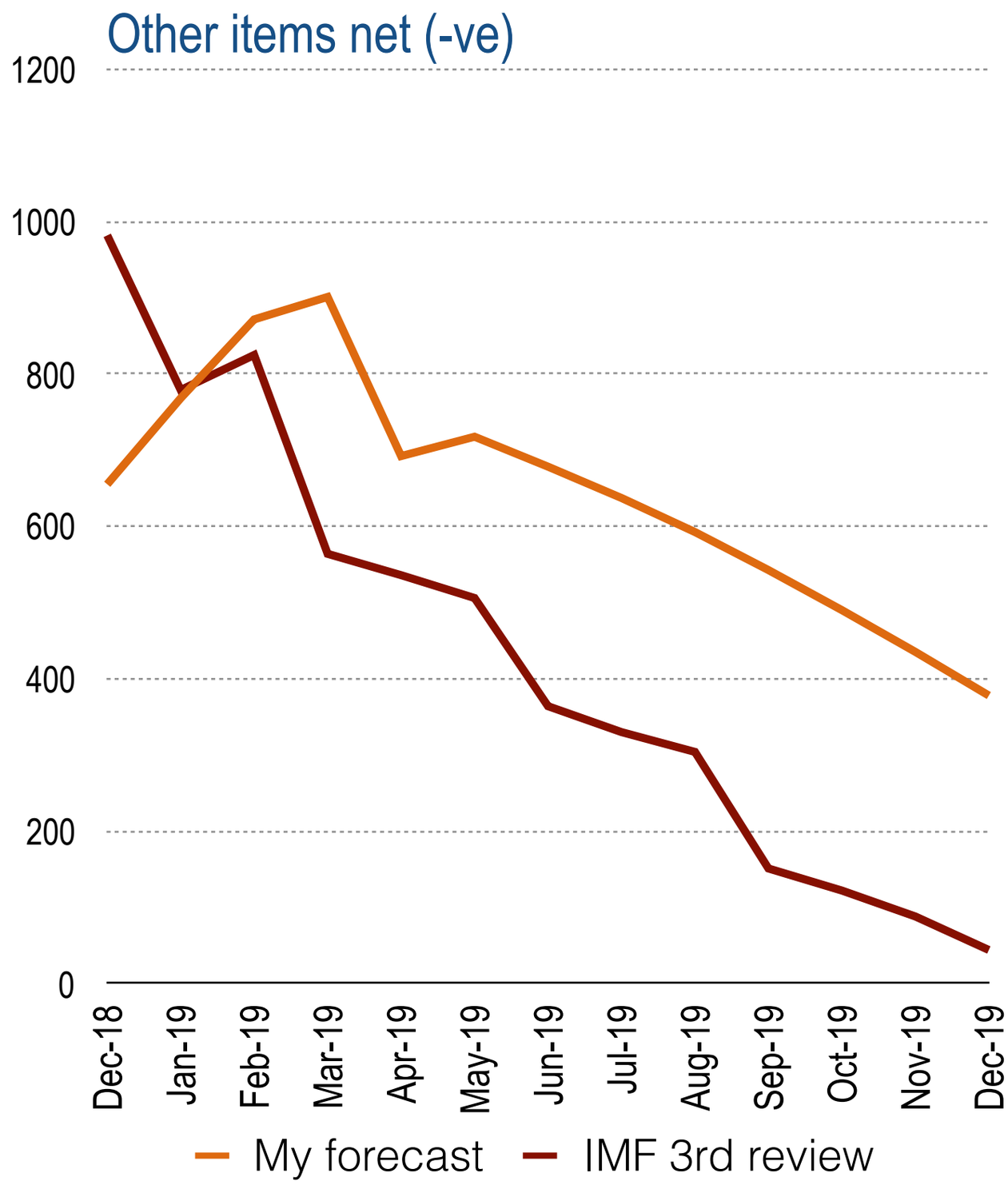
BCRA NFA and base money plus securities: simple forecast (ARS billions)



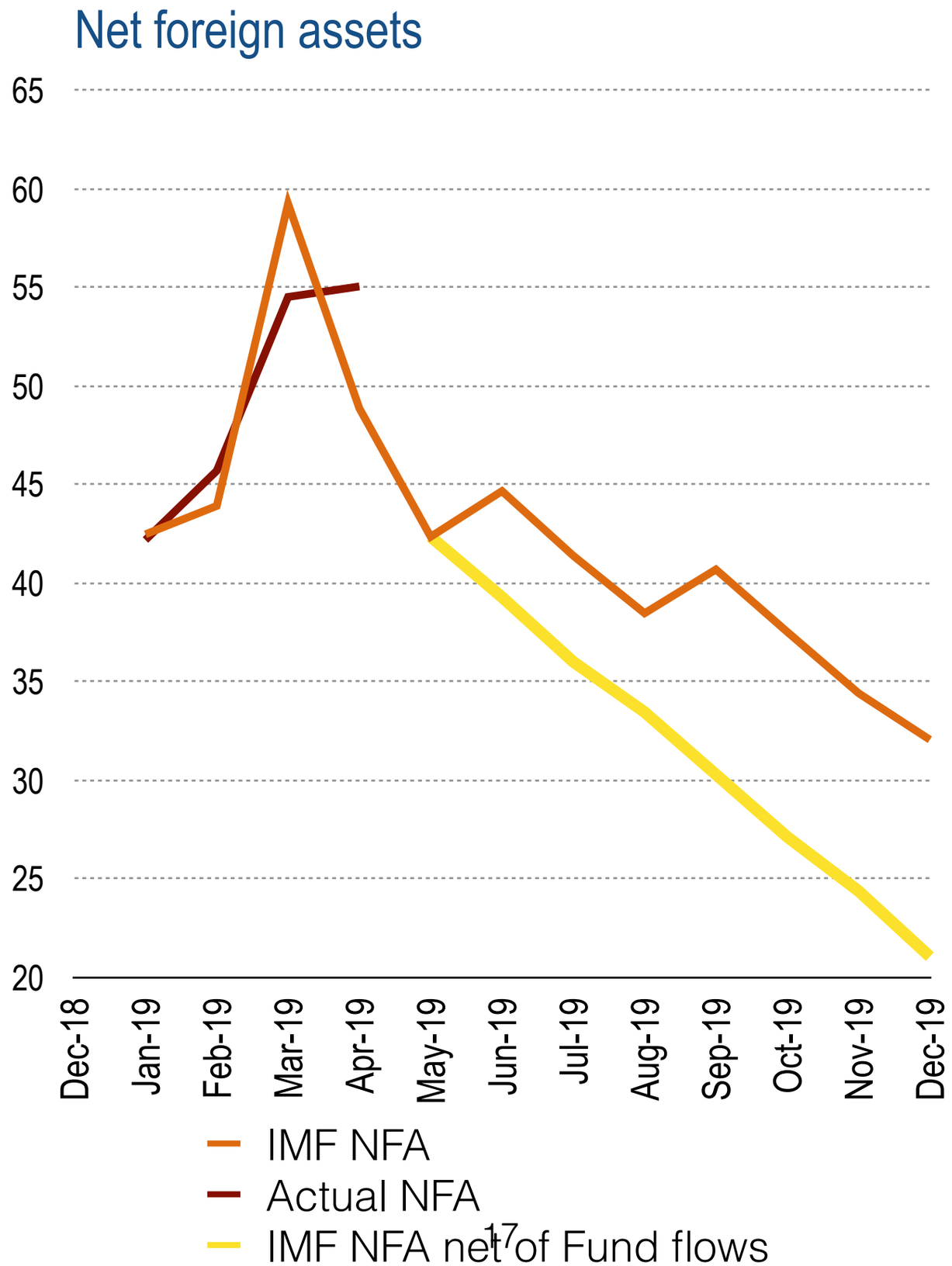


BCRA securities and other items net (ARS billions)





BCRA net foreign assets (USD billions)



Central bank sustainability: basic analytics

BCRA sustainability

The central bank's balance sheet can be summarized as:

$$K_t + \xi_t NFA_t^* + NDA_t + \xi_t NDA_t^* = BM_t + CB_t + NW_t$$

where:
K_t is the CB capital, which we assume to be dominated in local currency;
ξ_t is the nominal exchange rate;
NFA_t^* net foreign assets (mainly gross international reserves) dominated in dollars;
NDA_t net domestic assets, such as holdings of government bonds in local or foreign currency;
CB_t is the outstanding quantify of central bank bills (BCRA bills, which are all denominated in pesos);
BM_t is base or high-powered money of the central bank;
NW_t is the net worth of the central bank—the difference in value between assets and liabilities.

BCRA sustainability

In other words, net worth is:

$$NW_t = K_t + \xi_t NFA_t^* + NDA_t + \xi_t NDA_t^* - BM_t - CB_t$$

The change in net worth from t-1 to t reflects the valuation adjustment on net foreign and domestic assets dominated in foreign exchange plus the net interest income on assets—where we assume zero interest on base money:

$$\begin{aligned}\Delta NW_t = [T_t - W_t] + \Delta K_t + \Delta\xi_t NFA_{t-1}^* + \Delta\xi_t NDA_{t-1}^* \\ + \left(i_t^K K_{t-1} + i_{F,t}^* \xi_t NFA_{t-1}^* + i_t NDA_t + i_{D,t}^* \xi_t NDA_{t-1}^* - i_t^B CB_{t-1}\right)\end{aligned}$$

which is the change in balance sheet, including valuation adjustments, plus net interest income.

BCRA sustainability

From the central bank balance sheet, the change in net worth can be written:

$$\Delta NW_t = \Delta K_t + \xi_t \Delta NFA_t^* + \Delta \xi_t NFA_{t-1}^* + \Delta NDA_t + \xi_t \Delta NDA_t^* + \Delta \xi_t NDA_{t-1}^* - \Delta BM_t - \Delta CB_t$$

substituting in the definition of the change in net worth, the change in capital and valuation adjustments cancel, to get the flow budget constraint facing the central bank:

$$(1 + i_t^B) CB_{t-1} = [T_t - W_t] + i_t^K K_{t-1} + (1 + i_t^*) \xi_t NFA_{t-1}^* + (1 + i_t) NDA_{t-1} + \left(1 + i_{D,t}^*\right) \xi_t NDA_{t-1}^* + \Delta BM_t + [CB_t - \xi_t NFA_t^* - NDA_t - \xi_t NDA_t^*]$$

BCRA sustainability

Subtract $(1 + i_t^B)[\xi_{t-1} NFA_{t-1}^* + NDA_{t-1} + \xi_{t-1} NDA_{t-1}^*]$ from each side, we get:

$$\begin{aligned}(1 + i_t^B)\,\Omega_{t-1} = \; & \Omega_t + [T_t - W_t] + i_t^K K_{t-1} + [(1 + i_t^*)\xi_t - (1 + i_t^B)\xi_{t-1}] NFA_{t-1}^* \\ & + [(1 + i_t) - (1 + i_t^B)] NDA_{t-1} + \left[\left(1 + i_{D,t}^*\right)\xi_t - (1 + i_t^B)\xi_{t-1}\right] NDA_{t-1}^* \\ & + \Delta BM_t\end{aligned}$$

where $\Omega_t = CB_t - \xi_t NFA_t^* - NDA_t - \xi_t NDA_t^*$.

BCRA sustainability

Divide through by nominal GDP—using lower case letters to reflect variables relative to GDP, we get

$$\frac{1+i_t^B}{1+g_t}\varphi_{t-1} = \varphi_t + [t_t - w_t] + \frac{i_t^K}{1+g_t}K_{t-1} + \left[\frac{(1+i_t^*)\,\xi_t/\xi_{t-1} - (1+i_t^B)}{1+g_t}\right] nfa_{t-1}^*$$
$$+ \left[\frac{(1+i_t) - (1+i_t^B)}{1+g_t}\right] nda_{t-1} + \left[\frac{\left(1+i_{D,t}^*\right)\xi_t/\xi_{t-1_t} - (1+i_t^B)}{1+g_t}\right] nda_{t-1}^*$$
$$+ \Delta bm_t + \frac{g_t}{1+g_t} bm_{t-1}$$

where $nfa_{t-1}^* = \xi_{t-1} NFA_{t-1}^*/Y_{t-1}$ and $nda_{t-1}^* = \xi_{t-1} NDA_{t-1}^*/Y_{t-1}$.

BCRA sustainability

Rearrange as the flow budget constraint facing the central bank

$$\varphi_{t-1} = \frac{1+g_t}{1+i_t^B}\varphi_t + \frac{1+g_t}{1+i_t^B}[t_t - w_t] + \frac{i_t^K}{1+i_t^B}k_{t-1} + \frac{g_t}{1+i_t^B}bm_{t-1}$$
$$+ \left[\frac{(1+i_t^*)(1+e_t) - (1+i_t^B)}{1+i_t^B}\right] nfa_{t-1}^* + \left[\frac{(1+i_t) - (1+i_t^B)}{1+i_t^B}\right] nda_{t-1}$$
$$+ \left[\frac{(1+i_{D,t}^*)(1+e_t) - (1+i_t^B)}{1+i_t^B}\right] nda_{t-1}^* + \frac{1+g_t}{1+i_t^B}\Delta bm_t$$

where $1 + e_t = \xi_t/\xi_{t-1}$.

BCRA sustainability

We obtain the inter-temporal budget constraint, including the no-Ponzi condition, by iterating forward on this flow constraint. For simplicity, we assume a steady state for all variables, dropping the t sub-scripts:

$$\varphi_{t-1} = \left(\frac{1+g}{i^B-g}\right)[t-w] + \left(\frac{i^K}{i^B-\gamma}\right)k_{t-1} + \left(\frac{g}{i^B-g}\right)bm_{t-1} + \left(\frac{1+g}{i^B-g}\right)\Delta bm$$
$$+ \left[\frac{(1+i^*)(1+e)-(1+i^B)}{i^B-\lambda}\right]nfa^*_{t-1} + \left[\frac{(1+i)-(1+i^B)}{i^B-\delta}\right]nda_{t-1}$$
$$+ \left[\frac{(1+i^*_D)(1+e)-(1+i^B)}{i^B-\theta}\right]nda^*_{t-1} + NPC$$

where the no-Ponzi condition is given by:

$$NPC = \lim_{N\to\infty}\left(\frac{1+g}{1+i^B}\right)^{N+1}\varphi_N$$

BCRA sustainability

Simplify by letting $\Delta bm = 0, \lambda = \delta = \theta = g$ and rearranging to get an expression for the capital of the central bank needed to assure the NPC condition obtains:

$$i^K k_{t-1} \geq (i^B - \gamma)\varphi_{t-1} + \left(\frac{i^B - \gamma}{i^B - g}\right)(1+g)[w-t] - \left(\frac{i^B - \gamma}{i^B - g}\right) g \cdot bm_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+i^B) - (1+i^*)(1+e)]nfa^*_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+i^B) - (1+i)]nda_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+i^B) - (1+i^*_D)(1+e)]nda^*_{t-1}$$

BCRA sustainability

We can simplify further by recalling the definition of φ_{t-1} and substituting in:

$$\varphi_{t-1} = cb_{t-1} - nfa^*_{t-1} - nda_{t-1} - nda^*_{t-1}$$

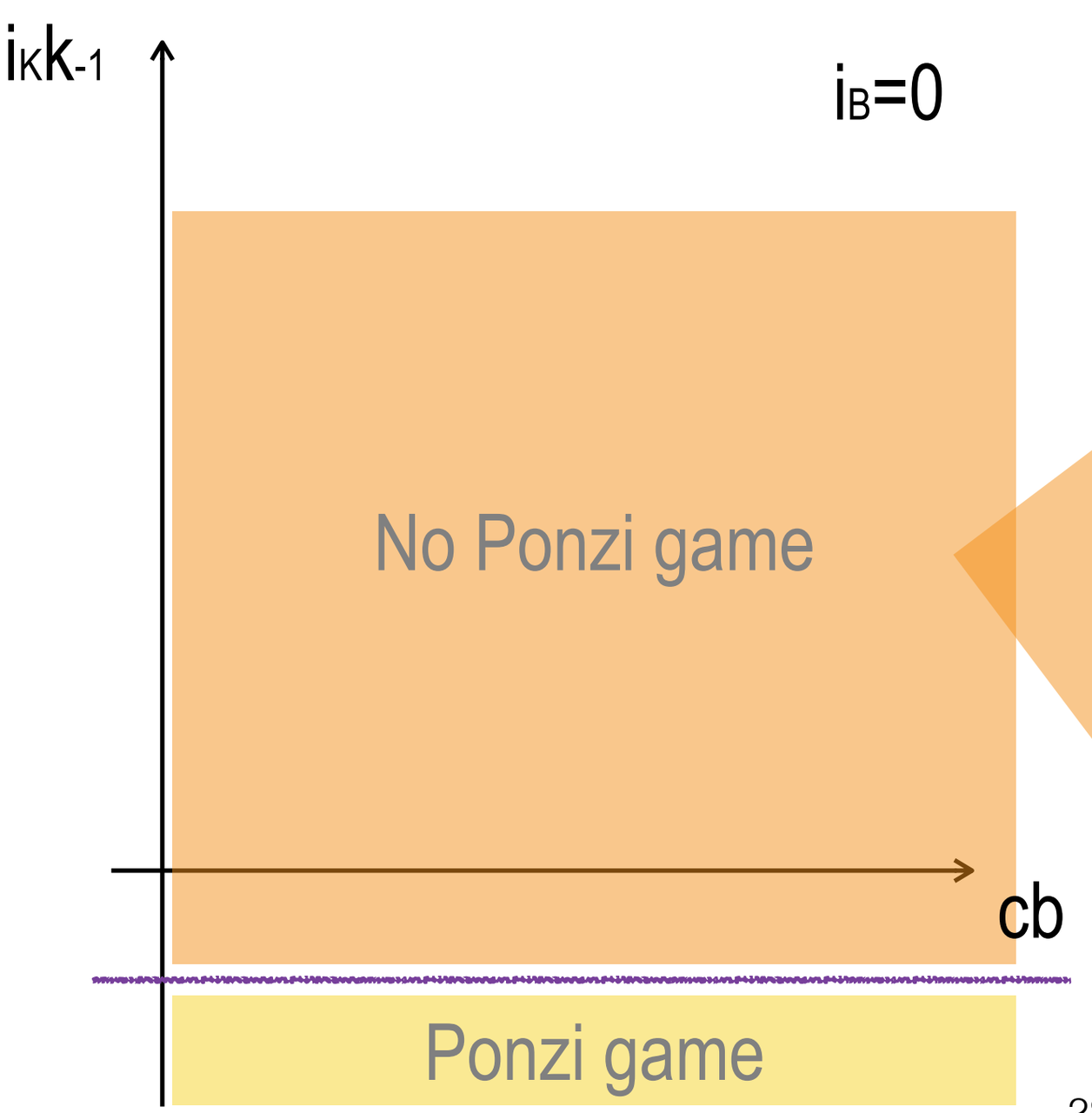
such that:

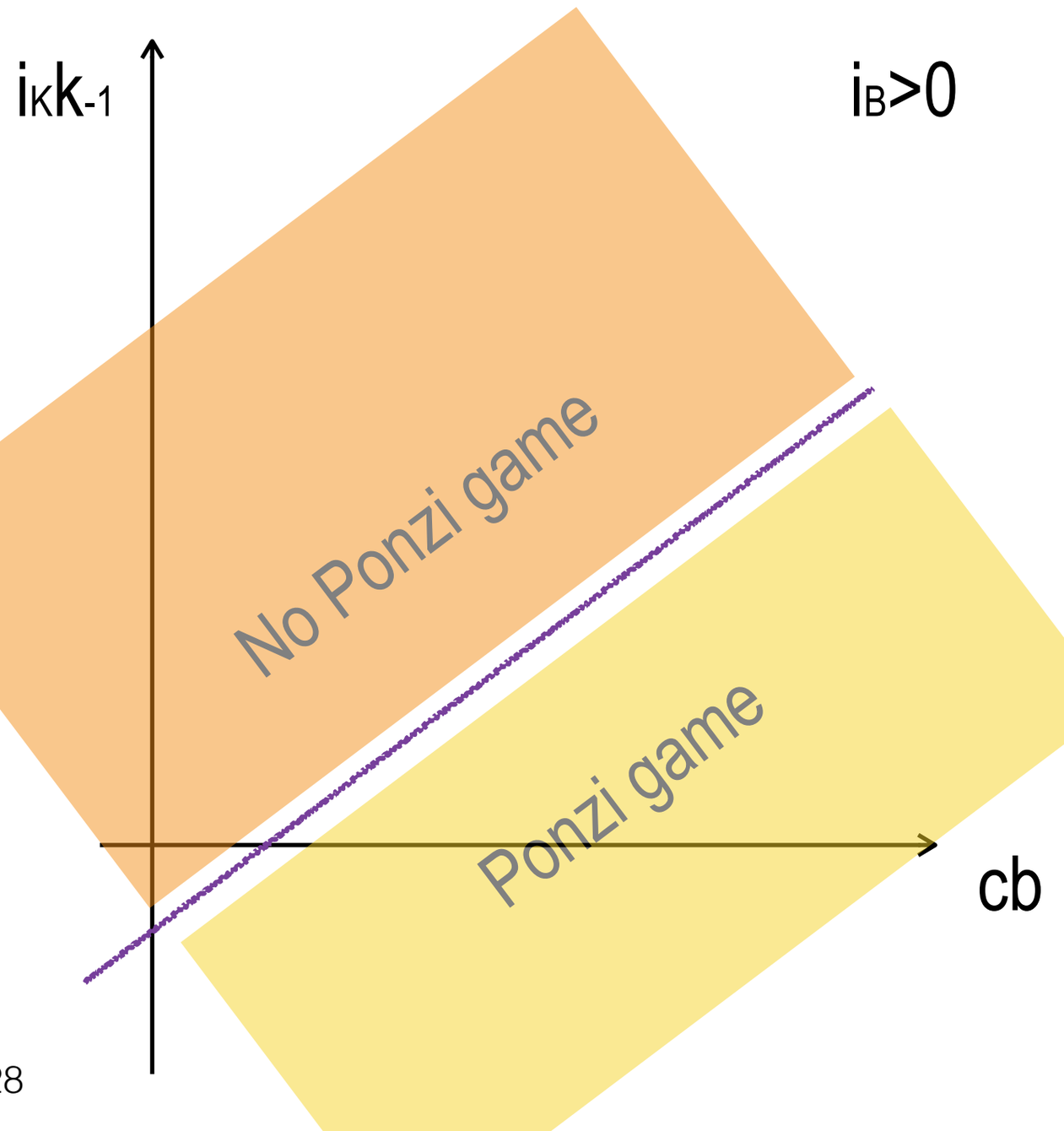
$$i^K k_{t-1} \geq (i^B - \gamma) cb_{t-1} + \left(\frac{i^B - \gamma}{i^B - g}\right)(1+g)[w-t] - \left(\frac{i^B - \gamma}{i^B - g}\right) g \cdot bm_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+g) - (1+i^*)(1+e)] nfa^*_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+g) - (1+i)] nda_{t-1}$$
$$+ \left(\frac{i^B - \gamma}{i^B - g}\right)[(1+g) - (1+i^*_D)(1+e)] nda^*_{t-1}$$

BCRA sustainability

Start with the simple case where $\gamma = 0$, $g = 0$, and $e = 0$ and $t = 0$.

$$i^K k_{t-1} \geq i^B cb_{t-1} + w - (i^* nfa^*_{t-1} + i \cdot nda_{t-1} + i^*_D \cdot nda^*_{t-1})$$

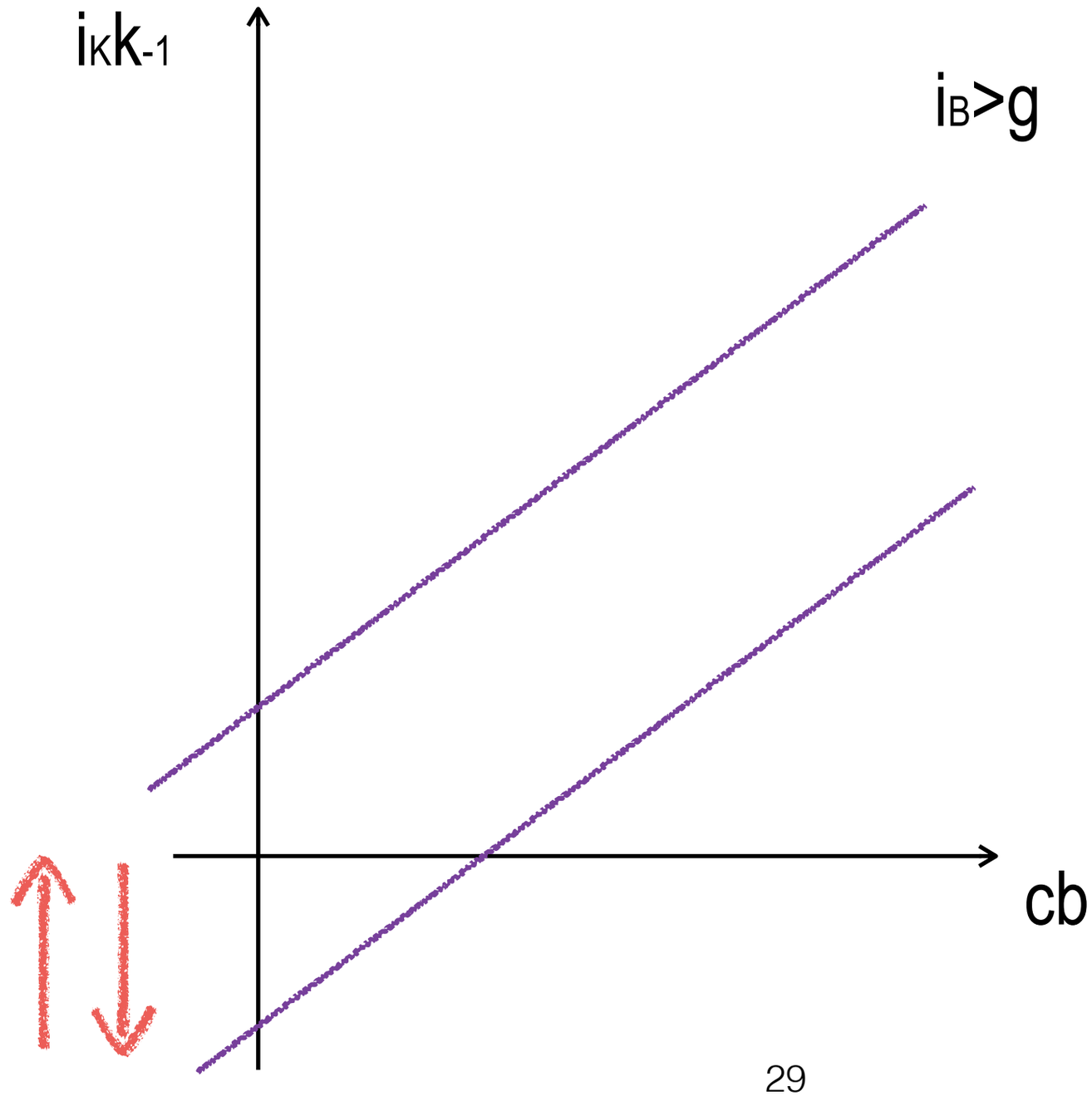




BCRA sustainability

More complicated, where $\gamma = 0$, $g > 0$, and $e > 0$ and $t = 0$.

$$i^K k_{t-1} \geq i^B cb_{t-1} + \left(\frac{i^B}{i^B - g}\right)(1+g)w - \left(\frac{i^B}{i^B - g}\right) g \cdot bm_{t-1}$$
$$+ \left(\frac{i^B}{i^B - g}\right)[(1+g) - (1+i^*)(1+e)]nfa^*_{t-1}$$
$$+ \left(\frac{i^B}{i^B - g}\right)[(1+g) - (1+i)]nda_{t-1}$$
$$+ \left(\frac{i^B}{i^B - g}\right)[(1+g) - (1+i^*_D)(1+e)]nda^*_{t-1}$$



BCRA sustainability: A Simulation

Parameters	
gamma	0%
e	10%
iD	2%
iD*	1%
i*	2%
iB	22%
g	18%
nda	4.7%
nda*	8.0%
nfa	4.5%
cb	7.7%
bm	8.0%
w	0.07%

Simulating Argentina's BCRA recap needs

				ik*k	iBcb	w	g*bm	nda	nda*	nfa		ik	k
gamma = 0%	iB = 22%	e = 10%		2.8%	1.7%	0.4%	-8.0%	4.2%	3.0%	1.4%		5.0%	56.4%
gamma = 9%				1.7%	1.0%	0.3%	-4.7%	2.5%	1.8%	0.9%		5.0%	33.3%
gamma = 18%				0.5%	0.3%	0.1%	-1.4%	0.8%	0.6%	0.3%		5.0%	10.3%
gamma = 0%	iB = 20%	e = 10%		3.6%	1.5%	0.8%	-14.5%	7.6%	5.5%	2.6%		5.0%	71.8%
gamma = 9%				2.0%	0.8%	0.4%	-8.0%	4.2%	3.0%	1.4%		5.0%	39.5%
gamma = 18%				0.4%	0.2%	0.1%	-1.4%	0.8%	0.6%	0.3%		5.0%	7.2%
gamma = 0%	iB = 20%	e = 14%		-1.5%	1.5%	0.8%	-14.5%	7.6%	2.3%	0.8%		5.0%	-30.1%
gamma = 9%				-0.8%	0.8%	0.4%	-8.0%	4.2%	1.3%	0.4%		5.0%	-16.5%
gamma = 18%				-0.2%	0.2%	0.1%	-1.4%	0.8%	0.2%	0.1%		5.0%	-3.0%