Appendix to
"A Framework for Studying the Monetary and Fiscal History of Latin America"
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This note explains the steps used to do the government budget accounting presented in the chapter "A Framework for Studying the Monetary and Fiscal History of Latin America" by Timothy J. Kehoe, Juan Pablo Nicolini, and Thomas J. Sargent in *A Monetary and Fiscal History of Latin America, 1960–2017*.

1 Argentina

The data for the budget accounting for Argentina is contained in the MS Excel file ArgentinaBudgetAccouting.xlsx. The sources for this data are contained in the PDF ArgentinaBudgetAccouting.pdf. First, we construct the real exchange rate (Calculations, column f) series using the CPI from Argentina (Data, column i) and the United States (Data, column h) with the formula:

$$\xi_t = \frac{E_t P_t^*}{P_t}$$

Primary deficit over GDP (Calculations, column d) and money balance over GDP (Calculations, column e) are calculated using nominal GDP (Data, column c), nominal primary deficit (Data, column d) and monetary base (Data, column e) using the formulas:

$$d_t = \frac{D_t}{P_t Y_t} \qquad m_t = \frac{M_t}{P_t Y_t}$$

Gross inflation in Argentina and the United States (Calculations, column g and h) are computed using the CPI indexes (Data, column i and h):

$$\pi_t = \frac{P_t}{P_{t-1}} \qquad \pi_t^* = \frac{P_t^*}{P_{t-1}^*}$$

To compute the debt series (Calculations, column c), we use the following inputs: nominal GDP in thousands of pesos (Data, column c), the nominal exchange rate (Data, column j) and the nominal debt in millions of dollars (Data, column b). Notice that when we normalize by the GDP, we need to multiply the numerator by 1000 to put everything in the same units. The formula follows these steps:

$$\frac{E_t B_t^*}{P_t Y_t} = \frac{E_t B_t^*}{P_t Y_t} \frac{P_t^*}{P_t^*} = \frac{E_t P_t^*}{P_t} \frac{B_t^*}{P_t^* Y_t} = \xi_t \theta_t^*$$

To compute the interest payments series (Calculations, column i) we first compute the following ratio using the interest in thousands of pesos (Data, column f) and the nominal GDP(Data, column c):

$$\frac{E_t B_{t-1}^* (R_{t-1} - 1)}{P_t Y_t}$$

Then we add the nominal debt in the previous period over GDP:

$$\frac{E_t B^*_{t-1}(R_{t-1}-1)}{P_t Y_t} + \frac{E_t B^*_{t-1}}{P_t Y_t} = \frac{E_t B^*_{t-1} R_{t-1}}{P_t Y_t}$$

Notice that after some manipulation we get the following expression:

$$\frac{E_t B^*_{t-1} R^*_{t-1}}{P_t Y_t} = \left(\frac{E_t P^*_t}{P_t}\right)\left(\frac{P^*_{t-1} Y_{t-1}}{P^*_t Y_t}\right)\frac{B^*_{t-1} R^*_{t-1}}{P^*_{t-1} Y_{t-1}} = \xi_t \left(\frac{1}{g_t \pi^*}\right)\theta^*_{t-1} R^*_{t-1}$$

Finally, we use the debt series computed before (Calculations, column c) and the real exchange rate (Calculations, column f) to get:

$$\xi_{t-1}\theta^*_{t-1}\frac{\xi_t}{\xi_{t-1}} = \xi_t \theta^*_{t-1}$$

And by substracting the last two expressions we get:

$$\xi_t \left(\frac{1}{g_t \pi^*}\right)\theta^*_{t-1} R^*_{t-1} - \xi_t \theta^*_{t-1} = \xi_t \theta^*_{t-1}\left(\frac{R^*_{t-1}}{g_t \pi^*_t} - 1\right)$$

The last term we need to compute is seigniorage by doing

$$m_{t-1}\left(1 - \frac{1}{g_t \pi_t}\right)$$

The budget constraint is

$$\underbrace{\xi_t(\theta^*_t - \theta^*_{t-1})}_{change\ in\ total\ debt} + \underbrace{(m_t - m_{t-1})}_{money\ issuance} + \underbrace{m_{t-1}\left(1 - \frac{1}{g_t \pi_t}\right)}_{seigniorage}$$

$$= \underbrace{d_t}_{primary\ deficit} + \underbrace{\xi_t \theta^*_{t-1}\left(\frac{R^*_{t-1}}{g_t \pi^*} - 1\right)}_{total\ debt\ service} + \underbrace{T_t}_{transfers}$$

2 Mexico

The data for the budget accounting for Mexico is contained in the MS Excel file MexicoBudgetAccouting.xlsx. The sources for this data are contained in the PDF MexicoBudgetAccouting.pdf. We construct the real exchange rate series as for Argentina using the nominal exchange rate (Calculations, column j) and the CPI from Mexico (Calculations, column g) and the United States (Data, column k). We also compute the primary deficit (Calculations, column d), the money balances (Calculations, column f) and the seigniorage (Budget Accounting, column e) as in Argentina.

Next we construct local debt (Data, column b) over GDP (Data, column c) by defining:

$$\theta^n = \frac{B_t}{P_t Y_t}$$

To construct external debt over GDP (Calculations, column h) we use the real GDP (Data, column g), the U.S. CPI (Data, column k), the nominal exchange rate (Data, column l) and dollar debt in

pesos (Data, column e). Notice that to express the debt in dollars, we need to divide the debt in pesos by the exchange rate. The final formula gives:

$$\theta^* = \frac{B_t^*}{P_t^* Y_t}$$

The gross rate of change in GDP (Calculations, column k) is computed using the real GDP (Data, column g). Similarly, we get the gross rate of change in Mexican and U.S. prices (Calculations, columns l and m).

For the service of domestic debt (Calculations, column n) we use domestic interest payments (Data, columns h and i), nominal debt (Data, column b) and nominal GDP. We have:

$$\frac{B_{t-1}R_{t-1}}{P_t Y_t} = \frac{B_{t-1}R_{t-1}}{P_t Y_t}\frac{P_{t-1}Y_{t-1}}{P_{t-1}Y_{t-1}} = \left(\frac{R_{t-1}}{g_t \pi_t}\right)\theta_{t-1}$$

Exactly as for Argentina, we also compute the external debt services (Calculations, column o). Recall that to finish the budget accounting we need to subtract θ_{t-1}^n and $\xi_t \theta_{t-1}^*$ from the previous computations.

The budget constraint is

$$\underbrace{(\theta_t^n - \theta_{t-1}^n)}_{change\ in\ domestic\ debt} + \underbrace{\xi_t(\theta_t^* - \theta_{t-1}^*)}_{change\ in\ foreign\ debt} + \underbrace{(m_t - m_{t-1})}_{money\ issuance} + \underbrace{m_{t-1}\left(1 - \frac{1}{g_t \pi_t}\right)}_{seigniorage}$$

$$= \underbrace{d_t}_{primary\ deficit} + \underbrace{\xi_t \theta_{t-1}^* \left(\frac{R_{t-1}^*}{g_t \pi^*} - 1\right)}_{foreign\ debt\ service} + \underbrace{\theta_{t-1}^n \left(\frac{R_{t-1}}{g_t \pi} - 1\right)}_{domestic\ debt\ service} + \underbrace{T_t}_{transfers}$$