What Can We Learn
From the Current Crisis in Argentina?

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The economy of Argentina finds itself submerged in a great depression that, even if though began four years ago, deepened after mid 2001 with average quarterly falls of deseasonalized GDP with respect to the previous quarter of 5 percent for the last two quarters of 2001 and the first of 2002. This violent deepening of the recession occurred just at the moment that economic agents, almost universally, became convinced of the impossibility of sustaining the Convertibility Plan.

Dirección Nacional de Coordinación de Políticas Macroeconómicas, Secretaría de Política Económica (2002)
What Happened in Argentina in 2001-2002?

The Brazilian devaluation did not lead to problems for the Argentinian current account — both exports and the trade surplus in fact grew.

March 16 2001: President De la Rúa rejected the plan presented by the Minister of the Economy, Ricardo López Murphy, to reduce the fiscal deficit.

After López Murphy’s resignation, De la Rúa appointed Domingo Cavallo, the architect of the Convertibility Plan during the first Menem administration, as Minister of the Economy.
Cavallo presented a new economic plan in the lower house of Argentina’s congress. On 28 March 2001, the congress refused to allow Cavallo to cut government salary and pension costs, and the government sold debt to cover the deficit.


In December 2001, the government defaulted on its debt and, in January 2002, it abandoned the Convertibility Plan.
Trade in Goods and Services

percent GDP

year


exports

imports
Argentina External Debt/GDP

percent

year

PROVINCIA DE BUENOS AIRES

LETRA DE TESORERIA PARA CANCELACION DE OBLIGACIONES (PATAÇON)

A 08814498

AL PORTADOR

LEY N° 12.727

UN PESO

DARDO ROCHA

VALOR NOMINAL

A 08814498

LEY N° 12.727

ARTÍCULO 1º: "Declárase en estado de emergencia administrativa, económica y financiera al Estado Provincial..."

ARTÍCULO 2º: "Aproábase la emisión de Letras de Tesorería para Cancelación de Obligaciones, las que se denominarán "Pataçón".

ARTÍCULO 3º: "Los títulos serán emitidos bajo las modalidades de los Artículos 742, 744 y 745 del Código de Comercio."

ARTÍCULO 4º: "Las Letras de Tesorería para Cancelación de Obligaciones pagarán el diez ocho por ciento (18%) de su valor nominal el 25 de julio de 2002. Las Letras de Tesorería serán nominadas en pesos."

ARTÍCULO 5º: "El pago efectuado a acreedor mediante Pataçones o Bonos de Cancelación de Obligaciones, importará la extinción irrevocable de los créditos por los que se efectúa la entrega."
Great Depressions of the Twentieth Century Project

Use growth accounting and applied dynamic equilibrium models to reexamine great depression episodes:

United Kingdom (1920s and 1930s) — Cole and Ohanian
Canada (1930s) — Amaral and MacGee
France (1930s) — Beaudry and Portier
Germany (1930s) — Fisher and Hornstein
Italy (1930s) — Perri and Quadrini
Argentina (1970s and 1980s) — Kydland and Zarazaga
Chile and Mexico (1980s) — Bergoeing, Kehoe, Kehoe, and Soto
Japan (1990s) — Hayashi and Prescott

(Review of Economic Dynamics, January 2002 revised and expanded version forthcoming as Minneapolis Fed volume)
Lessons from Great Depressions Project

• The main determinants of depressions are not drops in the inputs of capital and labor — stressed in traditional theories of depressions — but rather drops in the efficiency with which these inputs are used, measured as total factor productivity (TFP).

• Exogenous shocks like the deteriorations in the terms of trade and the increases in foreign interest rates that buffeted Chile and Mexico in the early 1980s can cause a decline in economic activity of the usual business cycle magnitude.

• Misguided government policy can turn such a decline into a severe and prolonged drop in economic activity below trend — a great depression.
Applied dynamic general equilibrium model

The representative consumer maximizes

$$\sum_{t=1980}^{\infty} \beta^t \left[ \gamma \log C_t + (1-\gamma) \log (\bar{h}N_t - L_t) \right]$$

subject to

$$C_t + K_{t+1} - K_t = w_i L_t + (r_t - \delta) K_t.$$ 

Feasibility:

$$C_t + K_{t+1} - (1-\delta) K_t = A_t K_t^\alpha L_t^{1-\alpha}.$$
Argentina: Real GDP per working age person

![Graph showing the trend of Argentina's Real GDP per working age person over time. The x-axis represents the years from 1900 to 2000, and the y-axis represents the index (1900=100). The graph shows a general upward trend with fluctuations.](image-url)
Real GDP Per Working Age Person and Total Factor Productivity
Calibration

First order conditions:

\[
\frac{1}{C_{t-1}} = \frac{\beta}{C_t} \left[ h + r_t - \delta_k \right]
\]

\[
1 - \gamma = \frac{\gamma w_t}{hN_t - L_t - C_t}.
\]

Estimate \( \beta = 0.96, \gamma = 0.30 \) 1960-1970 data.
Model with Adjustment Costs

\[ C_t + X_t = A_t K_t^\alpha L_t^{1-\alpha} \]

\[ K_{t+1} = (1-\delta)K_t + \phi(X_t/K_t)K_t \]

where

\[ \phi(X/K) = \left[ \delta^{1-\eta}(X/K)^\eta + (\eta-1)\delta \right]/\eta. \]

For 0<\(\eta\leq1\), \(\phi'(X/K)>0\), \(\phi''(X/K)\leq0\), \(\phi(\delta) = \delta\), \(\phi'(\delta) = 1\).

The model without adjustment costs is the special case \(\eta=1\).

In numerical experiments \(\eta=0.8\).

**Should we model rigidity in the labor market (instead)?**
Real GDP per Working-Age Person

Base Case Model

Model with Adjustment Costs
Hours Worked per Working-Age Person

Base Case Model

Model with Adjustment Costs
Capital-Output Ratio

Base Case Model

Model with Adjustment Costs

data

model
Mexico: 1988-2000

One-sector growth model

maximize $\sum_{t=1988}^{\infty} \beta^t [\gamma \log C_t + (1-\gamma) \log (\bar{h}N_t - L_t)]$

subject to $C_t + K_{t+1} - K_t = w_t L_t + (1-\tau_t)(r - \delta)K_t + T_t - X_t$

feasibility constraint

$C_t + K_{t+1} - (1-\delta)K_t + X_t = A_t K_t^\alpha L_t^{1-\alpha}$.

$A_t$ and $X_t$ are treated as exogenous.
Real GDP per Working Age (15-64) person and TFP in Mexico
\[ RER = NER \times \frac{P_{us}}{P_{ar}} \]

units:

\[
\frac{\text{pesos}}{\text{dollar}} \times \frac{\text{dollars/U.S. basket}}{\text{pesos/Argentine basket}} = \frac{\text{Argentine baskets}}{\text{U.S. basket}}
\]

Suppose \( P_{ar} = NER \times P_{us}^T \) (law of one price)

\[
RER^N = \frac{P_{ar}^T}{P_{us}^T} \times \frac{P_{us}}{P_{ar}} = \frac{(P_{us}/P_{us}^T)}{(P_{ar}/P_{ar}^T)}
\]

\( RER^N \) is the part of the real exchange rate explained by the relative price of nontraded goods.
What is left over in $RER$ is the real exchange rate for traded goods:

$$RER^T = NER \times \frac{P^T_{us}}{P^T_{ar}}$$

Notice that

$$RER = RER^T \times RER^N$$

$$\log RER = \log RER^T + \log RER^N$$

$$rer = rer^T + rer^N$$

**TRADED**

Agriculture, Mining and Petroleum, and Manufacturing

**NONTRADED**

Construction and Services
Mexico-U.S. Real Exchange Rate

1988=100

RERN

RER

year

MODEL

Consumers

\[
\max \sum_{t=0}^{\infty} \beta^t \left[ \epsilon \left( \frac{c_{Tt}}{n_t} \right)^\rho + (1 - \epsilon) \left( \frac{c_{Nt}}{n_t} \right)^\rho - 1 \right]/\rho
\]

subject to

\[
p_{Ti}c_{Ti} + p_{Ni}c_{Nt} + a_{t+1} = w_t \vartheta_t + (1 + r_t)a_t + T_t
\]

\[
a_t \geq -A
\]

where

\[
a_t = q_{t-1}k_t + b_t,
\]

\[k_0, b_0 \text{ given}\]

Here \(\vartheta_t\) is working-age population and \(n_t = 0.5\vartheta_t + 0.5\text{pop}_t\) is adult-equivalent population.
**Production functions**

Domestically produced traded good

\[ y_{Dt} = \min \left[ \frac{z_{TD}}{a_{TD}}, \frac{z_{ND}}{a_{ND}}, A_D k_{Dt}^{\alpha_D} l_{Dt}^{1-\alpha_D} \right] \]

Nontraded good

\[ y_{Nt} = \min \left[ \frac{z_{TN}}{a_{TN}}, \frac{z_{NN}}{a_{NN}}, A_N k_{Nt}^{\alpha_N} l_{Nt}^{1-\alpha_N} \right] \]

Investment good

\[ i_t = G z_{Tlt}^\gamma z_{Nlt}^{1-\gamma} \]

**Armington aggregator**

\[ y_{Tt} = M(\mu x_{Dt}^\xi + (1-\mu) m_i^\xi)^{1/\xi} \]
**Market clearing**

Domestically produced traded good

\[ x_{Dt} + x_{Ft} = y_{Dt} \]

Composite traded good

\[ c_{Tt} + z_{TIt} + z_{TDt} + z_{TNt} = y_{Tt} \]

Nontraded good

\[ c_{Nt} + z_{NIt} + z_{NDt} + z_{NNt} = y_{Nt} \]

Investment good

\[ k_{t+1} - (1 - \delta)k_t = i_t \]

Factor markets

\[ k_{Dt} + k_{Nt} = k_t, \quad \ell_{Dt} + \ell_{Nt} = \ell_t \]
**Balance of payments**

\[ m_t + b_{t+1} = p_{Dt}x_{Ft} + (1 + r_t)b_t \]

**Foreign demand**

\[ x_{Ft} = D((1 + \tau_{Ft})p_{Dt})^{-\frac{1}{1-\zeta}} \]

**Transfer of tariff revenue**

\[ T_t = \tau_{Dt}m_t \]
**Profit maximization**

Domestically produced traded good

\[ w_t = (p_{Dt} - a_{T Dt}p_{Tt} - a_{N Dt}p_{Nt})A_D(1 - \alpha_D)(k_{Dt}/\ell_{Dt})^{\alpha_D} \]

\[ 1 + r_t = [(p_{Dt} - a_{T Dt}p_{Tt} - a_{N Dt}p_{Nt})A_D \alpha_D (\ell_{Dt}/k_{Dt})^{1-\alpha_D} \\
+ (1 - \delta)q_t]/q_{t-1} \]

Nontraded good

\[ w_t = (p_{Nt} - a_{T Nt}p_{Tt} - a_{N Nt}p_{Nt})A_N(1 - \alpha_N)(k_{Nt}/\ell_{Nt})^{\alpha_N} \]

\[ 1 + r_t = [(p_{Nt} - a_{T Nt}p_{Tt} - a_{N Nt}p_{Nt})A_N \alpha_N (\ell_{Nt}/k_{Nt})^{1-\alpha_N} \\
+ (1 - \delta)q_t]/q_{t-1} \]
Investment good

\[ p_{Tt} = q_t \gamma G(z_{Nt}/z_{Tt})^{1-\gamma} \]
\[ p_{Nt} = q_t (1 - \gamma) G(z_{Tt}/z_{Nt})^{\gamma} \]

Armington aggregator

\[ p_{Dt} = p_{Tt} \mu M^\varsigma \left( \frac{c_{Tt} + z_{Tt}}{x_{Dt}} \right)^{1-\varsigma} \]
\[ 1 + \tau_{Dt} = p_{Tt} (1 - \mu) M^\varsigma \left( \frac{c_{Tt} + Z_{Tt}}{m_t} \right)^{1-\varsigma} \]

where

\[ p_{Tt} = \frac{1}{M} \left[ \mu^{\frac{1}{1-\varsigma}} p_{Dt}^{\frac{\varsigma}{1-\varsigma}} + (1 - \mu)^{\frac{1}{1-\varsigma}} (1 + \tau_{Dt})^{\frac{\varsigma}{1-\varsigma}} \right]^{\frac{-(1-\varsigma)}{\varsigma}} \]
CAPITAL ADJUSTMENT FRICTIONS

\[ i_{Dt+1} + i_{Nt+1} \leq Gz_T^\gamma z_{Nt}^{1-\gamma} \]

\[ k_{Dt+1} \leq \phi(i_{Dt+1}/k_{Dt})k_{Dt} + (1 - \delta)k_{Dt} \]

\[ k_{Nt+1} \leq \phi(i_{Nt+1}/k_{Nt})k_{Nt} + (1 - \delta)k_{Nt} \]

\[ \phi'(i/k) > 0, \ \phi''(i/k) < 0, \ \phi(\delta) = \delta, \ \phi'(\delta) = 1 \]

\[ (\phi(i/k) = (\delta^{1-\eta}(i/k)^\eta - (1 - \eta)\delta)/\eta, \ 0 < \eta \leq 1) \]

Adjusting the sector specific capital stock rapidly is costly. Capital in the traded goods sector has a different price, \( q_{Dt} \), than capital in the nontraded goods sector, \( q_{Nt} \).

(In simulations \( \eta = 0.9 \).)
LABOR ADJUSTMENT FRICTIONS

\[ \ell_{Dt+1} \leq \lambda \ell_{Dt} \]
\[ \ell_{Nt+1} \leq \lambda \ell_{Nt} \]

There is a limit to how fast sector specific labor can adjust. Labor in the traded goods sector receives a different wage, \( w_{Dt} \), than labor in the nontraded goods sector, \( w_{Nt} \).

(In simulations \( \lambda = 1.03 \).)
SUDDEN STOP!

\[ b_t = b_{t-1} + \bar{b}, \ t = T, \ldots, T+N \]

Domestic interest rate is endogenously determined, although interest payments on foreign debt \(-b_t\) are made at international interest rate.
**REAL GDP**

\[ Y_t = p_{Dt_0}y_{Dt} - p_{Tt_0}z_{TDt} - p_{Nt_0}z_{NDt} \]
\[ + p_{Nt_0}y_{Nt} - p_{Tt_0}z_{TNt} - p_{Nt_0}z_{NNt} + \tau_{Dt}m_t \]

**REAL INVESTMENT**

\[ I_t = p_{Tt_0}z_{TIt} + p_{Nt_0}z_{NIt} \]

**REAL CAPITAL STOCK**

\[ K_{t+1} = (1 - \delta)K_t + I_t \]

**TOTAL FACTOR PRODUCTIVITY**

\[ TFP_t = \frac{Y_t}{K_t^\alpha (\ell_{Dt} + \ell_{Nt})^{1-\alpha}} \]
The graph shows the trade balance as a percentage of GDP from 1988 to 2000. The data line (red) and the model line (blue) are depicted over time. The trade balance in 1988 is negative, with a significant decline throughout the 1990s, reaching its lowest point around 1994. There is a sharp increase in 1996, followed by fluctuations until 2000.
Real GDP per Working Age (15-64) person and TFP in Mexico Model

GDP

TFP

year
