

Discussion of the History of Peru 1

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The chapter on Peru by Martinelli and Vega provides a comprehensive and fascinating overview of Peru's monetary and fiscal transition from high inflation to stabilization and then to several decades of low inflation and economic growth. In this discussion, I present a framework that links the political progress discussed in the chapter with positive economic outcomes. In particular, the simple model provides an explanation for why political reform, debt reduction, enhanced credibility, and growth are inextricably linked. I conclude by placing Peru's experience in context with other emerging markets.

Figure 1 replicates the authors' Figure 1 and depicts Peru's GDP growth over the last half century. Peru's post-1990 growth experience is striking. Figure 2 replicates the authors' Figure 3, which documents the fiscal consolidation that took place in the 1990s and 2000s. Associated with this consolidation is a dramatic decline in debt, particularly external debt, as a fraction of GDP. This is depicted in Figure 3, which is the same as the authors' Figure 8. At the same time as the fiscal and monetary stabilization, Peru began reforming its private sector, including a major privatization program. One result of this combination of policies was a sharp increase in inward foreign direct investment as a percentage of GDP, depicted in Figure 4.

This discussion provides a framework for understanding why this prudent fiscal policy led not only to monetary stability but also to a period of sustained growth and investment. To do so, I build on Aguiar and Amador (2011).

Consider a deterministic, discrete time environment in which a small open economy (SOE) operates a neoclassical production function. Specifically, output is $f(k)$ when k is the stock of capital, all expressed in per capita terms, with $f'(k) > 0$ and $f''(k) < 0$. The SOE's government has enough policy tools to choose per capita consumption c and the level of capital k each period. To simplify the exposition, suppose the capital is rented from a world market each period at a rate $r + \delta$, where r is the world risk-free interest rate and δ is the rate of capital depreciation. See the Martinelli and Vega chapter for a more general framework in which capital is accumulated via investment. The important element is that capital is mobile between periods but is vulnerable to expropriation within a period.

The government finances consumption and capital expenditures through current output and net borrowing and lending with foreign debt markets. In particular, external debt b_t evolves according to the law of motion:

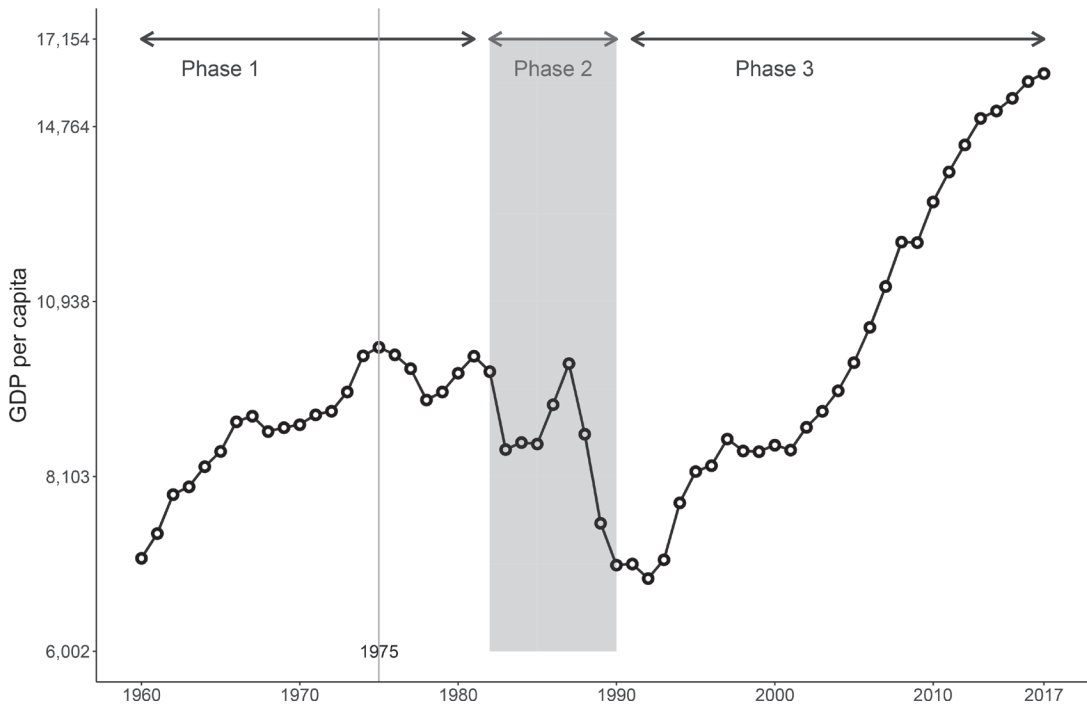


Figure 1. GDP per capita

Note: The figure replicates Figure 1 in the chapter by Martinelli and Vega; GDP is in 2007 soles.

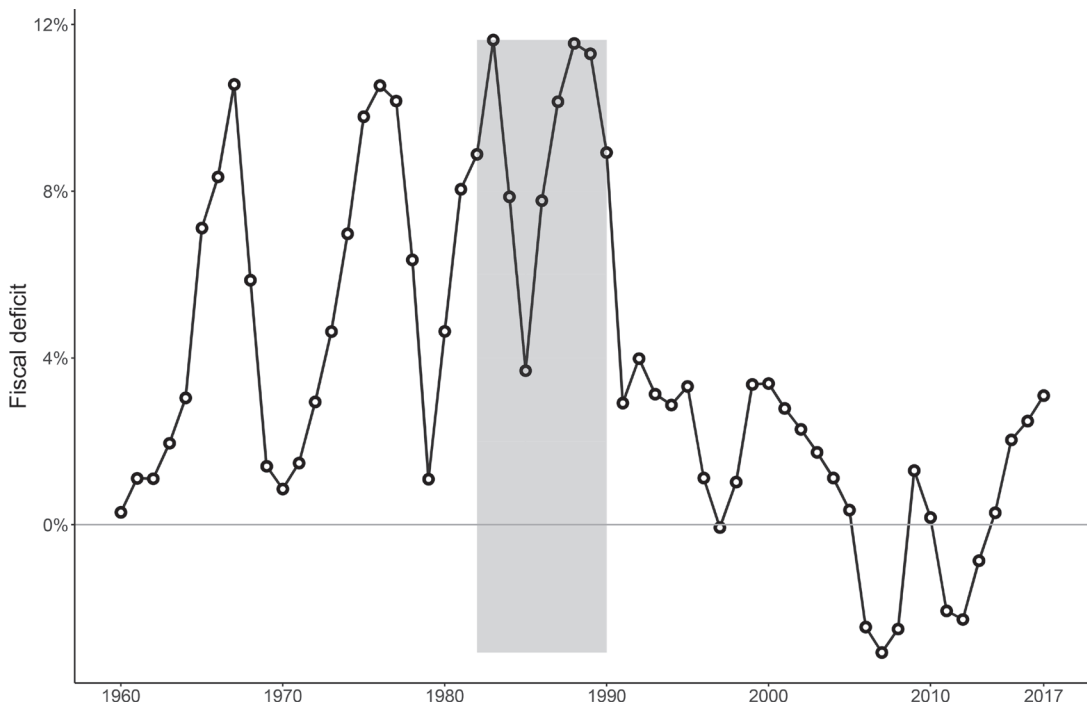


Figure 2. Fiscal deficit

Note: The figure replicates Figure 3 in the chapter by Martinelli and Vega; see that chapter for details.

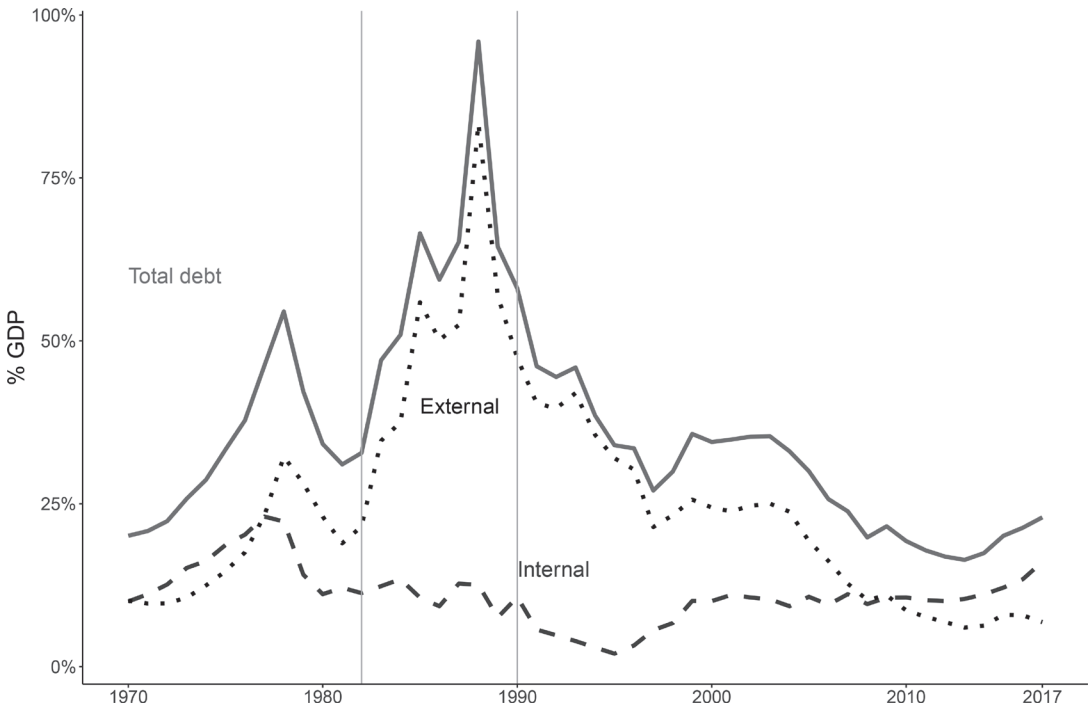


Figure 3. Domestic and external debt

Note: The figure replicates Figure 8 in the chapter by Martinelli and Vega; see that chapter for details.

$$b_{t+1} = R(c_t + (r + \delta)k_t + b_t - f(k_t)),$$

where $R = 1 + r$. Summing this equation forward from initial debt b_0 and imposing a no-Ponzi condition, we obtain a present value “resource constraint”:

$$b_0 = \sum_{t=0}^{\infty} R^{-t} (f(k_t) - (r + \delta)k_t - c_t). \tag{RC}$$

Any allocation $\{c_t, k_t\}$ that satisfies (RC) is feasible for the government to implement.

The representative domestic agent has preferences over consumption sequences, given by

$$\sum_{t=0}^{\infty} \beta^t u(c_t), \tag{1}$$

where $\beta \in (0,1)$ is the discount factor and $u(c)$ is a strictly increasing function. For simplicity, we shall assume $\beta R = 1$, although this rules out some interesting debt dynamics that are discussed in Aguiar and Amador (2011).

The environment has two main frictions. The first is a political economy friction. In particular, suppose political parties randomly rotate in and out of power. Following the tradition of Alesina and Tabellini (1990) and Persson and Svensson (1989), a party prefers spending to occur while in power. In particular, suppose that the political incumbent

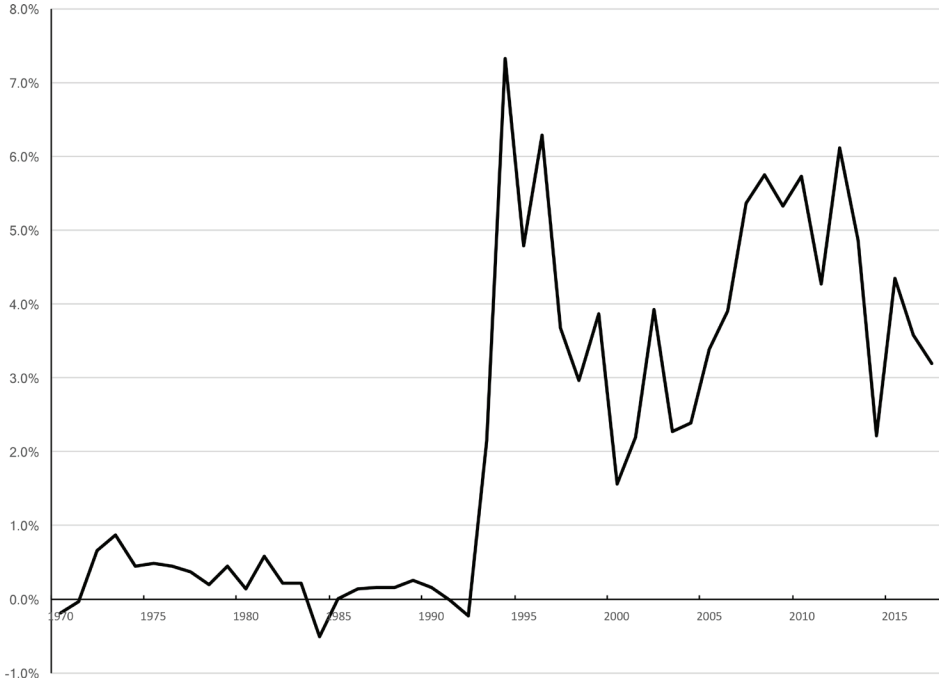


Figure 4. Foreign direct investment

Source: World Development Indicators

Note: The figure depicts net foreign direct investment as a percentage of GDP.

enjoys utility $\tilde{\theta}u(c)$ while in power, where $u(c)$ denotes the utility of the domestic representative agent. The incumbency bias is represented by $\tilde{\theta} > 1$. Assume there are N political parties, and with probability $\gamma \equiv 1/N$, party $n \in \{1, 2, \dots, N\}$ is in power. Transitions are independent and identically distributed, and hence there is a constant hazard γ that party n will be in power next period regardless of current incumbency. Aguiar and Amador (2011) implement a more general formulation in which incumbency affects the probability of being in power next period.

Given a sequence of consumptions $\{c_t\}$, the incumbent at period t has value

$$\tilde{W}_t = \tilde{\theta}u(c_t) + \sum_{j=1}^{\infty} \beta^j [\tilde{\theta}\gamma + 1 - \gamma] u(c_{t+j}),$$

where the term in square brackets in the continuation value captures the uncertainty regarding future incumbency. As this value is a constant, we can express the current incumbent's value in normalized form:

$$W_t \equiv \frac{\tilde{W}_t}{\tilde{\theta}\gamma + 1 - \gamma} = \theta u(c_t) + \sum_{j=1}^{\infty} \beta^j u(c_{t+j}), \tag{W}$$

where $\theta \equiv \tilde{\theta} / (\tilde{\theta}\gamma + 1 - \gamma)$ is a parameter that summarizes the preference for incumbency combined with the probability of losing office. Note that aside from the risk of political transitions, the current incumbent shares the same discount factor as private agents, β . This construction results in political preferences that have a hyperbolic (or quasi-geometric) discount factor in the spirit of Laibson (1994). An increase in $\tilde{\theta}$ or an increase in turnover ($\gamma \downarrow$) both increase θ , making the government more present biased.

In addition to the political economy friction, the other inefficiency in the environment is due to limited commitment. In particular, the government cannot commit to repaying debt and respecting capital property rights. The incumbent at time t always has the option of deviating from an allocation to increase current consumption. The consequence is a lower continuation value, as foreigners are no longer willing to trade financial assets or physical capital once the government has deviated. Aguiar and Amador (2011) specify microfoundations for the punishment. For this discussion, it suffices to posit a deviation value $\underline{W}(k)$, with $\underline{W}'(k) > 0$.

The environment builds on the neoclassical growth model, and hence capital is a focal variable that is subject to expropriation. That is, private investors are concerned about capital taxation or expropriation. It is not conceptually difficult to extend this environment to inflation and money balances. The mechanism described below that links debt reduction with enhanced credibility can therefore easily encompass Peru's inflation stabilization as well.

We now characterize constrained efficient allocations in this environment. Specifically, consider allocations that maximize the representative domestic agent's initial welfare subject to the resource constraint and a sequence of constraints that ensure each incumbent does not deviate:

$$\begin{aligned}
 v(b_0) &= \max_{c_t, k_t} \sum_{t=0}^{\infty} \beta^j u(c_t) \\
 &\text{subject to:} \\
 b_0 &\leq \sum_{t=0}^{\infty} R^{-t} (f(k_t) - (r + d)k_t - c_t) \\
 \underline{W}(k_t) &\leq W_t \forall t.
 \end{aligned} \tag{P}$$

Let $\mu_0 > 0$ be the multiplier on the resource constraint and $\lambda_t R^{-t} \mu_0$ be the multiplier on the sequence of political participation constraints. The first-order condition for k_t is

$$\lambda_t = \frac{f'(k_t) - (r + \delta)}{W'(k_t)}. \tag{2}$$

The numerator on the right-hand side is the wedge between the marginal product of capital and the rental rate. The denominator is a strictly positive number. Hence, capital is distorted down if $\lambda_t > 0$. That is, if the political participation constraint strictly binds,

capital is depressed. This implies that lack of commitment to debt repayments and property rights puts downward pressure on the level of economic activity.

The first-order condition for c_t is

$$1 = u'(c_t) \left(\frac{1}{\mu_0} + \sum_{s=0}^{\infty} \lambda_{t-s} + (\theta - 1)\lambda_t \right). \quad (3)$$

The first term in the brackets on the right is the role the resource constraint plays in determining the level of consumption: more initial debt implies a greater μ_0 and a lower c_t , all else constant. The second term sums the multipliers λ_s over $s \leq t$. This sum is weakly positive and hence raises c_t , all else constant. This reflects that c_t enters the value for all previous political incumbents, and hence raising c_t relaxes the political participation constraint for all prior governments. This is the usual “back-loading” incentive in models of limited commitment. The final term reflects that consumption in period t is of particular value to the incumbent in that period due to the political friction $\theta > 1$.

An interesting implication of (3) is that $\lambda_t \rightarrow 0$ as $t \rightarrow \infty$. If this were not the case, then $\sum \lambda_t$ would diverge, violating the first-order condition. Hence, the economy eventually saves its way out of the constraints. From (2), this implies that $f'(k_t) \rightarrow r + \delta$, and capital achieves its first-best level.

The fact that the steady state is the efficient level of production stems from the strong incentives to delay consumption in models of limited commitment when $\beta R = 1$. However, the speed at which k_t converges to the efficient level depends on θ_t . To see this, suppose u is linear: $u'(c_t) = 1$. The first-order condition (3) then traces out the following first-order difference equation:

$$\lambda_{t+1} = \left(1 - \frac{1}{\theta} \right) \lambda_t. \quad (4)$$

The greater the political economy wedge θ , the slower the rate of convergence to the first-best level of output. Hence, more distorted political economy environments have slower growth.

To bring the model back to the discussion of fiscal and monetary stabilization, under some concavity assumptions on \underline{W} , equation (2) implies that as $\lambda_t \rightarrow 0$, capital is increasing to its first-best level. This implies that the political deviation value $\underline{W}(k_t)$ is increasing over time. One can show that to ensure participation, this requires that consumption is growing and debt is declining. That is, as debt declines over time, both capital and consumption increase.

Credibility in this environment is earned by the reduction of debt, and the payoff is greater growth. This mimics the experience of Peru depicted in the figures above.¹ A theme throughout this volume is the role that credibility of fiscal prudence plays in inflation stabilization. The same credibility plays a role in encouraging greater private-sector economic activity.

Peru’s growth experience via debt reduction is not unique. Gourinchas and Jeanne (2013) document that high-growth emerging markets tend to run current account

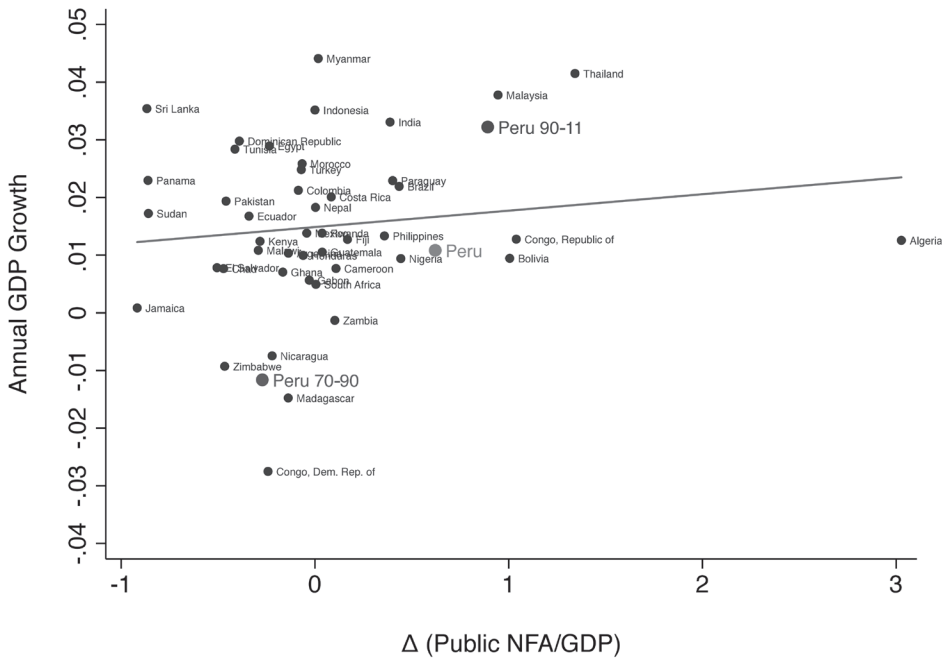


Figure 5. Growth and net foreign assets (NFA)

Source: Data from the World Development Indicators

Note: Public NFA is defined as government foreign reserves minus external public and publicly guaranteed debt. The vertical axis is log change in real GDP between 2011 and 1970 divided by 41. The horizontal axis is the change over this period in U.S. dollar–denominated NFA divided by mean dollar-denominated GDP.

surpluses; that is, growth is associated with net capital *outflows*. Aguiar and Amador (2011) dig deeper and document that this pattern is driven by the public sector reducing external indebtedness (or increasing foreign reserves, or both), combined with private-sector capital inflows. Figure 5 depicts the pattern for forty-five developing economies. On the horizontal axis is the change in public-sector net foreign assets (NFA) between 1970 and 2011 normalized by average U.S. dollar-denominated GDP, where public NFA is defined as foreign reserves minus public external debt expressed in dollars. On the vertical axis is annual average growth in real GDP over the same period. The positive slope indicates that countries that grow relatively fast also have increases in net foreign assets. That is, countries grow by reducing their net indebtedness.

The three large dots in Figure 5 depict Peru’s experience. The dot labeled “Peru” is the data point for Peru over the entire sample. The two dots labeled “Peru 70–90” and “Peru 90–11” represent the subperiods 1970–90 and 1990–2011, respectively. The robust growth that Peru has experienced since 1990 coincides with a significant reduction in external debt. Viewed through the lens of the model above, the political stabilization post-1990 led to a coincident decline in debt overhang and faster growth. The chapter

by Martinelli and Vega documents that the same forces led to inflation stabilization. While the political frictions in the model are taken as primitive, the exercise highlights that Peru's improved political economy environment is consistent with the host of good economic outcomes discussed briefly above and in great detail in the fascinating analysis by Martinelli and Vega.

Note

- 1 The chapter by Martinelli and Vega emphasizes growth through productivity. The simple framework of this discussion exhibits growth through capital intensity. However, the mechanism applies to any output-enhancing activity that is vulnerable to government expropriation or taxation. Many productivity-enhancing investments fit this class of activities.

References

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