Reforms could bring Brazil’s potential GDP to 3.5%

• We have estimated Brazil’s potential GDP based on the evolution of the economy since 1961.

• A fiscal adjustment that increases domestic savings and stabilizes public debt, combined with the implementation of microeconomic reforms, could bring potential GDP to 3.5%.

• Without these adjustments, potential GDP would be closer to 1.5%.

• The episodes of macroeconomic degradation observed in the past 55 years, culminating in a significant increase in inflation levels or the non-payment of government obligations, reduced per-capita income by at least 25%.

The strong recession since the end of 2014 has left ample idleness in the use of capital stock and labor. This idleness makes room for more robust growth for a certain period, without generating inflationary pressure. However, sustainable growth following a cyclical recovery depends on potential GDP growth, which is the focus of this study.

We modeled growth as a function of the rate of accumulation of physical capital, of the working population and of productivity. We show that the last is affected by episodes of macroeconomic degradation, by the investment/GDP ratio and by external components (global per-capita GDP growth and international commodity prices).

The results show that the country’s growth has been limited by three main factors:

1) Low domestic savings. Low domestic savings limit investments, which decreases the pace of capital accumulation and productivity gains through the adoption of new technologies.

2) Macroeconomic disruptions. We estimate that the episodes of non-payment of government obligations (default) or significant increases in inflation since 1961 have reduced the country’s income level by at least 25%.

3) Microeconomic inefficiency. Productivity gains in the period have been below the levels observed in equivalent countries, due to the regulatory, tax and labor-relations drags that characterize the “Brazil Cost.”

The world economy’s performance is also important to explain oscillations in potential GDP. And finally, the demographic changes, with declining growth of the working-age population in Brazil, help to explain the dynamics in the period.

That said, what is the potential growth of the Brazilian economy? It depends on the progress of reforms.

We estimate potential GDP growth at 3.5%, conditioned to the implementation of a fiscal adjustment focused on spending cuts and microeconomic reforms. The fiscal adjustment would have the dual role of increasing domestic savings (increasing the country’s ability to invest) and ensuring the sustainability of public debt (avoiding future macroeconomic disruptions). Among the microeconomic reforms, there is the recently approved...
labor reform, and there is ample room for advances in trade liberalization, in the tax and regulatory structure, and finally in education. The Long-Term Rate, currently being voted on in Congress, represents an opportunity on both the macro and microeconomic fronts.

On the other hand, in the absence of advances in macroeconomic and microeconomic reforms, potential growth would fall to approximately 1.5%. Growth at such low levels would hamper the stabilization of public debt, increasing the likelihood of macroeconomic disruptions and degradation, which in turn could push growth to even lower levels.

Finally, it should be noted that even a 3.5% growth rate would lead to a slow convergence to current levels of per-capita income in the advanced economies. Considering an annual population growth of 0.7% and excluding FX effects, we estimate that Brazil would take 66 years to reach the current level of US per-capita income with this growth rate. Convergence to the current income level of countries classified as advanced but only marginally above the development threshold would also be slow: Czech Republic (26 years), Portugal (29), South Korea (40). Convergence to Chile’s current income level would require 16 years at this pace.

**Capital, work and productivity**

To estimate potential GDP, we used the Solow growth model, which defines output based on capital stock, working population and productivity of factors in use – see annexes for a description of the equation and data used. According to this model, structural growth of GDP is a consequence of the increase in the capital stock, labor force and productivity\(^1\).

Economic cycles, in turn, are characterized by temporary fluctuations in the use of capital and the unemployment rate, as well as some residual cyclical component of productivity.

<table>
<thead>
<tr>
<th>Period</th>
<th>Average growth</th>
<th>Estimated potential</th>
<th>Capital contribution</th>
<th>Labor contribution</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961 - 1964: Inflation and rupture</td>
<td>3.4%</td>
<td>4.4%</td>
<td>2.5%</td>
<td>2.1%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>1965 - 1966</td>
<td>4.4%</td>
<td>4.2%</td>
<td>2.6%</td>
<td>2.1%</td>
<td>-0.5%</td>
</tr>
<tr>
<td>1967 - 1974: Economic “Miracle”</td>
<td>9.4%</td>
<td>9.4%</td>
<td>3.6%</td>
<td>2.0%</td>
<td>3.8%</td>
</tr>
<tr>
<td>1975 - 1980: Oil crisis</td>
<td>6.6%</td>
<td>6.5%</td>
<td>3.6%</td>
<td>1.8%</td>
<td>1.1%</td>
</tr>
<tr>
<td>1981 - 1990: ”Lost decade“</td>
<td>1.6%</td>
<td>1.7%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>-1.2%</td>
</tr>
<tr>
<td>1991 - 1994: Trade Liberalization, privatization and inflation</td>
<td>2.7%</td>
<td>2.4%</td>
<td>0.6%</td>
<td>1.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>1995 - 2002: Stabilization and reforms</td>
<td>2.6%</td>
<td>2.6%</td>
<td>0.9%</td>
<td>1.2%</td>
<td>0.4%</td>
</tr>
<tr>
<td>2003 - 2010: Macroeconomic tripod consolidation and commodities boom</td>
<td>4.0%</td>
<td>3.4%</td>
<td>1.1%</td>
<td>1.1%</td>
<td>1.2%</td>
</tr>
<tr>
<td>2011-2016: Commodities bust and New Economic Matrix</td>
<td>0.3%</td>
<td>1.6%</td>
<td>1.3%</td>
<td>0.7%</td>
<td>-0.5%</td>
</tr>
<tr>
<td><strong>Total (1961 - 2016)</strong></td>
<td><strong>3.9%</strong></td>
<td><strong>4.0%</strong></td>
<td><strong>1.9%</strong></td>
<td><strong>1.5%</strong></td>
<td><strong>0.6%</strong></td>
</tr>
</tbody>
</table>

\(^1\) Several studies on the subject incorporate some measure of human capital in the working population component. As we have not included a human capital measure, its impact on the output is transferred to the productivity of factors in use.
Table 1 shows the breakdown of average growth in several periods of recent Brazilian history\(^2\). We highlight:

- The slowdown of population growth is leading to a declining contribution from the increase in the working population to GDP growth, which has receded from 2.1 pp in the 1960s to 0.8 pp in recent years.

- The economic “Miracle” between 1967 and 1974 was influenced by a strong accumulation of capital stock (low initial stock, high investment/GDP ratio), productivity gains and the already mentioned favorable demographics.

- The so-called “Lost Decade” (between 1981 and 1990) was marked by low growth, mainly due to declining investment and negative productivity.

- The following cycle, from 1991 to 2002, was marked by higher average growth, influenced by productivity gains.

- Growth accelerated in the commodity boom cycle (between 2003 and 2010), with additional productivity gains.

- The low average growth between 2011 and 2016 is associated with a decrease in productivity and a strong cyclical component.

**Explaining investment**

According to the national accounts, investment is equal, in equilibrium, to the sum of domestic and foreign savings. Domestic savings equal the country’s income minus its consumption (private and the government’s). Foreign savings equal the negative of the current-account balance (i.e., a current-account deficit constitutes positive foreign savings).

Given that the current-account deficit cannot be very high for too long, investment over time is mainly determined by the country’s domestic savings.

The evolution of investment as a proportion of GDP (chart below) peaked in the mid-1970s, retreating sharply during the oil crisis. The decline continued at a gradual pace during the “Lost Decade” and in the 1990s, lasting until 2003. From then on, with the consolidation of the macroeconomic tripod and the commodity boom of the 2000s, there was some increase until 2013, when the exhaustion of the New Economic Matrix led to another decline. In 2016, it reached the lowest level of the sample (since 1961).

Domestic savings, which together with foreign savings finance investments, registered high levels in the 1970s, gradually slowing down thereafter, with episodes of more pronounced weakness in the early 1980s and late 1990s. This downward trend explains the low level of investment observed in the Brazilian economy for some years.

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\(^2\) Annex 3 shows the charts of the historic rate of expansion of capital stock and the economically active population.
Explaining Productivity

To explain productivity (chart above), we use a model based on three sets of variables:

- The first set is composed of variables that incorporate the global environment: global per-capita GDP growth and real international commodity prices.

- The second set comprises indicators of macroeconomic disruption or degradation. Years in which the country failed to comply with its debt obligations or with significant increases in inflation levels, both consequences of the absence of stabilization of public accounts.

- The third set includes the lagged level of investment as a proportion of GDP and the variation in the use of installed capital capacity. Recent investment influences productivity by allowing a greater alignment of capital stock with technology and current relative prices. The variation in the use of installed capital capacity allows the incorporation of the typically pro-cyclical nature of productivity.

Table 2 illustrates two specifications used. The difference between them is that the second specification includes the variation in the use of installed capacity (measured by NUCI, see annex), the inclusion of which affected the coefficient estimated for commodities. The following results use the average of the two models, given the uncertainty about which would be the “best” specification.

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3 Additional variables were considered but not entered into the final models. An impeachment marker did not show a statistically significant impact. Trade liberalization (sum of exports and imports divided by GDP) also showed no impact. Given the importance of trade liberalization for the productivity of the chain of manufactured goods, the impact of integration with global production chains is likely contaminated by commodity prices and FX shocks (which affect foreign trade as a proportion of GDP). The urbanization rate (its level or variation) also failed to show additional explanatory power.

4 The level of capacity utilization between 1960 and 1976 was obtained through a model based on the remaining explanatory variables. Thus, the t-statistics referring to the productivity model with capacity utilization are distorted.

5 The drop in the coefficient associated with international commodity prices is a consequence of its positive correlation with the use of installed capacity.
Macroeconomic disruptions have a permanent effect on the level of per-capita income. The episodes of government default on foreign debt reduce productivity by 1%-2% in the year that the event takes place, and the following year. If the episode includes components of domestic debt (the example in history since 1961 is “Plano Collor” in 1990), there is an additional shock of 2%-3% in the year that the event occurs. Finally, significant increases in inflation levels reduce productivity by 2%. Summing up the effect of all shocks since 1961, we estimate a cumulative drop of 25% in the country’s income. Note that this corresponds to the direct effect. If we consider that the abovementioned effects mutually reinforce each other, the impact on per-capita income tends to have been substantially greater.

Looking at the variables related to the external environment, a 1-pp increase in global per capita growth is associated with an increase in productivity of 0.5 pp, the same impact associated with a 10% increase in international commodity prices, in real terms.

Finally, a 1-pp increase in the investment/GDP ratio is consistent with a recurring increase of 0.12 pp in productivity.

Table 3 shows the breakdown of average productivity among the three sets, in several periods. The unexplained part of productivity is listed in the “others” column. We assess that these fluctuations largely reflect microeconomic advances or setbacks, including workforce qualification.

The strong productivity growth during the “Miracle” years (1967-1974) is explained by a favorable global environment and a high investment/GDP ratio. In addition, there were gains that are not explained by the model (which uses macroeconomic factors). These gains are probably associated with microeconomic developments, such as the Financial System reform.

The sharp decline in productivity during the “Lost Decade” (1981-1990) was mainly due to macroeconomic disruptions (hyperinflation and debt defaults) and a decline in investment, which took place simultaneously with (and partly because of) a less favorable global environment.

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6 We unsuccessfully attempted to incorporate lagged variables of the indicators of macroeconomic disruptions, in order to incorporate some payback of the negative shock distributed in the following years. However, the data failed to show econometric evidence that the shock is compensated in the following years. Which means that there is evidence that the effects of macroeconomic disruptions on productivity, and consequently on the level of income, are permanent.
Productivity showed a slight advance in the following cycles (1991-2002), with macroeconomic stabilization (in particular, inflation control with “Plano Real”) and with microeconomic reforms (trade liberalization, privatizations and regulatory agencies, among others).

Between 2003 and 2010, productivity advanced further, driven by the return of a favorable global environment (China’s strong growth and the consequent rise in commodity prices), the consolidation of the macroeconomic tripod and the continuity of microeconomic reforms (particularly, the progress in the credit framework).

However, productivity fell again between 2011 and 2016. This decline is partly explained by a less favorable global environment (decline in commodity prices), but domestic macroeconomic and microeconomic factors are a significant part of the explanation. In particular, we highlight the decline in investment and the acceleration of inflation over the period. We interpret the decline in components not explained by the macro variables as a consequence of greater government intervention, revision of regulatory frameworks, and the interruption of improvements in microeconomic bottlenecks.

### Scenarios for potential GDP

Based on the specification described for the breakdown of growth, we can estimate the potential GDP from hypotheses on explanatory variables. Some variables are “exogenous,” in the sense that they are not affected by economic policy decisions, such as demographics and the global economy. We assume an annual growth of 0.8% of the labor force (consistent with demography), 1.75% growth of global GDP per capita (average of our forecasts for the next four years) and stable international commodity prices, in real terms.

The remaining two components (investment/GDP ratio and movements that are not explained by the model variables, listed in the “others” column of table 3), are linked to macro and microeconomic policies, respectively.

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7 Given that potential growth is under consideration, it is implied that unemployment and the use of installed capacity are stable at the equilibrium level. Therefore, the variation of installed capacity is not considered in the estimate of potential GDP.
Let us remember that investment affects potential GDP through two channels: the growth rate of capital stock and the productivity of factors in use. Additionally, investment is limited by the availability of savings, particularly domestic savings.

A fiscal adjustment focused on spending would reduce government spending as a proportion of GDP, increasing public savings.

We calculate potential GDP under two domestic savings scenarios. The first one considers domestic savings at 15% of GDP, similar to the levels observed in 2015 (14.8%) and 2016 (15.1%). This scenario is compatible with the absence of a significant fiscal adjustment. The second scenario considers an increase of 5 pp to 20% of GDP, consistent with a strong fiscal adjustment stemming from spending cuts.

With several microeconomic drags that characterize the “Brazil Cost” and limit the country’s growth, it is important to consider the possibility of progress in microeconomic reforms. The fact that the effects are dispersed over a broad and indeterminate period makes it difficult to study past cases.

However, it is possible to estimate the increase in productivity associated with microeconomic reforms. The standard deviation of the five-year moving average of the productivity residue in the model (0.5 percentage points – see column “others” in table 3) may be considered an approximate measure of the impact of consistent progress on the microeconomic front. There is room for (1) improvements in the regulatory and tax frameworks, (2) trade liberalization, and (3) education. The recently approved labor reform also fits into this context (see specific analysis in Labor Reform: Potential Impacts), as well as advances in the governance of state-owned companies.

The results for the two scenarios of domestic savings/GDP, associated with the presence or absence of progress of microeconomic reforms, are shown in table 4. The scenario that combines macroeconomic adjustment with micro reforms achieves a potential GDP growth rate of 3.5%.

However, the same models that indicate a 3.5% sustainable growth rate with fiscal adjustment and microeconomic reforms can also indicate a significantly less favorable scenario. Without the fiscal adjustment and the reforms, the investment/GDP ratio could remain close to the current level, leading to potential growth of about 1.5%. Growth at such a low level would hamper the stabilization of public debt, increasing the likelihood of macroeconomic disruptions and the resulting permanent shocks on productivity. Therefore, it would imply that Brazil would continue to be a relatively poor country.

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Alexandre Gomes da Cunha

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8 Past experiences aiming to increase investment without increasing public savings have shown unfavorable results. Forced adjustments in private domestic savings have created distortions in the economy, while investment cycles overly dependent on external financing have led to external vulnerabilities.
**Annex 1: Solow growth model**

Solow’s growth model explains GDP as a function of the capital stock and the working population, assuming constant returns to scale. Basic equations:

\[ Y_t = A_t \cdot K_t^\alpha \cdot L_t^{1-\alpha} \]

\[ \log(Y_t) = \log(A_t) + \alpha\log(K_t) + (1 - \alpha)\log(L_t) \]

Where A is the productivity of factors in use; K is the capital stock adjusted for use; L is the working population; \( \alpha \) is the elasticity of output relative to capital.

According to Gomes, Pessôa and Veloso (2003), we consider that the elasticity of output relative to capital is equal to 0.4.

**Annex 2: Data used**


**Global GDP per capita:** global GDP growth, adjusted for global population growth – both released by the World Bank.

**Commodities:** international commodity prices index, deflated by the US CPI, with emphasis on the relevant commodities for the Brazilian export basket.


**Markers of relevant increase in inflation levels:** active in years when the number of digits of the implicit GDP deflator rose, and 2016.
Annex 3: Evolution of physical capital stock and the labor force

The charts below show the rate of expansion of the capital stock and the labor force (see assumptions of the working age population and participation rate in Annex 2).

The capital stock showed a strong expansion in the 1970s, with a low initial capital-output ratio and a high level of investments, slowing down from then on until 2003. The favorable external environment and the consolidation of the macroeconomic tripod led to a new acceleration until 2014. The expansion of capital stock decelerated again with the recession in 2015 and 2016.

The labor force shows a gradual slowing trend throughout the sample, in line with demographics. Since 1999, there have been fluctuations in the participation rate (which did not occur in previous years, see Annex 2).

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