# Macro Vision

June 9, 2026

## Industrial stagnation in Brazil and what to do about it

- The Brazilian industry has been stagnant for more than a decade and has recorded significantly weaker performance than other sectors and than industry in other countries. This weakness does not stem from a lack of demand, but rather from structural supply-side constraints, notably stagnant productivity and rising unit labor costs, with a consequent compression of industrial profit margins.
- A low level of productivity, inconsistent with wage dynamics (affected by indexation mechanisms and labor shortages), raises the relative prices of non-tradable goods, which leads to a structural appreciation of the real exchange rate, thereby reducing the external competitiveness of tradable goods.
- As a result, the expected return on investment in industrial sectors declines, ultimately reducing investment itself and leading to a smaller capital stock in industry. The lower intensity of this factor of production further reduces labor productivity, which feeds back into higher unit labor costs, restarting and reinforcing a vicious cycle of deindustrialization.
- Several economic policies – related to high public spending, labor market frictions, and regulatory constraints – also fuel and aggravate this vicious cycle of stagnation and, if reversed or redesigned, could set in motion a virtuous cycle of industrial development in Brazil.
- Greater emphasis on education and infrastructure, while recognizing the important role of the private sector in these areas, would promote an increase in labor productivity. Public policies that reduce pressures and distortions in the Brazilian labor market would, in turn, allow for better alignment between productivity and wages.
- A reduction in the size of government (public spending as a share of GDP) would decrease demand for non-tradable goods, generating less pressure for real exchange rate appreciation and lowering equilibrium interest rates, thus avoiding the crowding out of investment.
- Finally, promoting greater trade openness would play a central role in increasing productivity and competitiveness in the industrial sector, by facilitating access to more efficient inputs and promoting the diffusion of technology and best production practices.

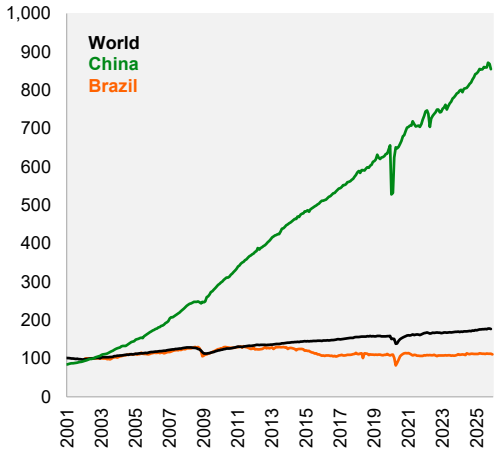
### 1. The relative performance of Brazilian industry in recent years

**Brazilian industrial production has been stagnant for years.** After reaching a peak in mid-2008, domestic industry declined sharply, in line with the global financial crisis at the time. The recovery to pre-crisis levels only occurred in early 2010, when industry returned to its 2008 peak, but it remained around that level until early 2014. A new downturn in industry began at that point, coinciding with the Brazilian recession from 2014 to 2016 – the longest and deepest in recent history, lasting 33 months (from March 2014 to December 2016), according to FGV's CODACE. From 2017 onwards, Brazilian industrial output can be said to have broadly stagnated, except for the sharp but temporary drop in early 2020, at the onset of the Covid-19 pandemic, followed by a strong rebound (left chart).

**Even considering the strong rise of Chinese industry in recent years, Brazilian industry has stood out negatively relative to other countries.** Following China's accession to the WTO in late 2001, the country quickly became the "world's factory," supported by low labor costs and a significant industrial-export policy. Since the start of the 21st century, Chinese industrial output has increased more than sevenfold, while global industrial production excluding China grew by around 30% over the same period. By contrast, the expansion of Brazilian industry has been

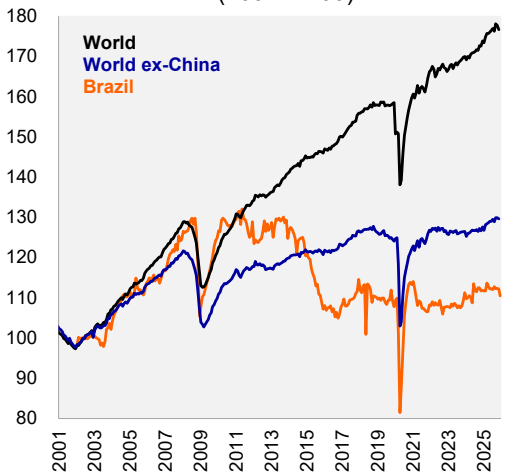
even weaker: about 12% cumulatively over roughly 25 years (or less than 0.5% per year), albeit with considerable volatility at certain points (right chart).[1]

**Industry: World, China and Brasil**
Index (2002 = 100)




Source: IBGE, Itaú, CPB World Trade Monitor

**Industry: World, World ex-China and Brasil**
Index (2002 = 100)

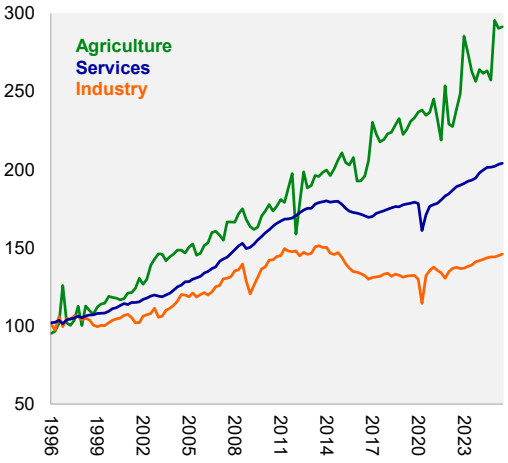



Source: IBGE, Itaú, CPB World Trade Monitor

**Domestically, industry has also stood out negatively compared to other sectors of the Brazilian economy.** Agribusiness continues to be the most prominent sector, exhibiting strong and consistent growth dynamics (despite short-term volatility) underpinned by productivity gains, as we will discuss below. The services sector has also distinguished itself from industry by posting more robust growth (chart below, left).

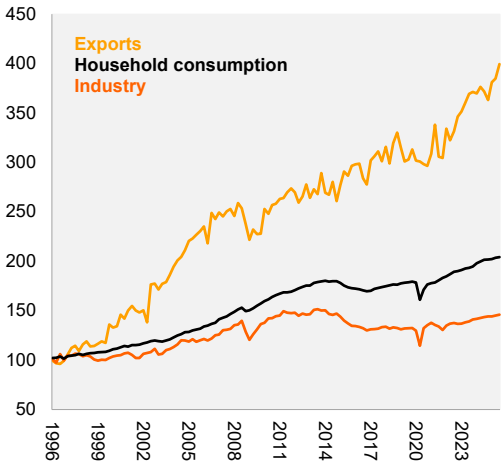
**The prolonged stagnation of Brazilian industry, despite robust (both domestic and external) demand in recent years, suggests the presence of significant supply-side constraints.** The Brazilian economy has grown at an average rate of 2.4% per year since 2000. More specifically, both external demand (measured by exports) and domestic demand (measured by household consumption) have grown much faster than industrial output, indicating that weak demand has not been the reason behind the sector's low growth (chart below, right).

**GDP: Supply by sector**
Index (1995 = 100)




Source: IBGE, Itaú

**GDP: Industry vs demand**
Index (1995 = 100)




Source: IBGE, Itaú

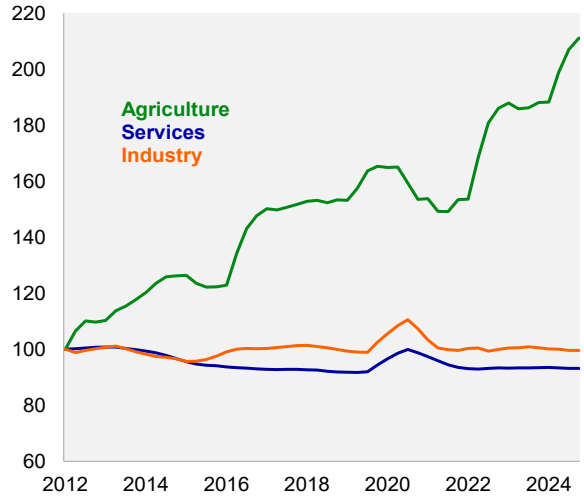
[1] Analyses that focus on the share of industry in the economy (industry/GDP) are based on the misconception that this share should increase, whereas empirical evidence shows that the service sector has been gaining ground in almost all economies, at any income level. An approach focused on growth rather than on share, such as ours, has the advantage of emphasizing productivity and cost dynamics (that is, the sector's competitiveness), without implying that industry should aim to reach any historical level of participation in the economy.

**To investigate the causes of Brazilian industrial stagnation, we will examine below the dynamics of employment, productivity, costs, prices, sector profit margins, and external competitiveness.**[2] We will compare these dynamics with those of the services sector (mainly) and agriculture, a contrast that will help highlight the challenges faced by Brazilian industry.

## 2. Rising employment, but falling productivity in industry

**Over more than a decade, labor productivity in Brazil did not grow either in industry or in services, while it soared in agriculture.** The data is even more impressive when we consider that industry is a capital-intensive sector, whose technological advancement would tend to drive labor productivity over time. This was not the case for Brazilian industry in the period, whose labor productivity remained stagnant and close to that of services, a sector where capital intensity is usually lower than in industry (and, therefore, productivity should naturally grow less over time). In agriculture, in turn, productivity grew strongly, which is probably associated with both technological advances and the sector's capital intensity.[3],[4]

**Productivity by sector (GDP/Employed Population)**
Index (Dec/2012 = 100)




Source: IBGE, Itaú

**While industrial productivity remained stagnant, employment in the sector proved resilient.** Industrial employment declined during the 2014–2016 recession but subsequently recovered a significant portion of these losses, particularly after the pandemic (charts below). With industrial output alternating between periods of decline and stagnation, while employment in the sector remained resilient, industrial productivity has stagnated in recent years, as discussed above. A similar pattern has been observed in the service sector, although with even more stable employment and output dynamics. In contrast, agriculture has experienced strong output growth – a likely result of technological advances and greater capital intensity – alongside a decline in total employment (with stability in formal employment) in the sector. This combination has led to a significant increase in productivity in Brazilian agriculture.

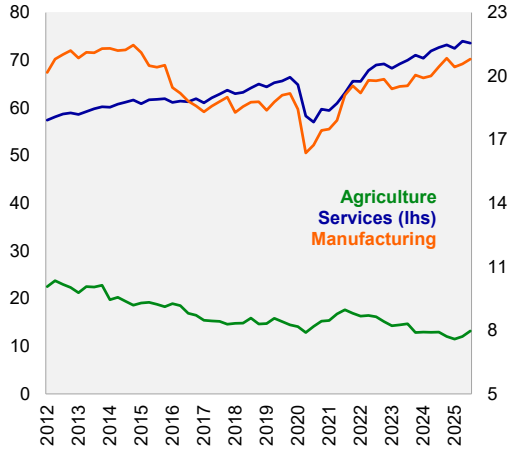
[2] The tax reform of consumption taxes (Constitutional Amendment 132/2023) is likely to benefit industry relative to services, as it enables a simplification of the tax system that is particularly advantageous for sectors with long production chains and higher tax cascading. These effects, of course, depend on the implementation and transition to the new framework. Moreover, fully capturing these gains will require the industrial sector to overcome the various challenges (the focus of this study) that have led to its stagnation in recent years.

[3] A capital-intensive and highly productive agricultural sector challenges the simplistic and common view that, by producing and exporting primary goods, Brazil is neglecting the development of a more sophisticated productive capacity.

[4] A more detailed analysis of labor productivity by sector was conducted by the Central Bank of Brazil in a study published in the March 2026 Monetary Policy Reportv. Consistent with the evidence presented here, the Central Bank's study shows that, between 2019 and 2025, agriculture stood out as the main contributor to productivity gains, driven by the combination of output expansion and a reduction in total employment. Other sectors recorded only modest increases—or even declines—in productivity.

**Employed population, by sector**

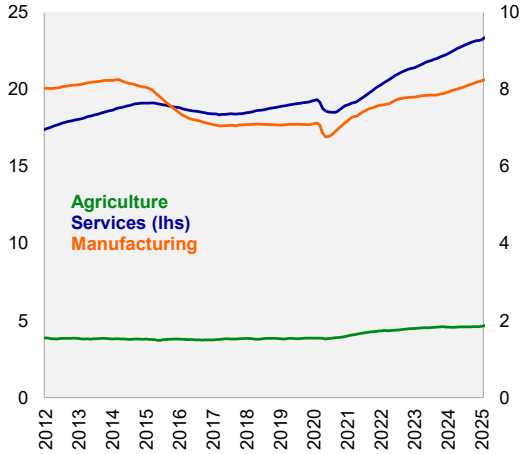
Millions of people




Source: IBGE, Itaú

**CAGED: formal employment stock by sector**

Millions of people



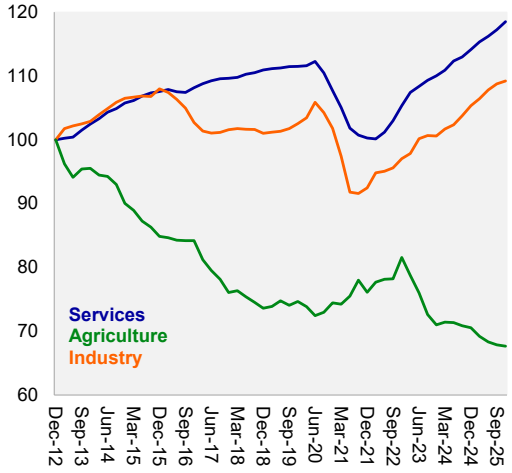

Source: IBGE, Itaú

## 3. Unit labor cost and prices

**Despite stagnant productivity, wages continued to rise, thus increasing unit labor costs (ULC) in both industry and services.** As the name suggests, ULC is the average labor cost required to produce one unit of output. Formally, it is defined as the ratio between labor costs and productivity. Labor shortages, indicated by the decline in the unemployment rate (which currently stands near historical lows) have led to wage pressures. This, together with stagnant industrial productivity, has resulted in an increase in ULC, especially after the pandemic. The increase in ULC has been similar in the service sector, while in agriculture ULC has declined, as any wage increases were more than offset by the sector's strong productivity gains.

**Unit Labor Costs (ULC)**

Index (Dec/2012 = 100, 4-quarter moving average)




Source: IBGE, Itaú

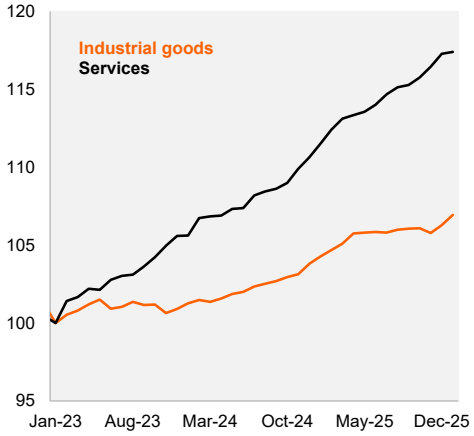
**Labor cost increases in industry and services, although similar in magnitude, have very different impacts on prices in each sector.** Services are, in general, non-tradables[5] – that is, transportation costs, technical constraints or institutional restrictions prevent their international exchange – so that, in the absence of external competition, cost increases can be more easily passed through to final prices. Industrial goods, on the other hand, are essentially tradables, which creates difficulties in passing cost increases through to final prices given the existence of external

[5] We use the definition of tradable and non-tradable goods adopted by the Central Bank, as set out in Technical Note No. 57. The full list with a detailed breakdown of each item can be accessed here.

alternatives. Not by chance, in a context of wage pressures and low unemployment, service prices have increased much more than prices of industrial goods in the post-pandemic period (charts below).[6]

**IPCA: industrials vs services**

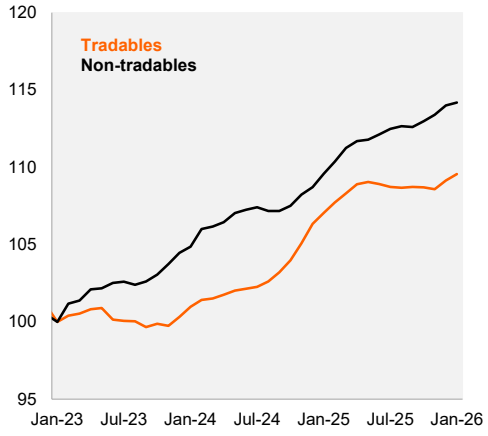
Index (Jan/2023 = 100)




Source: IBGE, Itaú

**IPCA: tradables vs non-tradables**

Index (Jan/2023 = 100)




Source: IBGE, Itaú

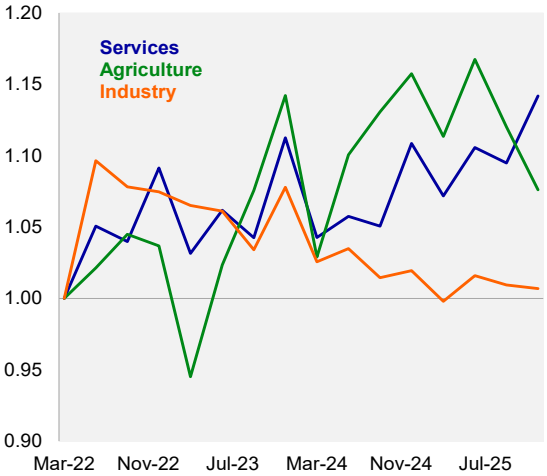
## 4. Profit margins by sector

**Given the differences in the ability to pass through cost increases, profit margins tend to be preserved in the service sector, but decline in the industrial sector when there are wage pressures without productivity gains.** As the services sector faces limited exposure to external competition, increases in labor costs are more easily translated into proportional increases in prices, so that profit margins are preserved. In industry, however, international competition implies that prices cannot easily offset cost increases, which end up being absorbed by profit margins.

**Estimates of profit margin growth by sector once again highlight agribusiness as the top performer, while profit margins in services have recently stagnated and those in industry have declined, in line with expectations (chart).** The decline in industrial productivity becomes even clearer from mid-2022 onwards, already under less influence from the post-pandemic recovery. To compute profit margins by sector, we use the following proxy, based on a simple model described in the appendix: $\mu = 1 - \frac{ULC}{P}$.

**Profit margin (1-ULC/price index)**

Index (Jan/2022 = 1)




Source: IBGE, Itaú

[6] Relative prices during the pandemic years were substantially affected by disruptions in international trade, so we chose to focus our analysis on the post-pandemic period.

**We also assess the correlation between sectoral ULC and the proxy for profit margins by sector.** To do so, we run a simple regression (for the post-pandemic period, from 2021 onwards) in first differences, in order to avoid "level trends":

$$\Delta\mu_t = \alpha + \beta\,\Delta\ln\,(ULC_t) + \varepsilon_t$$

where, $\Delta\ln\,(ULC_t)$= log change in ULC and $\Delta\mu_t$= change in profit margins. The results are shown in the table below:

| Sector | β | Standard error | R2 | n |
|---|---|---|---|---|
| **Services** | **−0.663** | 0.392 | 0.151 | 18 |
| **Industry** | **−1.328** | 0.232 | **0.672** | 18 |
| **Agriculture** | **−0.340** | 0.567 | 0.022 | 18 |

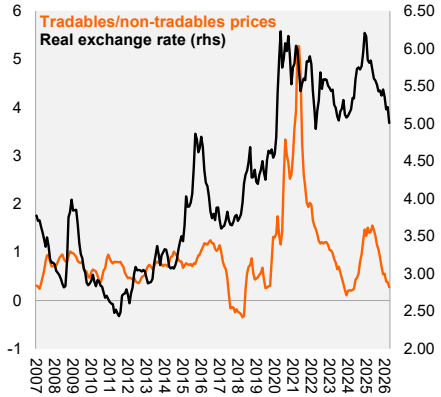
**We conclude that the relationship between profit margins and sectoral ULC behaves as expected, with the industrial sector experiencing the largest impact on margins as costs rise and are not passed through to prices.** This is an intuitively expected result and can be derived analytically (see Analytical Appendix). Indeed, the exercise shows that in industry, increases in ULC are systematically and more strongly associated ($\beta \approx -1{,}33$) with margin compression, and this relationship is statistically meaningful ($R^2 \approx 0{,}67$) – a result consistent with theory (Section 4, Analytical Appendix).[7]

**In services, the effect of ULC on margins is smaller and not statistically significant, as expected, given the sector's greater ability to pass ULC increases through to prices, thereby avoiding impacts on profit margins** (Item 3, Analytical Appendix). For agriculture, the correlation between profit margins and ULC is the weakest among all sectors and is also not statistically significant, reflecting the higher volatility of profit margins, which are more affected by international prices than by ULC (the latter declining, given productivity gains that exceed wage increases).

## 5. Effects on external competitiveness

**There are two distinct ways to measure the real exchange rate:** (i) the traditional real exchange rate, defined as the nominal exchange rate multiplied by the external price level and divided by the domestic price level ($E \cdot P^*/P$), and (ii) a measure based on internal relative prices, given by the ratio between the prices of tradable and non-tradable goods ($P_T/P_N$). The two metrics capture different economic mechanisms. The divergence between them observed in recent years is not a statistical anomaly, but rather a sign that the strong nominal exchange rate depreciation has not translated into structural gains in competitiveness (chart).

**Tradables/non-tradables prices vs real exchange rate (bilateral, at current prices)**




Source: IBGE, BCB, Itaú

[7] As the margin proxy is constructed from ULC and the price index, the regression should not be interpreted as a causal test, but rather as an exercise that helps compare, across sectors, the extent to which increases in ULC are offset through price pass-through, thus translating into increases or declines in profit margins.

**The traditional real exchange rate ($E \cdot P^*/P$) measures the relative price of an average foreign basket in domestic terms.** It is a variable determined by movements in the nominal exchange rate and aggregate inflation, and is therefore heavily influenced by financial shocks, changes in risk perception, capital flows and monetary policy. As such, it is highly informative for cyclical analysis, imported inflation pressures and short-term dynamics. By construction, it combines prices of both tradable and non-tradable goods within price indices.

**The $P_T/P_N$ measure (prices of tradables relative to prices of non-tradables) reflects how attractive the production of tradable goods is relative to non-tradable sectors within the economy.** This metric, which is standard in models à la Balassa-Samuelson, is directly linked to relative sectoral productivity, wages, sectoral markups and domestic costs. By construction, it is independent of external prices and filters out purely financial shocks.

**Why have the two metrics diverged so significantly?** The more traditional measure of the real exchange rate has, as usual, been heavily influenced by the nominal exchange rate, and therefore strongly affected by changes in risk perception, capital flow and monetary policy. By contrast, service prices in Brazil have been heavily influenced by wages, labor market conditions and domestic policies.

**This divergence shows that, even with a strong nominal exchange rate depreciation, inflation in non-tradables has offset a significant portion of the competitiveness gains when viewed through the lens of internal relative prices.** In other words, the Brazilian economy has effectively experienced an externally driven depreciation in recent years, without a consistent domestic repricing favorable to tradable sectors. This divergence makes it clear that exchange rate depreciation is not synonymous with structural competitiveness. The traditional real exchange rate may point to short-term stimulus to exports and the industrial sector, but without adjustment in internal relative prices — particularly via wages and services — such gains tend to be limited and temporary.

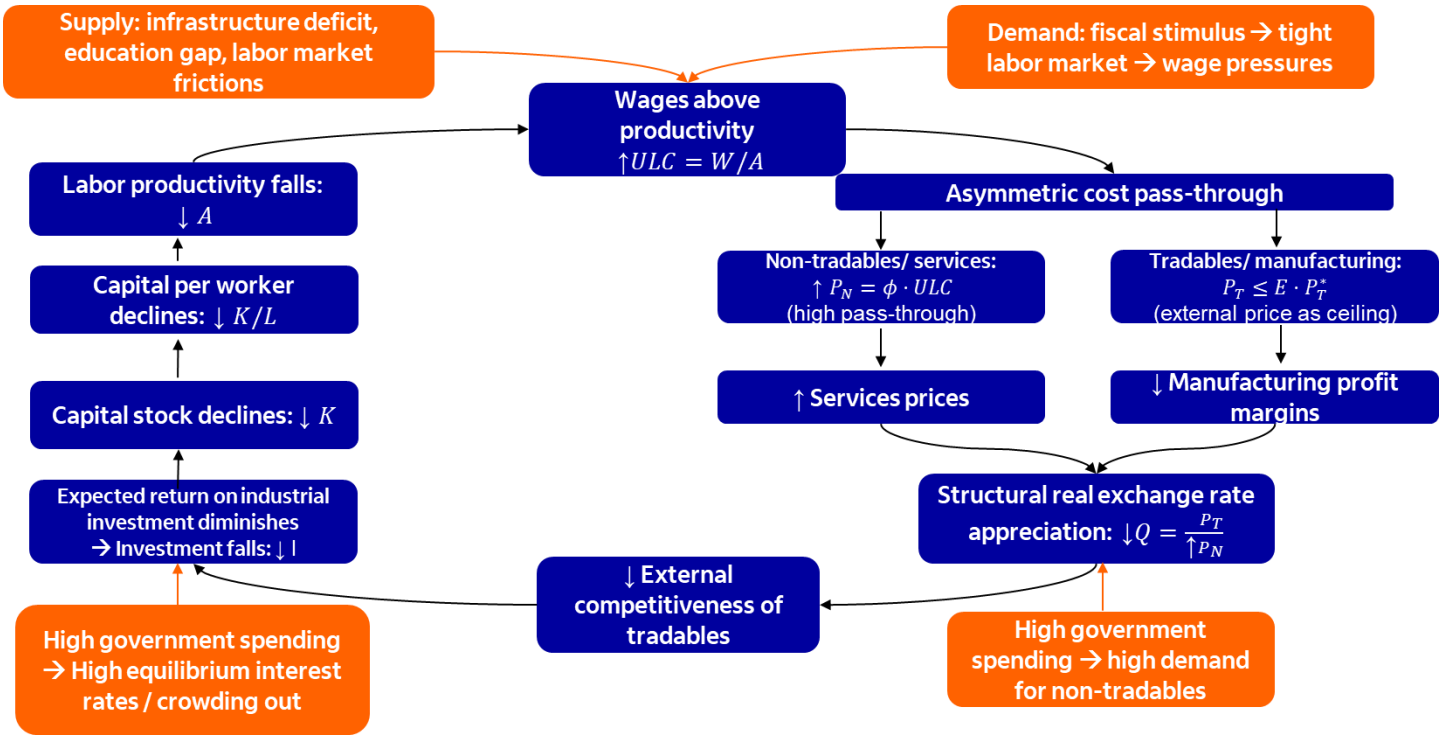
**The misalignment between the two measures reinforces the assessment that Brazil continues to experience only modest structural gains in competitiveness, despite an apparently depreciated real exchange rate when measured using traditional indices.** The $E \cdot P^*/P$ metric remains the appropriate benchmark for monitoring the cycle, imported inflation and financial dynamics, but for analyses of growth, productive diversification and medium to long-term competitiveness, the $P_T/P_N$ metric is more informative, especially at a time of divergence between these measures, such as the current one. In sum, developments in industrial and service prices have not favored investment in industry, reinforcing structural stagnation.

## 6. What can be done to get out of the vicious circle of industrial stagnation in Brazil?

**Our diagnosis is, therefore, that multiple effects cause Brazilian industrial stagnation – all of them influenced by economic policies.** The figure below, supported by the Analytical Appendix at the end, summarizes our analysis: a low level of productivity, inconsistent with wage dynamics, increases relative prices of non-tradable goods, which promotes a structural appreciation of the real exchange rate, thus reducing the external competitiveness of tradable goods. As a result, the expected profitability of investment in industrial sectors decreases, which ends up reducing investment itself and resulting in a lower capital stock in the industry. The lower intensity of this production factor further reduces worker productivity, which feeds back into a higher unit labor cost, restarting the vicious circle.

**Several economic policies drive and worsen this vicious circle of stagnation and, if reversed or redesigned, could set in motion a virtuous circle of industrial development in Brazil.** In the figure, such policies appear in orange boxes. It is self-evident what must be done to transform vice into virtue in the industry. An emphasis on education and infrastructure would promote increased worker productivity. Public policies that reduce pressures and distortions in the Brazilian labor market would, in turn, allow a better alignment between this productivity and the salaries charged. Taken together, such measures would reduce the unit cost of labor, thus increasing the relative competitiveness of tradable goods. Investment and capital accumulation, in turn, could be boosted by a better business environment (reduced uncertainty) and a lower equilibrium interest rate – the latter strongly influenced by the size of the government (public spending/GDP). We will now analyze each of these points in more detail.

**The vicious circle of deindustrialization and its drivers**




## Infrastructure

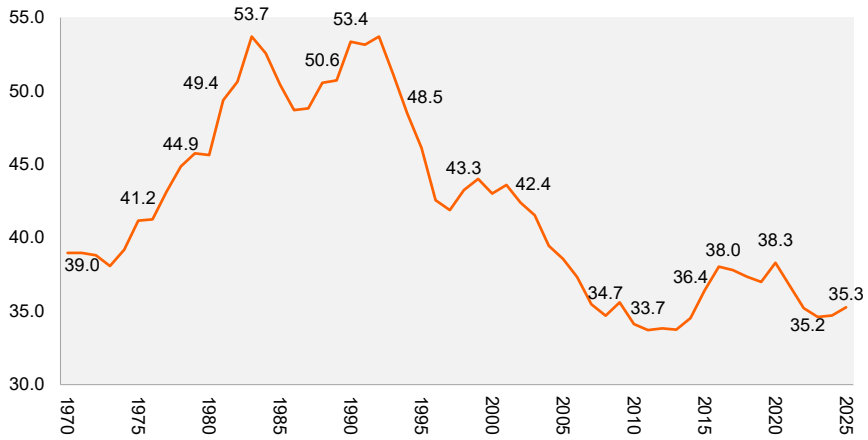
**Creating conditions for more investment in infrastructure is one of the most efficient and fundamental ways to break the vicious circle of industrial stagnation.** Simply put, productivity represents the degree of efficiency with which the factors of production, capital and labor are combined. Infrastructure at an adequate level could increase the economy's total productivity, by allowing an efficient combination of production factors and generating positive externalities.

**Logistical, energy and connectivity bottlenecks not only increase direct costs, but also reduce the effective productivity of labor and capital.** Companies need to maintain larger stocks, operate with redundancies and accept efficiency losses that do not appear directly in traditional productivity statistics, but materialize in the expanded unit cost (what we could call “Brazil cost”).

**The infrastructure investment gap remains high, despite recent regulatory advances.** According to consultancy Inter.B, in 2024 Brazil invested 2.3% of GDP in infrastructure. The consultancy also estimates that an annual investment of 4.65% of GDP in infrastructure would be necessary to reach the target stock of 63.7% of GDP at the end of two decades. This level of stock would be a basic condition for universalizing access to services and meeting the demands of the population and companies, according to the consultancy. Since the beginning of the decade, however, the capital stock in infrastructure has been falling[8], without managing to surpass the 35-40% range in the recent period (chart below), which portrays an investment environment – regulatory and macroeconomic – that is still far from ideal for most infrastructure sectors. Policies that induce an inefficient transit of industrial inputs across the national territory end up reinforcing the negative impact of a deficient transport and logistics infrastructure.

[8] The estimated capital stock data produced by Inter.B Consultoria consider investment flows allocated to each sector, net of their respective average depreciation rates – defined based on the rates used by representative companies and regulatory agencies regarding the useful life of the main fixed assets required for each operational activity. The full methodology is available in FRISCHTAK, Cláudio; MOURÃO, João. Uma Estimativa do Estoque de Capital de Infraestrutura no Brasil. Desafios da Nação, 2017. Available at:https://epge.fgv.br/conferencias/modernizacao-dainfraestrutura-brasileira-2017/files/estoque-de-capital-de-infra-brasil-22-08-2017.pdf

**Infrastructure Capital Stock — 1970 to 2025 (% of GDP)**




Source: Inter.B Consultancy

**Basic sanitation and its subsectors are relatively closer to reaching the required levels of investment, with the solid waste segment showing a smaller gap relative to the target capital stock[9].** Estimates indicate the need for annual investments of around 0.46% of GDP in sanitation and 0.07% in solid waste over the next 20 years. This positive performance highlights the importance of adequate regulation and private investment. In fact, this outcome has been driven by the approval of the New Sanitation Legal Framework (Law No. 14,026/2020)[10], which established targets for the universalization of potable water services and sewage collection and treatment. The framework created a competitive environment and reduced uncertainty for investment in these sectors, thereby attracting private capital. The effects of these investments on public health (as well as on the environment), and therefore on labor productivity, are clear and certainly very significant. Building on this example, the challenge is to create similar investment conditions in other infrastructure sectors. Recent developments in the sector underscore the importance of an institutional environment conducive to private sector-led growth.

**Given the persistent fiscal constraints in Brazil, public investment capacity is limited, and the role of private capital becomes central to enabling the expansion and modernization of infrastructure.** In recent years, this leading role has already materialized, with the private sector accounting for around 70% of infrastructure investment. In this context, instruments such as concessions and public-private partnerships become key mechanisms to mobilize private savings, enhance efficiency in project execution, and unlock investment in essential sectors. Thus, more than an alternative, private sector participation is a necessary condition to sustain long-term growth, increase productivity, and reduce structural bottlenecks in the Brazilian economy.

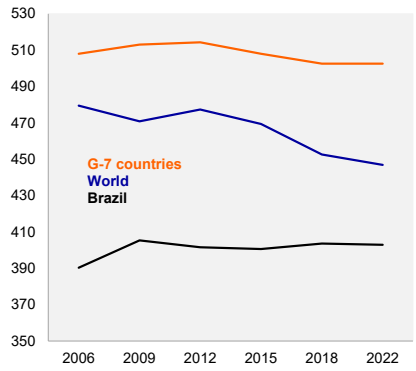
## Human capital and the labor market

**Labor productivity in Brazil is closely linked to the quality of human capital.** Despite increases in years of schooling, performance in international assessments remains weak and stagnant, indicating a low effective accumulation of skills. Results from PISA 2022 show that Brazil remains near the bottom among 81 countries, ranking 65th in mathematics, 52nd in reading, and 62nd in science. In addition, only about 14% of students are enrolled in technical education, well below international standards[11], which limits the development of intermediate skills that are essential for industry and modern services. This underscores a profound shortfall in the formation of the skills needed to boost productivity and support competitive integration into global value chains. Perhaps even more concerning, recent assessments indicate that a significant share of teachers face severe limitations in key areas such as mathematics[12]. Low human capital also constrains the flexibility of the Brazilian labor market, as worker reallocation across sectors cannot occur easily.

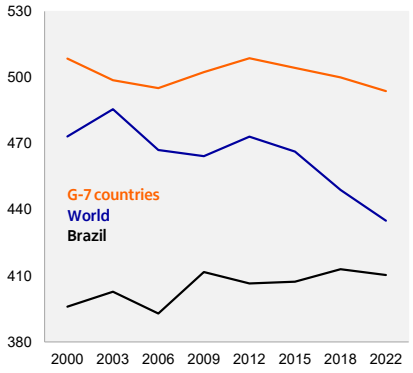
[9] Assessment also according to Inter.B Consultancy.
[10] Full text: https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/lei/l14026.htm
[11] Ranked 41st out of 44 countries according to the OECD (as cited in Education GPS - Brazil - Overview of the education system (EAG 2025)).
[12] Link: pnd_e_enade_2025_cursos.pdf

**As a result, productivity does not keep pace with wage increases, which instead lead to higher unit labor costs.** In the absence of consistent productivity gains, higher wages – stemming from automatic indexation mechanisms, labor market frictions, and, on a cyclical basis, labor shortages – tend to translate into service inflation or margin compression in the tradable goods sector, rather than into sustained growth.

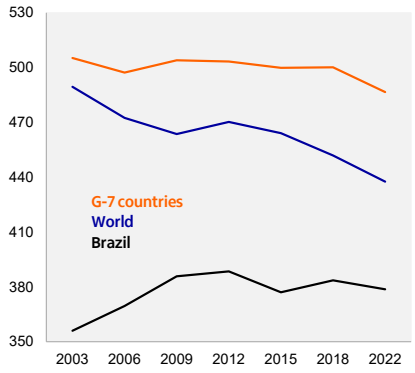
**Science performance**
Escale: 0 to 1000 points




**Reading performance**
Escale: 0 to 1000 points




**Mathematics performance**
Escale: 0 to 1000 points




Source: PISA, Itaú

**Low and/or inadequate human capital is associated with limited worker bargaining power, which ultimately drives public policies aimed at ensuring a minimum income level, albeit with unintended consequences.** Social programs, such as Bolsa Família, are essential to combat extreme poverty. However, the size of such programs must be carefully calibrated, as they raise the reservation wage of the working-age population to a level that may exceed the productivity of low human capital workers, thereby reducing their employability. A similar issue arises with policies that raise the minimum wage above inflation, where excessive increases can turn a remedy into a distortion by compressing margins and discouraging investment in segments of the economy.

**Restrictions on labor contracts tend to exacerbate the trend toward deindustrialization and labor substitution in an environment of stagnant productivity.** Increased labor market rigidity has asymmetric effects across sectors: in non-tradables (services), cost increases tend to be passed through to prices, putting upward pressure on service inflation, whereas in tradables (industry), limited pass-through leads to greater margin compression and a stronger incentive to substitute labor with automation. Moreover, increases in labor costs, in the absence of corresponding structural productivity gains, worsen relative prices, reduce industrial investment, and reinforce the trend toward deindustrialization.

**To avoid a situation in which policies that raise labor costs exacerbate deindustrialization, the solution is to expand the quality of education and technical training—not just access to education—so that productivity can keep pace with income gains.** This is, of course, a slow process that spans multiple political cycles, but it is indispensable.

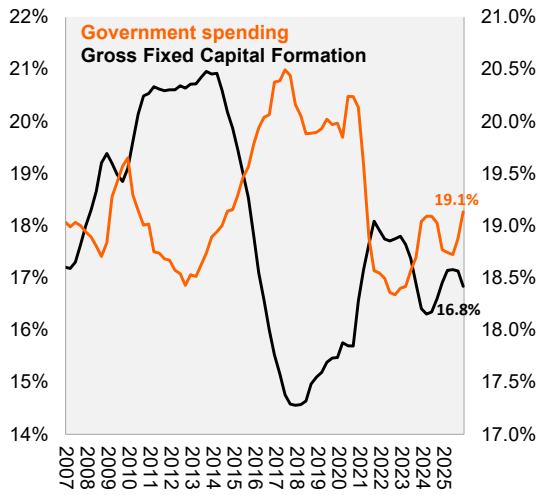
## Government size

**A high level of public spending, especially when concentrated on current expenditures, exerts an asymmetric impact on relative prices by having an intrinsic bias toward demand for non-tradables.** By its nature, government spending is largely directed toward labor-intensive services (such as public administration, healthcare, education, security, and transfers that sustain local consumption). This biased increase in demand puts upward pressure on wages and costs in non-tradables, raising service inflation and leading to faster growth in $P_N$ relative to $P_T$. As discussed (and detailed in the Analytical Appendix), this results in a structural real appreciation (a decline in $P_T/P_N$), exacerbating the trend toward deindustrialization.

**In addition, high government spending tends to raise equilibrium interest rates and crowd out investment.** The result is a less capital-intensive production structure, leading to lower labor productivity. This process is further reinforced by uncertainty regarding the future tax burden (for the economy as a whole and across sectors), given the high financing

needs of public accounts, which are proportional to the level of government spending. Indeed, there is clear evidence that government size (measured as spending relative to GDP) is negatively correlated with investment (chart).

**Government spending and Investment (% GDP)**




Source: IBGE, Itaú

**Therefore, the discussion about the size of government relative to the economy is closely linked to the debate on how to break the cycle of industrial stagnation in Brazil—a point that should not be underestimated.**

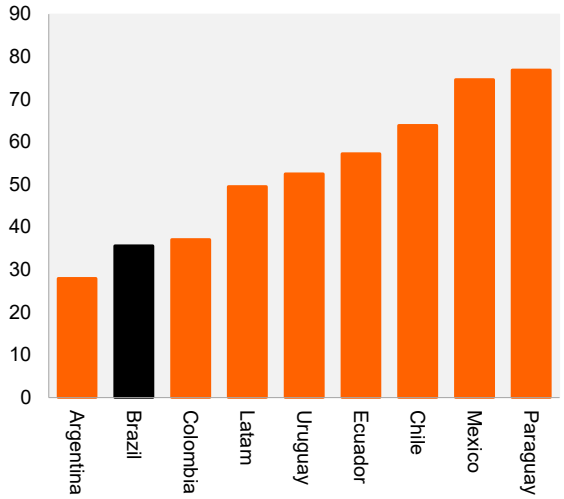
## Trade openness

**Contrary to what a superficial analysis might suggest, avoiding external competition is not part of the solution for Brazil's reindustrialization – on the contrary, limited external exposure is one of the "original sins" that have hindered the country's industrial development.** We have highlighted external competition as a factor that constrains price pass-through in industry, which ultimately reduces profit margins when domestic costs rise. This could lead to the mistaken argument that closing the economy to international trade would be a solution, by eliminating this source of competition and allowing profit margins to be preserved in the sector.

**Policies aimed at closing the economy or reducing external competition tend to be particularly harmful over the longer term, as they exacerbate the tendency toward low productivity.** A lower degree of trade openness weakens incentives for efficiency, limits the adoption of technology, and allows less competitive production structures to persist, resulting in lower productivity, higher prices, and slower growth. As such, a sustained reduction in trade openness tends to undermine industrial development, as Brazilian history clearly demonstrates. Given Brazil's relatively low degree of trade openness (chart below), a shift toward greater integration would help precisely by enabling stronger productivity gains over time. If protectionism were the solution, the industrial sector would not be exhibiting its current performance.

**Greater trade openness plays a central role in enhancing industrial productivity and competitiveness, by facilitating access to more efficient inputs and promoting the diffusion of technology and best production practices.** The literature for Brazil, as well as for emerging economies more broadly, shows that trade liberalization is associated with gains in both intra- and inter-sectoral efficiency, as well as increased integration into global value chains. Although the process of opening up may entail short-term costs—such as labor reallocation and the exit of less productive firms—its dynamic effects are positive and essential, as it induces modernization, innovation, and economies of scale. A country like Brazil will only approach the technological frontier through integration into global production chains, not through isolation.

**Trade Openness in Latin America, 2024**
(exports + imports % of GDP)




Source: World Bank, Itaú

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# ANALYTICAL ANNEX

## 1. Perfect competition:

Consider a firm that produces according to the following function:

$$Y = A \cdot L, \text{ where } Y = \text{output, } L\text{= labor, } A = \text{labor productivity.}$$

The only cost is labor: $C = W \cdot L$, where $W$ is the nominal wage. In a perfectly competitive environment, the firm chooses $L$ to maximize profit $\Pi$:

$$\max_{L} \ \Pi = P \cdot Y - W \cdot L = P \cdot AL - WL$$

The first-order condition, given by $\frac{d\Pi}{dL} = P \cdot A - W = 0$, implies that: $P = \frac{W}{A}$

The unit labor cost (ULC) is defined as the labor cost required to produce one unit of output, that is:

$$ULC = \frac{C}{Y} = \frac{W \cdot L}{A \cdot L} = \frac{W}{A}$$

Therefore:

$$\boxed{P = ULC}$$

**Interpretation:**

- **Wage dynamics and productivity fully determine prices.**
- **If wages rise without an increase in productivity, the resulting increase in unit labor cost is passed through prices.**

## 2. Introducing market power:

We want to assess profit margins, and to do so, we need to introduce market power into the analysis. Suppose now that the firm faces a constant-elasticity demand curve:

$$Y = P^{-\varepsilon}, \varepsilon > 1$$

This captures market power: the firm chooses the price $P$, knowing that it will sell less if it charges more. Now the firm chooses the price $P$ to maximize profit: $\Pi = P \cdot Y - C$
Substituting $Y = P^{-\varepsilon}$ and $C = ULC \cdot Y$:

$$\Pi = (P - ULC) \cdot Y = (P - ULC) \cdot P^{-\varepsilon}$$

The firm chooses $P$ to maximize profit:

$$\Pi = P \cdot Y - C$$

Substituting $Y$ and $C = ULC \cdot Y$:

$$\Pi = (P - ULC) \cdot Y = (P - ULC) \cdot P^{-\varepsilon}$$

Taking the derivative with respect to $P$, we obtain the following first-order condition:

$$\frac{d\Pi}{dP} = P^{-\varepsilon}\left[1 - \varepsilon \frac{P - ULC}{P}\right] = 0$$

Therefore: $1 = \varepsilon \frac{P - ULC}{P}$. Rearranging, we get: $P = \frac{\varepsilon}{\varepsilon - 1} ULC$. Defining the markup as $\phi \equiv \frac{\varepsilon}{\varepsilon - 1}$, we conclude that:

$$\boxed{P = \phi \cdot ULC}$$

**Interpretation: The price is a constant markup over the unit labor cost.**

## 3. Profit margins for non-tradable sectors:

The profit margin is expressed as:

$$\mu \equiv \frac{P \cdot Y - C}{P \cdot Y} = \frac{P - ULC}{P}$$

Substituting $P = \phi \cdot ULC$, we get $\mu = \frac{\phi \cdot ULC - ULC}{\phi \cdot ULC} = \frac{\phi - 1}{\phi} = \frac{1}{\varepsilon}$. That is,

$$\boxed{\mu = \frac{\phi - 1}{\phi} = \frac{1}{\varepsilon}}$$

**Interpretation:**

- **The profit margin in a non-tradable is solely by the elasticity of demand (assumed constant).**
- **In particular, the unit labor cost (ULC) and, therefore, wages and productivity, do not affect the profit margin, since increases in ULC are passed through to prices.**

## 4. Profit margins for tradable sectors:

Now, suppose the firm produces a tradable good, given an international price $P^*$, denominated in foreign currency. With a nominal exchange rate $E$, this imposes a ceiling on the domestic price:

$$\boxed{P \leq E \cdot P^*}$$

The firm would like to charge a price that applies a markup over ULC (that is, it would like $P = \phi \cdot ULC$), but it cannot exceed the external price. Therefore, the effective price is:

$$\boxed{P = \min\{\phi \cdot ULC,\ E \cdot P^*\}}$$

There are, therefore, two possibilities:

Possibility 1: The external ceiling is not binding: $\phi \cdot ULC \leq E \cdot P^*$

In this case, the prices is $P = \phi \cdot ULC$ and the profit margin is $\mu = \frac{P - ULC}{P} = \frac{\phi - 1}{\phi}$, as we saw.

Possibility 2: The external ceiling is binding: $\phi \cdot ULC > E \cdot P^*$

In this case, the price is $P = E \cdot P^*$ and the profit margin is $\mu = \frac{E \cdot P^* - ULC}{E \cdot P^*}$ or, rewriting:

$$\boxed{\mu = 1 - \frac{ULC}{E \cdot P^*}}$$

Note that: $\frac{\partial \mu}{\partial ULC} < 0$. That is, increases in the ULC reduce the profit margin for firms in the tradable goods sector.

**Interpretation: In tradable goods markets, sufficiently large increases in ULC (due to wages rising faster than productivity, for example) reduce the profit margin because pass-through to prices is constrained by the external price.**

## 5. Impact on investment and capital stock in the industrial sector

So far, for simplicity, we have not considered capital, only labor. We will now make some considerations about the implications for investment, capital stock, and how this feeds back into labor productivity.

Assuming (realistically) that investment $I$ in the industrial sector depends positively on expected profitability, which is a function of the profit margin:

$$I = I(\mu), I'(\mu) > 0$$

Substituting the margin: $I = I\left(1 - \frac{ULC}{E \cdot P^*}\right)$. Therefore: $\boxed{\frac{\partial I}{\partial ULC} < 0}$

The sector's capital $K$ evolves as follows: $K_{t+1} = (1-\delta)K_t + I_t$, where $\delta$ is the depreciation of capital in each period.

With $\frac{\partial I}{\partial ULC} < 0$, it follows that: $\boxed{\frac{\partial K_{t+1}}{\partial ULC} < 0}$

**Interpretation:**

- **In the industrial sector (which is tradable), wage increases above productivity growth led to a reduction in investment.**
- **Lower investment leads to a smaller capital stock in the sector over time.**

## 6. Capital and labor productivity

Now suppose and extended production technology, with capital in addition to labor:

$$Y = A \cdot F(K, L)$$

Assuming a production function that is homogeneous of degree 1 (e.g., Cobb-Douglas) we can rewrite it in terms of labor productivity: $\frac{Y}{L} = A \cdot f\left(\frac{K}{L}\right)$.

Therefore: $\boxed{\frac{\partial (Y/L)}{\partial (K/L)} > 0}$

**Interpretation: The persistent decline in investment implies a lower capital stock relative to labor, which feeds back into lower labor productivity.**

## 7. Effects on the real exchange rate

Consider:

$E$= nominal exchange rate,

$P^*$=$(P_T^*)^{\alpha}\ (P_N^*)^{\,1-\alpha}$= foreign price index (in foreign curreny), and

$P$= $P_T^{\alpha}\ P_N^{1-\alpha}$ = domestic price index (in domestic currency), with $0 < \alpha < 1$,

we can rewrite the real Exchange rate as:

$$q \equiv \frac{E \cdot P^*}{P} = \frac{E \cdot (P_T^*)^{\alpha}(P_N^*)^{1-\alpha}}{(E P_T^*)^{\alpha} P_N^{1-\alpha}}$$

Using the law of one price for tradable goods, $P_T = E \cdot P_T^*$, the expression can be simplified to:

$$q = E^{\,1-\alpha}\left(\frac{P_N^*}{P_N}\right)^{1-\alpha}$$

To emphasize the economy's structural competitiveness (how attractive tradable production is relative to non-tradable sectors within the economy), we can apply two standard normalizations that allow us to express the real exchange rate purely in terms of domestic relative prices: $Q = q^{\frac{1}{1-\alpha}}\frac{P_T^*}{P_N^*} = \frac{E \cdot P_T^*}{P_N} = \frac{P_T}{P_N}$

In other words, a suitably normalized measure of the real exchange rate – focused on assessing the economy's structural competitiveness – is simply the ratio of tradable to non-tradable prices (or, approximately, industrial goods prices relative to services prices):

$$\boxed{Q = \frac{P_T}{P_N}}$$

**Interpretation:**

- **With tradable goods prices externally disciplined, fluctuations in non-tradable prices, which are proportional to ULC, affect the real exchange rate.**
- **In particular, the Brazilian real exchange rate has recently appreciated, reducing the competitiveness of tradable sectors (manufacturing) due to rising non-tradable prices (services). This is a direct consequence of the recent increase in ULC in the latter sector.**

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