Is Brazil's premature deindustrialization a case of Dutch disease? Comment on Nassif, Feijó and Araújo (2026)[1]

Specification and identification problems undermine NFA's econometric case for Dutch disease as Brazil's main deindustrialization driver

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Abstract

Nassif, Feijó and Araújo (2026) test whether Brazil's premature deindustrialization is a case of Dutch disease. We identify econometric problems that call into question their conclusions: the dependent variable does not measure deindustrialization; the OLS equation omits lagged dependent variables, generating autocorrelation that invalidates inference; trend and aggregate demand controls are absent; the trade liberalization variable is circularly constructed with a wrong-signed coefficient; REER and FIN remain endogenous; the VEC neither resolves identification problems nor is ordered consistently with the causal argument; and independent replication is precluded by inaccessible data. Their central claims require a revised specification.

Keywords: Dutch disease; deindustrialization; Brazil; specification; identification.

JEL Classification: O14; O54; C22; C26.

Introduction

Nassif, Feijó and Araújo (2026) — hereafter NFA — published in the Brazilian Journal of Political Economy an article that econometrically tests whether Brazil's premature deindustrialization can be attributed to Dutch disease, reinterpreted through the new-developmentalist framework of Palma (2005) and Bresser-Pereira (2008, 2020). In this perspective, Dutch disease in Brazil would have been caused not only by commodity booms but also by the liberalizing reforms of the 1990s — trade and financial opening — which dismantled the mechanisms that had previously neutralized it.

NFA's empirical strategy uses monthly data for the period January 1999 to December 2024. The dependent variables are, respectively, the real effective exchange rate (REER) in the first equation and the IBGE's physical production index for manufacturing (IND) in the second. The IND is seasonally adjusted, with fixed base 2002=100. The regressors of the central equation — equation (2) — are the REER lagged one period, a trade liberalization proxy (TLI) lagged six periods, and a financial openness proxy (FIN) lagged one period. Both equations are estimated by Ordinary Least Squares (OLS) and by a Vector Error Correction Model (VEC) with three lags in the REER equation and four lags in the IND equation.

The question NFA address is the same that Bacha, Terziani, Guimarães and Considera (2025) — hereafter BTGC — investigated in the Revista Brasileira de Economia. BTGC test two hypotheses for Brazil's deindustrialization between 1995 and 2022: Dutch disease, captured by real exchange rate appreciation generated by improvements in terms of trade and capital inflows; and premature deindustrialization, captured by GDP per capita evolution. Using

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quarterly data with the manufacturing share of GDP at constant prices as the dependent variable and a two-stage instrumental variables strategy to address real exchange rate endogeneity, BTGC conclude that both hypotheses find statistical support but neither quantitatively accounts for the observed decline. A residual time trend dominates — explaining 92% of the short-run decline — suggesting that other factors, possibly declining industrial competitiveness, are at work.

NFA characterize BTGC as 'the only study to have positively tested for the existence of Dutch disease in Brazil' (p. 2), while offering three criticisms. First, BTGC do not consider trade and financial liberalization as causes of Brazilian deindustrialization, relying solely on the exchange rate channel. Second, BTGC adopt the traditional neoclassical concept of Dutch disease — one associated with a boom in the natural resource sector — rather than the new-developmentalist interpretation that attributes the disease primarily to liberalizing reforms. Third, BTGC dissociate Dutch disease from the real appreciation of the Brazilian currency, which NFA regard as the central transmitting mechanism of the disease. This note examines the methodological problems in NFA that, in our view, undermine these criticisms and the article's own conclusions. We identify ten problems, set out in the sections below, and address the criticism leveled at the BTGC paper at the close of Section 6.

Before proceeding, we need to acknowledge important merits in NFA's article. First, it confronts directly — and with explicit econometric tools — a central question in the recent literature on Brazil that is often addressed only descriptively or narratively. Second, the ambition to build a bridge between the new-developmentalist interpretation of Dutch disease and a testable empirical strategy is a meaningful contribution to the debate. It is precisely for this reason that the specification and identification choices deserve close scrutiny, since the strength of the conclusions depends on them.

1. The dependent variable does not measure deindustrialization

NFA's equation (2) uses the IND as dependent variable. This series is not a measure of deindustrialization in the structural sense. From 1999 to 2024, the IND grew approximately 12% in absolute terms. At the same time, the manufacturing share of GDP at constant prices fell from around 17.5% to 10.9% — a decline of 38%. These two facts are fully compatible: industrial production grew in level while the rest of the economy grew much faster, so manufacturing lost structural weight. A level production index cannot capture this relative phenomenon by construction.

The correct dependent variable for investigating deindustrialization, as Rodrik (2016) explicitly argues and as BTGC adopt, is the share of manufacturing in value added at constant prices. This series is monotonically declining and directly measures the structural transformation NFA seek to explain. The choice of IND means NFA's model is explaining something different from what the title and conclusions claim.

NFA justify the choice of IND in a footnote, arguing it is an adequate proxy for the industrialization rate because its weighting system reflects value-added contributions. The argument appears insufficient for two reasons. First, a level proxy cannot substitute a relative share measure when the phenomenon under investigation is structural — the IND can grow while manufacturing loses weight in GDP, as indeed occurred over the period. Second, the data limitation that implicitly motivates this choice does not exist.

IBGE's quarterly GDP figures from the National Accounts have been available since 1996, covering NFA's entire estimation period at constant prices. Monthly disaggregation of this quarterly series can be accomplished by the use of the FGV IBRE Monthly GDP Monitor (FGV IBRE, 2026), which provides a monthly GDP estimate based on the same methodology

as IBGE's National Accounts, available from 2000 onward — with only the first year of NFA's estimation period requiring supplementation by linear interpolation from the quarterly series. With monthly GDP constructed by this method, NFA could have computed the monthly share of manufacturing in GDP at constant prices — the correct dependent variable for investigating deindustrialization. The choice of IND is therefore a specification decision, not a data constraint, and it undermines the validity of the question the article purports to answer.

2. Absence of aggregate demand control in the specification

Should NFA insist on the IND in level as dependent variable, the same monthly GDP obtained by the methods previously described could be included on the right-hand side of equation (2) as a control for aggregate demand for manufactured goods. The absolute level of industrial production grows simply because the economy grows — higher total income generates more demand for manufactures in absolute terms, regardless of any structural phenomenon. Without this control, variables correlated with the economic cycle may appear to explain IND when it is in fact capturing the aggregate demand effect.

A caveat is warranted: if NFA were to include contemporaneous GDP as a control, GDP itself would be endogenous to IND, since manufacturing is a component of GDP — rising industrial production mechanically raises total output. The standard remedy is to use lagged GDP or an instrumented value. This is a second-order problem relative to those discussed in subsequent sections, but it should be noted as a constraint on the correction we recommend.

3. Absence of lagged dependent variable in the OLS equation

Monthly manufacturing production is a highly persistent series. The current level of IND is overwhelmingly determined by its own recent past. Omitting IND_{t-1} from the right-hand side of equation (2) imposes the assumption of instantaneous and complete adjustment of industrial production to changes in the real exchange rate, tariffs, and financial openness — an assumption economically implausible at monthly frequency.

NFA lag all regressors in equation (2) — REER by one period, TLI by six, and FIN by one. Lagging the independent variables addresses potential contemporaneous simultaneity: a predetermined regressor cannot be affected by the current period's shock to IND. But this is a different problem from the one this section identifies. Including IND_{t-1} as a regressor captures the autoregressive dynamics of IND itself — the fact that this month's production is overwhelmingly determined by last month's. No amount of lagging the independent variables substitutes for this. The two corrections address distinct sources of misspecification and are both necessary.

NFA's own reported diagnostics confirm the problem. The Durbin-Watson statistic for the OLS model is 1.75. With 306 observations and three regressors, the 5% lower critical bound is approximately 1.82. Since $1.75 < 1.82$, the null hypothesis of no autocorrelation is rejected by their own diagnostic — despite the use of lagged regressors. Positive serial correlation in residuals is the textbook symptom of a missing lagged dependent variable in a dynamic process.

Residual autocorrelation is not merely a specification indicator — it has direct consequences for inference. With autocorrelated residuals, the variance of the estimators cannot be correctly estimated by OLS, rendering reported standard errors, t-statistics, and p-values unreliable. The statistical significance of the coefficients in Table 5 — which is the foundation of the article's central claim — cannot be reliably interpreted.

BTGC include two lags of the industrialization rate precisely to eliminate residual autocorrelation, and verify its absence through three instruments: the autocorrelation and

partial autocorrelation functions (ACF and PACF) for the first 20 lags, and the Ljung-Box test for joint autocorrelation across 10 lags, which does not reject the null with a p-value of 0.188. These tests are far more informative than the Durbin-Watson: the Ljung-Box tests autocorrelation jointly across multiple lags, is valid in the presence of lagged dependent variables and has a known distribution regardless of regressor structure. NFA perform none of these tests, limiting themselves to reporting a Durbin-Watson that, despite the use of lagged regressors, already rejects the null by their own critical values.

4. Absence of time trend and aggregate demand control

All variables in NFA's equation (2) share secular trends over the 1999–2024 period. Without any mechanism to absorb the common movement of these series, trending regressors will mechanically correlate with the also-trending dependent variable. Statistical significance in levels will reflect common trends as much as genuine structural relationships.

There is more than one way to address this problem. Inclusion of a deterministic time trend is one solution; inclusion of lagged dependent variables is another, and has the additional advantage of capturing the inertial dynamics of the process — as discussed previously. BTGC adopt both: two lags of the industrialization rate and a time trend, whose coefficient proves to be the quantitatively dominant factor. Whatever solution is adopted, it must be combined with a control for aggregate demand — in BTGC's case, GDP per capita and its square, which are the structurally appropriate controls when the dependent variable is the manufacturing share of GDP; if the IND in level is maintained, the equivalent control would be total GDP. What is problematic is the simultaneous absence of all these elements, which is precisely the situation of NFA's equation (2): without lagged dependent variables, without a time trend, and without an aggregate demand control, the coefficients of REER, TLI, and FIN mechanically absorb the common secular drift of the series, and statistical inference is compromised by the residual autocorrelation that the article's own diagnostics confirm.

5. Multiple problems with the trade liberalization variable

Footnote 16 of NFA explains how the annual nominal tariff was converted to monthly frequency: within each year y, the annual scheduled tariff T_y is distributed across the twelve months in proportion to each month's share of that year's total industrial production — TLI_t = T_y × IND_t / K_y, where K_y is the annual sum of IND values for year y. In the regression, TLI enters lagged six periods.

This construction has a decisive consequence: within any given year, TLI_t is by construction proportional to IND_t, since both T_y and K_y are constants for that year. Because the tariff changed very little across years — the Castilho et al. (2025) series shows the TEC falling from 13.79% in 1999 to 10.03% in 2024, less than 4 percentage points over 25 years, with eight consecutive years essentially flat between 2009 and 2016, corroborated by World Bank WITS data (indicator TM.TAX.MANF.SM.FN.ZS) — the cross-year variation in the scaling factor is minimal. Month-to-month variation in TLI is therefore overwhelmingly driven by IND, not by trade policy. At lag 6, TLI_{t-6} is effectively a lagged value of the dependent variable, misidentified as a trade policy instrument.

The coefficient on TLI therefore cannot be given a clear structural interpretation. It cannot be attributed to the trade policy channel — the tariff barely moved. It cannot be attributed to the autoregressive channel — more IND_{t-6} should predict more IND_t, implying a positive coefficient, yet the estimated coefficient is −0.21 in the OLS specification and −0,15 in the VEC specification. A plausible explanation for this negative sign is a spurious secular correlation: the tariff declined gradually while IND was rising on net over the period —

approximately 12% from 1999 to 2024 (IBGE, 2025) — so a falling TLI correlates with a rising IND, producing a negative coefficient in the absence of a time trend. Had a time trend been included, this spurious correlation would have been absorbed and the coefficient on TLI would likely have shrunk toward zero.

The negative sign is also difficult to reconcile with their theoretically framework in a way NFA do not acknowledge. In the new-developmentalist framework they embrace, more protection should support more industrial production — a positive coefficient. The estimated −0.21 (or −0.15) says the opposite: more protection is associated with less industrial production, which is the neoclassical free-trade result. NFA report that the coefficient is statistically significant. They do not comment on its sign.

Finally, the tariff used is a simple mean across the entire tariff universe rather than a measure weighted by the manufacturing industry's sectoral structure, making it an inadequate proxy for the protection relevant to the phenomenon the article investigates.

6. REER and FIN remain endogenous in the article's central equation

The external financial openness variable (FIN), constructed as the sum of monthly gross financial flows as a proportion of trade flows, is subject to the same identification problem as the REER. Capital flows are manifestly endogenous to economic activity. The trade flows composing the denominator are likewise affected by the level of industrial production.

NFA lag REER and FIN by one period, which partially addresses contemporaneous simultaneity — a predetermined regressor cannot be affected by the current period's shock to IND. However, lagging alone is insufficient in the presence of residual autocorrelation. With DW = 1.75 confirming serial correlation in the residuals, REER_{t-1} and FIN_{t-1} remain correlated with the error term at time t through the dynamic structure of IND. This is precisely why BTGC adopt an instrumental variables approach: terms of trade and the broad Dollar index provide variation in the REER that is genuinely orthogonal to shocks originating in the Brazilian manufacturing sector, rather than simply shifting the endogeneity problem back one period.

More fundamentally, NFA's model includes no instrument for FIN, and the same is critically true for the REER. Although NFA estimate a separate equation for the determinants of the real exchange rate (equation 1), the fitted values of that estimation are not used as an instrument for the REER in equation (2): the exchange rate entering the industrial production equation is the observed REER, not the predicted REER. The two-equation structure of the article suggests, but does not constitute, an instrumental variables procedure. Consequently, both the REER and FIN remain endogenous in the article's central equation, and the coefficients reported in Table 5 do not allow a causal interpretation — neither those from OLS nor those from the VEC, since both estimators share the same identification problem in the absence of exclusion restrictions.

This is also the appropriate place to respond to NFA's three criticisms of BTGC. On the first — that BTGC ignore trade and financial liberalization — BTGC do not include tariffs directly, but as argued in the previous section, Brazil's scheduled tariff moved very little over the estimation period according to both Castilho et al. (2025) and World Bank WITS data, making tariffs an unlikely driver of observed variation in industrial production. Financial flows, meanwhile, are implicitly captured by the broad Dollar index used as an instrument in the first stage: when the Dollar appreciates globally, capital flows out of emerging economies, the Real depreciates, and vice-versa. The Dollar index therefore captures the financial openness channel that NFA seek to measure with FIN — but does so through a variable that is plausibly exogenous to Brazilian industrial performance, unlike FIN itself.

On the second — that BTGC use the traditional neoclassical concept of Dutch disease — BTGC's first-stage regression uses terms of trade and the broad Dollar index as instruments precisely because these reflect both the commodity price and capital flow components of Dutch disease. The framework is not neoclassical but agnostic about the source of exchange rate variation: what matters is that the instruments are exogenous, not that they exclude financial factors.

On the third — that BTGC dissociate Dutch disease from real exchange rate appreciation — this criticism also does not hold. BTGC's first stage shows explicitly that terms of trade improvements and Dollar appreciation cause the Real to appreciate; the second stage estimates the effect of that appreciation on the manufacturing share. The causal chain — Dutch disease forces, real appreciation, deindustrialization — is precisely the one NFA invoke. The difference is that BTGC find the quantitative effect insufficient to account for the observed decline. That is a finding, not a dissociation.

7. The VEC does not resolve the identification problems

NFA present the VEC model as a robustness test addressing the potential endogeneity of the real exchange rate. Three qualifications are in order.

First: Johansen's procedure estimates the long-run cointegrating vector without requiring exclusion restrictions, and this is technically correct for I(1) variables. But identifying that variables share a long-run equilibrium relationship is not the same as establishing the direction of causality within that relationship. Knowing that REER and IND are cointegrated does not say whether REER causes IND or IND causes REER — both directions are consistent with the existence of a cointegrating vector. For the estimated coefficients to have causal interpretation in the sense the article requires — that the exchange rate and financial openness determine industrial production, and not the reverse — an additional identification strategy with plausibly exogenous variables is necessary. The VEC, by itself, does not provide that strategy.

Second: the VEC cannot correct the circularity in TLI's construction, nor the endogeneity of FIN. A regressor that is by construction a near-linear function of lagged IND, and a variable without an instrument, are not problems that any system estimator can resolve.

Third: Johansen's procedure correctly handles I(1) variables and does not suffer from the classical spurious regression problem of OLS in levels. But if variables share not only a common stochastic trend — which cointegration captures — but also a common deterministic trend and an uncaptured aggregate demand dynamic, these must be explicitly specified in the cointegrating equation. If these components are absent, the estimated cointegrating vector will absorb part of the common variation attributable to them and redistribute it among the present regressors. This offers a plausible explanation for why the VEC coefficient on the REER (0.74) is nearly three times the OLS coefficient (0.25).

8. The VEC ordering contradicts the article's causal argument

NFA report that the variable ordering in the VEC for equation (2) is: IND, REER, TLI, FIN. Our criticism does not concern the specific coefficients in the table, but the coherence between the ordering adopted and the article's causal argument.

In a Cholesky decomposition, the variable ordered first is assumed to affect all others contemporaneously while itself being unaffected by any of them within the same period. Placing IND first means assuming that industrial production moves first within each month and is not contemporaneously affected by the exchange rate — which is not consistent with

NFA's theoretical argument. The entire article contends that the REER drives manufacturing through Dutch disease, implying the exchange rate should be causally prior to industrial production. An ordering consistent with NFA's theory would place REER first and IND last. By placing IND first, NFA have imposed an identification assumption about short-run dynamics that contradicts the article's causal narrative, without reporting sensitivity analysis to alternative orderings.

9. Absence of counterfactual evaluation

The most direct counterfactual exercise for evaluating NFA's model would be to compute the joint contribution of the three independent variables to the IND trajectory over the period. This exercise would reveal whether the model as a whole can quantitatively account for what happened to Brazilian industrial production between 1999 and 2024.

A partial observation is possible: the BCB series 11752 for the REER, described in NFA's Table A1, is publicly available, and the REER in 2024 is essentially at the same level as in 1999. With NFA's coefficients (0.25, in OLS; 0.74 in VEC), the isolated contribution of the REER over the entire period is approximately zero. This is relevant because the REER is the central channel of the Dutch disease theory NFA apply, and the coefficient with the greatest explanatory power in the model. It is possible, however, that TLI and FIN are doing independent work, and that the joint effect is what matters for evaluating NFA's argument as a whole.

The problem is that the joint exercise cannot be performed by any independent reader. The adjusted tariff series (TLI) comes from an as-yet-unpublished database of Castilho et al. (2025); the financial openness series (FIN) was constructed by the authors and is not publicly available. Without these data, it is not possible to independently verify whether the model as a whole predicts the actual IND trajectory — neither its direction, nor its magnitude, nor its distribution across sub-periods. The R^2 of 0.67 reported in Table 5 indicates that the fitted model tracks the IND reasonably within the sample, but without access to the series it is impossible to know how much of that fit reflects genuine structural relationships and how much results from the specification problems discussed in the preceding sections. The unavailability of data is therefore not merely a procedural matter: it is what renders independent evaluation of the article's central claim impossible.

10. Data availability and replication standards

NFA report, both in footnote 11 and in the Data Availability Statement, that "the entire dataset is available upon request from the authors." Table A1 provides the sources of the series, allowing a diligent reader to reconstruct most of the data — but not to verify the tariff series, which comes from the as-yet-unpublished and inaccessible database of Castilho et al. (2025).

In the case of BTGC, the complete dataset is publicly available on the IEPE/Casa das Garças website, alongside the article itself. Any reader can download the data, reproduce the regressions, verify the counterfactual decomposition, and test alternative specifications — including, for example, the inclusion of a time trend and aggregate demand controls in the deindustrialization equation, which in BTGC prove to be the quantitatively dominant factors.

For an article that makes so strong a causal claim — that Dutch disease was the "principal driver" of Brazil's premature deindustrialization — and that explicitly positions itself against published results by other authors, public data availability is a condition for scientific debate to proceed. A referee or commentator wishing to verify whether the omission of a time trend and aggregate demand control is in fact driving NFA's results cannot do so without either reconstructing the series from scratch or awaiting a response to a data request.

Conclusion

NFA's article represents a valuable effort to empirically test the new-developmentalist Dutch disease framework. The question they address is important and deserves rigorous econometric treatment. Our concern is precisely that the article, as published, does not fully provide that treatment.

The problems accumulate. The dependent variable does not measure what the title claims; the data constraint invoked to justify this choice does not exist, since IBGE's quarterly GDP can be disaggregated to monthly frequency by standard methods, enabling both the correct dependent variable and the aggregate demand control to be computed. The OLS equation lacks lagged dependent variables: the residual autocorrelation confirmed by the Durbin-Watson of 1.75 — which the article's own critical values reject — compromises not only coefficient consistency but the entire statistical inference, a problem specific to OLS that lagging the independent variables does not resolve. The simultaneous absence of a time trend and aggregate demand control inflates coefficients in both estimators — through spurious regression in OLS, through absorption of common deterministic components in the VEC. The trade liberalization variable is circularly constructed: within each year it is by construction proportional to the dependent variable, and, since the scheduled tariff barely changed over the period, month-to-month variation in TLI is overwhelmingly driven by IND rather than by trade policy. In addition, TLI's estimated coefficient carries the wrong sign for NFA's own theoretical framework. REER and FIN remain endogenous in both estimators, since lagging by one period is insufficient in the presence of residual autocorrelation and neither estimator employs instruments or exclusion restrictions capable of identifying causal direction. The VEC, additionally, is ordered inconsistently with the article's causal argument.

Five adjustments appear essential to align NFA's econometric exercise with the phenomenon the article seeks to explain.

First, the dependent variable should be the manufacturing share of value added at constant prices, computed using monthly GDP obtained by monthly disaggregation of IBGE's quarterly National Accounts. With this dependent variable, the structurally appropriate controls are GDP per capita and its square, following Rodrik (2016) and BTGC.

Second, the problems of residual autocorrelation and secular drift must be addressed — whether by including lagged dependent variables, a time trend, or both — before any inference on the coefficients can be considered valid. If the IND in level is maintained, the appropriate aggregate demand control would be monthly GDP lagged one period, which breaks the contemporaneous mechanical link that arises because manufacturing is a component of GDP.

Third, the endogeneity of REER and FIN requires an identification strategy based on plausibly exogenous instrumental variables in an explicit two-stage procedure; lagging the regressors by one period is not a substitute.

Fourth, the trade liberalization variable must be reconstructed as a measure that varies independently of IND — an effective tariff weighted by the manufacturing industry's sectoral structure, interpolated to monthly frequency by a method independent of industrial production, and with data available for independent verification.

Fifth, the complete dataset must be made publicly accessible, enabling any reader to reproduce the results and test alternative specifications.

NFA's agenda of empirically testing the new-developmentalist framework remains important and deserves to be pursued with a more robust specification. NFA's theoretical section invokes the Bresser-Pereira concept of the industrial equilibrium real exchange rate — the rate that

would ensure manufacturing competitiveness — and argues that the market rate is systematically more appreciated than this equilibrium, implying chronic Dutch disease even without a net REER appreciation. Introducing this concept would require a model different from the one specified and estimated in NFA's article. The observed REER is what enters their regression; the deviation from the industrial equilibrium does not. To our knowledge, that deviation has never been estimated in the empirical literature. A more robust specification of the new-developmentalist Dutch disease hypothesis might well begin there.

References

Bacha, E. L.; Terziani, V. S.; Guimarães, E. A.; Considera, C. M. (2025). "Why has Brazil deindustrialized so much? Testing the Dutch disease and premature deindustrialization hypotheses". Revista Brasileira de Economia, Vol. 79, No. 2, e072025.

Bresser-Pereira, L. C. (2008). "The Dutch disease and its neutralization: a Ricardian approach". Brazilian Journal of Political Economy, Vol. 28, No. 1, pp. 47–71.

Bresser-Pereira, L. C. (2020). "New Developmentalism: development macroeconomics for middle-income countries". Cambridge Journal of Economics, Vol. 44, pp. 629–646.

Castilho, M. R.; Passoni, P.; Duarte, A. (2025). Tarifa nominal brasileira, 1983–2024. Unpublished dataset sourced from SECEX (Secretaria de Comércio Exterior do Brasil).

FGV IBRE (2026). *Monitor do PIB-FGV*. Instituto Brasileiro de Economia, Fundação Getulio Vargas, Rio de Janeiro. Monthly estimates of Brazilian GDP in volume and value, based on the methodology of IBGE's National Accounts. Series from 2000. Available at: https://portalibre.fgv.br/en/gdp-monitor

Nassif, A.; Feijó, C.; Araújo, E. (2026). "Is Brazilian premature deindustrialization a case of Dutch disease?". Brazilian Journal of Political Economy, Vol. 46, No. 2, e263791.

Palma, J. G. (2005). "Four sources of de-industrialisation and a new concept of the Dutch disease". In: Ocampo, J. A. (Comp.), Beyond reforms: structural dynamic and macroeconomic vulnerability. Palo Alto: Stanford University Press/World Bank, pp. 71–116.

Rodrik, D. (2016). "Premature deindustrialization". Journal of Economic Growth, Vol. 21, No. 1, pp. 1–33.

World Bank (2026). World Integrated Trade Solution (WITS). Tariff rate, MFN, simple mean, manufactured products (%) — Brazil, indicator TM.TAX.MANF.SM.FN.ZS. Available at: https://data.worldbank.org/indicator/TM.TAX.MANF.SM.FN.ZS?locations=BR