

Arezki, Rabah; van der Ploeg, Frederick; Rota-Graziosi, Gregoire; Lê, Văn Đạo

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The VAT Paradox in Resource Dependent Economies

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Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de

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The VAT Paradox in Resource Dependent Economies

By RABAH AREZKI, FREDERICK VAN DER PLOEG, GREGOIRE ROTA-GRAZIOSI AND
VĂN ĐẠO LÊ*

The introduction of the Value Added Tax (VAT) has been widely perceived as a successful instrument, boosting government revenue and stimulating industrialization. However, in countries that are heavily dependent on exports of natural resources the introduction of the VAT has led on average to lower tax revenues and did not stimulate industrialization. The VAT thus did not help these countries to diversify away from the natural resource sector contrary to its promise. The results indicate a novel channel for the resource curse hinging on the interaction between economic structure and the design of tax systems.

Keywords: Natural resource, tax, industrialization, value added tax

JEL codes: H25, O13, O14

* Arezki is Director of Research at the French National Center for Scientific Research & Senior Fellow at Harvard Kennedy School of Government. Van der Ploeg is Professor at University of Oxford and University of Amsterdam. Rota-Graziosi is Professor at Université Clermont Auvergne. Le-Van is affiliated with the International School at Vietnam National University. We thank Richard Baldwin, Landry Bikai, Patrick Guillaumont, Jean-Pierre Landau, Partha Sen, Lemma Senbet, Tony Venables, and Tarik Youssef for excellent suggestions and comments. We acknowledge the support received from the Agence Nationale de la Recherche of the French government through the program “Investissements d’avenir” (ANR-10-LABX-14-01).

I. Introduction

The introduction of the Value Added Tax (VAT) has been widely perceived as a successful instrument, boosting government revenue and stimulating industrialization. However, in the present paper, we show that in countries that are heavily dependent on exports of natural resources the introduction of the VAT has led on average to lower tax revenues and did not stimulate industrialization. The VAT thus did not help these countries to diversify away from the natural resource sector contrary to its promise. This suggests that the VAT in those countries has failed and should be redesigned or adapted to these countries' characteristics. The results indicate a novel channel for the resource curse hinging on the interaction between economic structure and the design of tax systems—not on Dutch disease or political economy considerations.

The choice of VAT as the subject of our analysis is rooted in its widespread adoption. France pioneered the adoption of the value-added tax (VAT) in 1954. It took over twelve years to implement fully this tax under its modern form (Lauré, 1993; Tristram, 2006).^{1 2} The VAT replaced the pre-existing turnover tax, which entailed a cumulative cascading effect. Since its initial implementation in France in 1954, more than 175 countries have adopted a VAT or a comparable Goods and Services Tax (GST) as of January 2025 (see Figure 1).³ This widespread diffusion reflects the effective role of VAT as cornerstone of modern tax policy, the principal instrument for revenue mobilization in both advanced and developing economies.

¹ First piloted in Côte d'Ivoire, then a French (export-oriented) colony, the VAT concerned initially a limited cohort of French manufacturers, numbering roughly 300,000 firms—that is about 15 percent of all registered enterprises in France. The VAT was subsequently broadened in carefully sequenced stages: the energy sector in 1959; the construction industry in 1963; and then all retailers, artisans, and most agricultural producers with the Act of 6 January 1966, which entered into force on 1 January 1968. By 1967, the French system had been harmonized with the European Economic Community's First and Second VAT Directives.

² In contrast to the more gradual introduction in France, we show global evidence that the speed of adoption of VAT has been rapid on average.

³ A notable exception is the United States which has not yet adopted the VAT.

The VAT is a prominent tool relying on its destination principle, which complemented the tax transition resulting from trade liberalization.⁴ Our objective in this paper is to explore the potential spillovers stemming from the introduction of VAT in terms of both tax revenue mobilization and industrialization, helping to diversify away from the natural resource sector.⁵

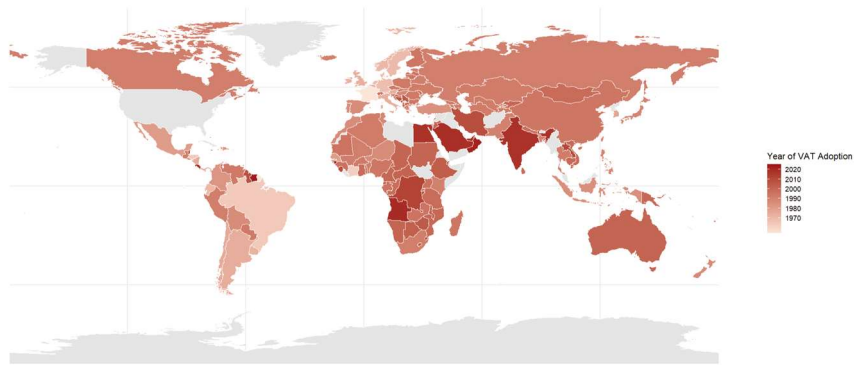


FIGURE 1. WORLDWIDE VAT INTRODUCTION

Notes: The map shows the date of introduction of Value Added Tax (VAT) by country as of January 2025. The darker the shade of red the more recent the adoption. Gray color indicates the country under consideration has not adopted VAT.

Dependence on exports of natural resources leads to macroeconomic challenges. One is the excessive indebtedness of economies experiencing the bust of a resource boom.⁶ Another is the Dutch disease wherein a natural resource discovery or price increase of the exported resource is accompanied by an overvalued real exchange rate, which in turn shrinks the non-resource export sector.⁷ That so-called "resource

⁴ The VAT was introduced concurrently with tariff dismantling and actively reinforced the broader liberalization process. Under the destination principle, the VAT is levied exclusively on domestic consumption. Exporters therefore obtain a full refund of the VAT paid on their inputs. By contrast, a turnover or sales tax is borne by exporters themselves and can attenuate—or even negate—the gains expected from lower customs duties.

⁵ See Lashitew et al. (2021) for a survey of economic diversification in resource dependent economies.

⁶ Arezki, Ramey and Shang (2017) explore the effect of news shocks in open economies using giant oil and gas discoveries showing that economies experiencing giant discoveries borrow from the rest of the world well before extraction starts.

⁷ Eastwood and Venables (1982) show how in the standard neoclassical model, an oil discovery will lead to an appreciation of the real exchange rate, operating through an increase in the relative price of non-tradables. Torvik (2001) shows that the Dutch disease can be avoided in a more sophisticated model by allowing for learning-by-doing in the non-

curse" whether it is through excessive indebtedness or the Dutch disease acts via the expenditure channel as opposed to the tax channel.⁸

However, a priori, there is no good reason to rule out that a potential "tax channel" of the resource curse is less potent than the expenditure channel.⁹ Tax revenue may not just be relatively lower in resource dependent economies, but tax systems may also impede economic diversification. A cursory examination of the data reveals that countries with greater dependence on natural resources have on average lower tax revenues (see Figure 2). That correlation thus warrants further investigation. The present paper fills the gap in the literature on the resource curse by systematically exploring the link between natural resource dependence, taxation and industrialization, exploiting global evidence from the introduction of the VAT.

tradable sector and knowledge spillovers from the non-tradable to tradable sector. See Arezki and Ismail (2013) and references therein for discussion of the mixed empirical evidence in favor of the Dutch disease.

⁸ See van der Ploeg (2011) for a survey of the literature on the so-called resource curse.

⁹ Resource dependence is a particularly pervasive phenomenon for developing countries. Indeed, developing countries being less industrialized and tend to consume fewer natural resources than they produce. That situation lends itself to skewing their economic structure toward dependence on exports of natural resources. Just like with expenditure policy, tax system could thus further distort the economic structure of resource dependent economies. That calls for a comparative analysis of the effect of VAT introduction between resource dependent and non-dependent economies.

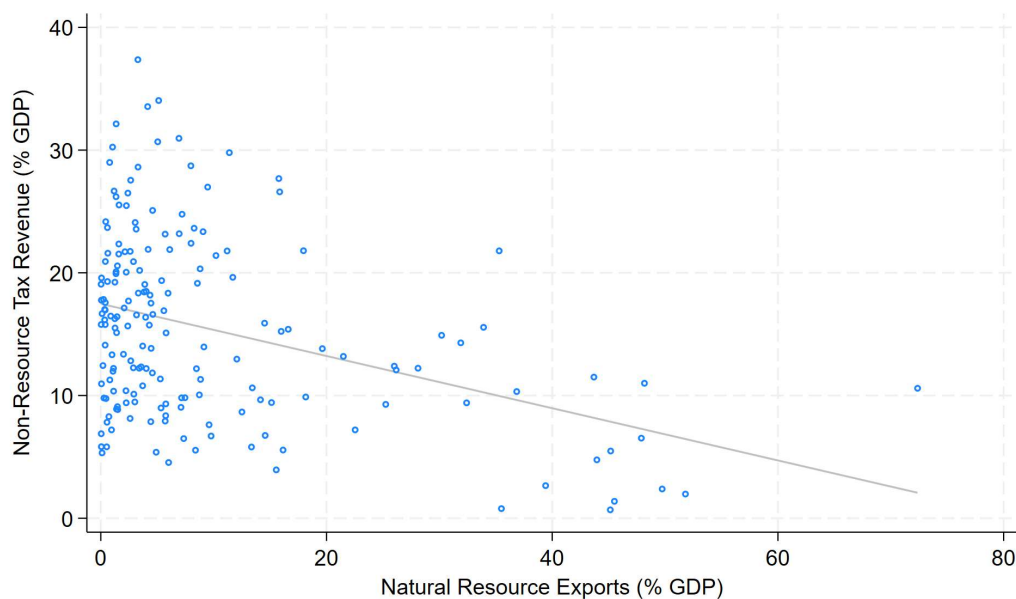


FIGURE 2. NATURAL RESOURCE DEPENDENCE AND TAXATION

Notes: Natural resource exports are the sum of export shares of agricultural raw materials, ores and metals, and fuels obtained from the World Bank, World Development Indicators. Non-resource tax revenue is obtained from subtracting resource revenues from total tax revenue excluding social contributions obtained from the United Nations' Government Revenue Dataset (GRD). All measures are expressed as shares of GDP. Using non-resource GDP instead yields similar results.

A substantial body of literature has examined the performance of VAT systems pointing to mixed results. Keen and Lockwood (2010) find a significant and sustained increase in tax revenue. Bausgaard and Keen (2010) show that low-income countries have generally failed to recover lost trade tax revenues through domestic taxation, including the VAT. An important debate related to the VAT is whether the tax amounts to an export subsidy.¹⁰ Feldstein and Krugman (1990) show theoretically that an ideal, uniform-rate VAT exerts no distortionary influence on either international trade flows or equilibrium resource allocations.

¹⁰ Another debate over the VAT is the controversy over the efficacy of the VAT in developing countries. Emran and Stiglitz (2005) emphasize the coverage gaps associated with VAT. Specifically, the large informal sector may escape the net provided by the VAT. The adoption of the VAT may thus reinforce a form of dualism in these countries. Instead, Keen (2008) pointed out that the VAT taxes all import at the border, and that VAT-liable firms charge VAT on their sales. These two characteristics limit the risk of VAT avoidance by the informal sector.

Interestingly, Benzarti and Tazhitdinova (2021) provide empirical evidence in support of the VAT not being distortive of trade flows across member countries of the European Union. In this paper, we provide evidence that the introduction of the VAT have a differentiated effect on tax revenues and industrialization depending on initial structure of the economy namely the degree of resource export orientation.

To the best of our knowledge, there is no systematic analysis exploring the effect of adoption of the VAT on both tax revenues and industrialization across economies differing in terms of their economic structures. Yet, the performance of the VAT is likely to vary considerably depending on structural factors such as resource dependence. As a consumption-based tax following the destination principle, the VAT subjects exports to zero rate so that goods and services consumed abroad fall outside the domestic tax base. Consequently, exporters are entitled to refunds linked to VAT paid on their inputs. This implies that transitioning from tariffs or sales taxes to a VAT regime may have markedly different fiscal and structural implications for export-oriented economies compared to economies without such a skewed economic structure.

That said, the net effect of VAT introduction on tax revenue remains an empirical question. Indeed, if refunds are implemented fully, the adoption of the VAT could potentially boost the resource sector. In other words, while VAT revenue could be lower, the introduction of the VAT could lead to more direct tax revenue and resource revenue. The interaction of the VAT and economic structure goes beyond the consequences on tax revenues. As mentioned above, the VAT is widely viewed as an instrument purporting to stimulate existing or to create new value chains. In this paper, we explore the effect of the introduction of the VAT on both tax revenues and industrialization.

To do so, we use a global panel dataset to explore the dynamic effects of introduction of the VAT on both tax revenues and industrialization. We find that the VAT has had a heterogeneous effect on (non-resource) tax revenues along the

degree of dependence on resource exports. Further, the introduction of the VAT did not stimulate economic diversification away from the natural resource sector, contrary to its promise. A remarkable feature of the tax channel we uncover is that it does not hinge on political economy considerations.¹¹ We find that the response of imports of goods and services—which are deductible of the VAT under that tax regime—constitutes an important mechanism for our main results. Our findings hence suggest a novel channel for the resource curse, which may be reinforced but does not rely on political economy considerations, hinging solely on the interaction between economic structure and the design of tax systems.

Our results are also related to the literature on the political economy of taxation and state building. Interestingly for the United States, James (2015) finds a negative relationship between resource-based revenues and non-resource tax revenues, and attributes this to the behavior of a benevolent social planner. As natural resource revenues increase, the government reduces its reliance on income taxation so that it can equate the marginal utility derived from public and private consumption, thereby achieving an optimal fiscal balance. In contrast, McGuirk (2013) offers a more political economy-oriented interpretation, positing that the decline in non-resource taxation reflects a deliberate strategy by governments to curtail their fiscal accountability. By minimizing dependence on taxes, which typically necessitate greater transparency, institutional responsiveness, and citizen oversight, governments may seek to consolidate political power and limit democratic pressures.¹² The empirical evidence presented in this paper suggests that, simply put, the design of the VAT subjects resource dependent economies to important

¹¹ Tornell and Lane (1999) describe a “voracity effect” in which a terms of trade windfall leads to state capture by powerful groups. Robinson, Torvik, and Verdier (2014) provide a similar model in which incentives for state capture increase with natural resources exports. See Ross (2012) for examples of rent seeking in the oil industry.

¹² McGuirk (2013) validates the negative relationship between resource rents and the demand for accountability through empirical analyses on households’ surveys in 15 African countries.

challenges both in terms of tax revenues but also in terms of structural transformation and the lack thereof.

The literature linking taxation and state building has emphasized the centrality of building a capable fiscal state (Bräutigam, Fjeldstad, and Moore, 2008; Besley and Persson, 2010 & 2011). The VAT has become a central pillar in the modernization of tax administrations, particularly in developing countries marked by pervasive informality and limited fiscal capacity. Moreover, the VAT collection mechanism transfers a significant share of the collection burden from the tax (and customs) administrations to the private sector. The institutional innovations brought about by the VAT contribute to strengthening the administrative infrastructure required for effective revenue mobilization, thus reinforcing the broader state-building process and the emergence of a capable fiscal state. Notwithstanding the benefit of the VAT in terms of state capacity, our main finding shows that the introduction of the VAT has not been beneficial for economies with distorted structures, namely those dependent on exports of natural resources.

Section II presents the data and the empirical framework. Section III presents our main results. Section IV inspects the mechanism behind our main results. Section V concludes.

II. Data and Empirical Framework

In this section, we present the data and the empirical framework used to explore the link between adoption of the VAT, tax revenues and industrialization.

A. Data

Table A in the Appendix provides the basic statistics related to the variables used in the empirical analysis.

VAT revenue, Non-Resource Tax Revenue and Total Tax Revenue.

Government revenues and its composition are from the Government Revenue Dataset (GRD).¹³ Our main dependent variable is non-resource tax revenues excluding social contributions. It is constructed using the GRD dataset as level and as share of non-resource GDP. Non-resource GDP is calculated using GDP in purchasing power parity (PPP) subtracting the value of natural resource rents obtained from the World Development Indicators from the World Bank.¹⁴ Netting out natural resources rents from tax revenues and GDP allow us to expunge the vagaries of price and quantity fluctuations of natural resources from the analysis. VAT revenue is also obtained from GRD, which offers standardized and cross-country comparable data on government tax revenues, including disaggregated figures for the VAT (Prichard et al., 2014).¹⁵ The dataset distinguishes the VAT from other taxes on goods and services, enabling consistent cross-national comparisons over time. VAT revenue is primarily expressed as a share of non-resource GDP.

VAT adoption. Information on the timing of adoption of the VAT is drawn from VATCalc (2025).¹⁶ In addition, several variables are also obtained from the World Bank, World Development Indicators, such as final consumption expenditure as a percentage of GDP, which is subsequently transformed into final consumption expenditure as a percentage of non-resource GDP following the same adjustment procedure.

Industrialization. The measure of industrialization index is proxied by the Competitive Industrial Performance (CIP) Index,¹⁷ obtained from the United

¹³ See URL link as follows: <https://www.wider.unu.edu/project/grd-government-revenue-dataset>

¹⁴ Natural resource rents are implicitly valued in PPP because of their tradable nature and pricing in US dollars.

¹⁵ See URL link as follows: <https://www.wider.unu.edu/project/grd-government-revenue-dataset>

¹⁶ See URL link as follows: https://www.vatcalc.com/global/how-many-countries-have-vat-or-gst-174/?utm_source=chatgpt.com

¹⁷ See URL link as follows: <https://prosperitydata360.worldbank.org/en/dataset/UNIDO+CIP>

Nations Industrial Development Organization (UNIDO), following the methodology developed by Correa and Todorov (2021). We use three key proxies for industrialization: (i) Share of world manufacturing exports index which captures the extent to which a country is integrated into global manufacturing trade (ii) Share of manufacturing value added (MVA), which is an indicator of a country's relative presence in global export markets in GDP Index, and (iii) Manufactured exports per capita index which reflects a country's contribution to global industrial output and serves as a proxy for international industrial competitiveness.

Natural resource Exports. As a proxy for natural resource exports, we construct an index based on the sum of the following three components, each expressed as a percentage of total merchandise exports: (i) agricultural raw materials exports, (ii) ores and metals exports, and (iii) fuel exports. The underlying data are sourced from the World Bank, World Development Indicators.¹⁸

B. Empirical Framework

Here we present our empirical framework to test the relationship between VAT adoption and non-resource tax revenues as well as industrialization. To estimate the dynamic response of tax revenues (industrialization) resulting from the adoption of the VAT, we employ the Local Projections Difference-in-Differences (LP-DiD) estimator formulated by Dube, Girardi, Jorda, and Taylor (2023). The LP-DiD method offers several key advantages. By reframing the conventional event-study DiD setting as a sequence of local projection regressions, it allows for flexible estimation of impulse response functions without imposing strong parametric assumptions. Importantly, it avoids the negative weighting problem common in

¹⁸ See <https://databank.worldbank.org/source/world-development-indicators>

two-way fixed effects (TWFE) models when treatment timing is binary. It also permits cleaner definition of treated and control units through the “clean control” criterion. The estimator of interest is

$$(1) \quad \Delta^h y_{i,t} = \delta_t^h + \beta^h \cdot \Delta VAT_{i,t} + \sum_{j \neq 0} \theta_j^h \cdot \Delta D_{i,t-j} + \varepsilon_{it}^h,$$

where $y_{i,t}$ denotes the outcome variable (either non-resource tax revenues or industrialization) for country i at time t , $\Delta^h y_{i,t} \equiv y_{i,t+h} - y_{i,t-1}$, and $\Delta VAT_{i,t}$ indicates treatment at time t . The coefficient β^h captures the treatment effect h periods after the adoption of the VAT.

To explore the heterogeneous effects of VAT adoption on relevant outcomes, we split the overall sample in two sub-samples corresponding to the bottom and top 25 percent group of countries in terms of natural resource dependence. We use the first 5-year period when data on tax revenues become available to obtain sub-samples based on ex ante as opposed to ex post characteristics. Further in Section IV, we split the overall sample in terms of income level, the extent of rule of law, and final consumption share to inspect the mechanism through which the introduction of VAT affects tax revenues and industrialization. We also inspect the mechanism behind our main results by analyzing the response of imports of goods and services, which are deductible of the VAT.

III. Main Results

Figures 3 and 4 show the impulse responses of various measures of tax revenues and industrialization following the introduction of the VAT based on LP-DiD. The shaded areas are 90% and 68% (darker gray) confidence bands based on standard errors that are corrected for heteroskedasticity and autocorrelation using robust Heteroskedasticity and Autocorrelation Consistent estimators.

Figure 3 displays the responses of respectively VAT revenues (Panel A), non-resource tax revenues (Panel B), and total tax revenues excluding grants and social security (Panel C). Each panel shows the results for low and high natural resource dependence. The top panels, Panel A.1 and Panel A.2 of Figure 3, show that VAT adoption has a positive effect on VAT revenues for both resource-poor and resource-rich economies. The effect on VAT revenues is persistent across the board.

For resource-poor economies, a peak effect is reached twelve years following the adoption of the VAT, after which the effect starts declining. For resource-rich economies, the effect on VAT revenue bottoms off after five years following VAT adoption. Importantly, the effect on VAT revenues appears much less pronounced for resource-rich economies than for resource-poor economies. As mentioned earlier, VAT adoption in resource dependent economies can (mechanically) lead to lower VAT revenue mobilization. The VAT subjects exports to a zero rate, since goods and services consumed abroad fall outside the domestic tax base. Consequently, exporters are entitled to refunds linked to VAT paid on their inputs. These refunds turn out to be attractive for producers in resource-rich economies. In contrast, predecessor taxes of the VAT such as turnover or sales taxes did not allow any automatic refund mechanism and instead taxed natural resource exports.

The effects of VAT adoption on VAT revenue is thus tied to resource dependence. We also further explore the role of resource dependence on broader measures of tax revenues. It remains an empirical question whether the effect of VAT adoption improved tax revenues whether or not we are considering resource revenues. The second and third panels (Panels B & C) of Figure 3 confirm that the role of resource dependence on the effect of VAT introduction on non-resource tax revenue and overall tax revenues is pronounced. Indeed, Panel B.1 of Figure 3 shows that the effect of VAT introduction on non-resource tax revenue is rising

consistently over time and is statistically significant at conventional levels for the sub-sample of non-resource dependent economies.

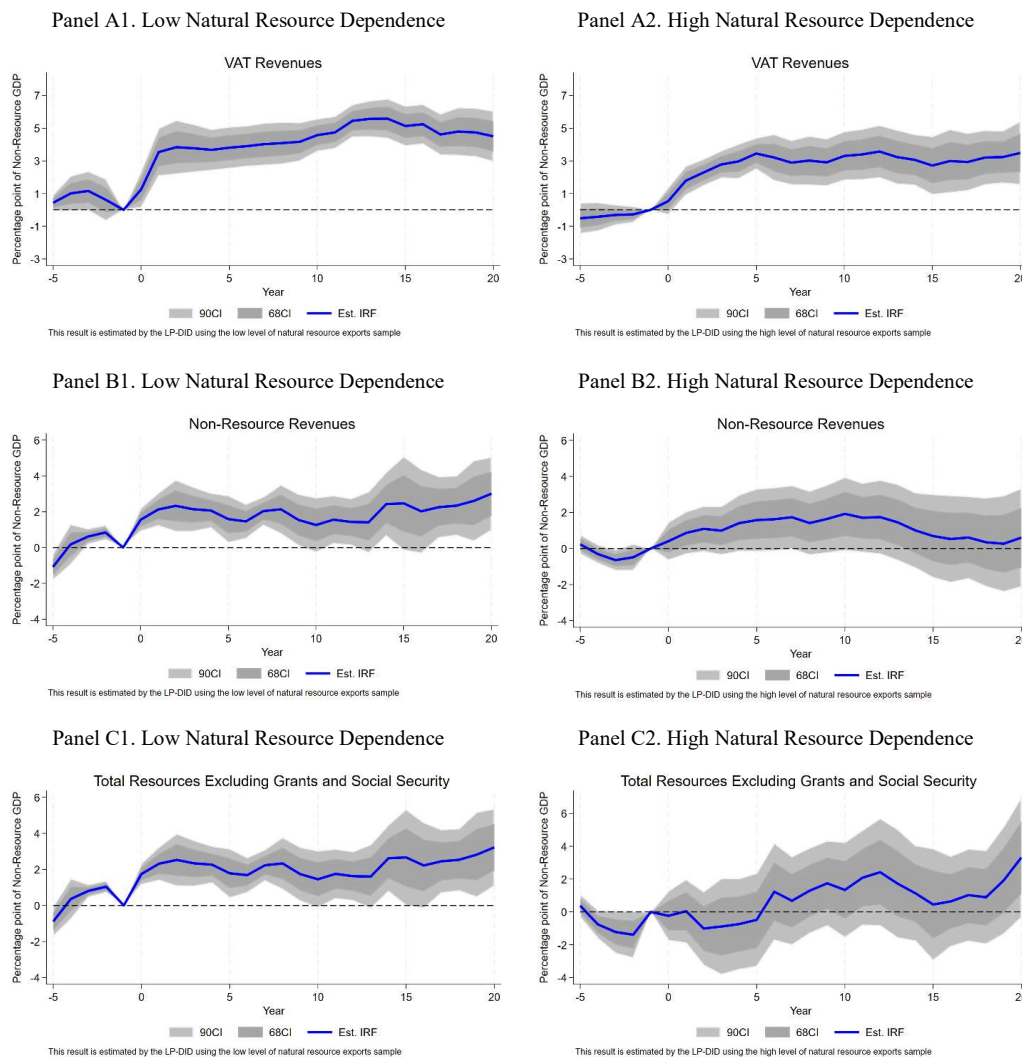


FIGURE 3. IMPULSE RESPONSES OF TAX REVENUES FOLLOWING VAT ADOPTION

Notes: The figure presents impulse responses of various measures of tax revenues (VAT revenues, non-resource revenues, total tax revenues excluding grants and social security) expressed as a share of non-resource GDP. The impulse responses are estimated using the Local Projections Difference-in-Differences method. Panels A1 and A2 examine VAT revenues for countries with low and high levels of natural resource exports, respectively. Panels B1 and B2 investigate non-resource tax revenues for the same subgroups. Panels C1 and C2 depict the effects on total public revenues excluding grants and social security contributions, again distinguishing between countries with low and high natural resource export dependence. The classification into low- and high-resource dependence groups is based on the cross-country distribution of average natural resource exports during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average natural resource export share falls within the bottom or top 25th percentile of this early-period distribution.

Instead, Panel B.2 of Figure 3 shows that the effect on non-resource tax revenue is relatively flat and not statistically significant at 90 percent confidence levels, albeit with a period of significance at 68 percent confidence levels post VAT adoption. Similarly, Panel C.1 and Panel C.2 of Figure 3 show that overall tax revenues are rising and statistically significant for resource-poor economies and flat and statistically insignificant for resource dependent economies. The pattern of the responses of the various tax revenue measures following VAT introduction thus indicates that resource dependence presents a fault line into tax revenue mobilization.

Figure 4 displays the responses of respectively the share of world manufacturing exports index (Panel A), manufactured exports per capita index (Panel B), and the share of world manufacturing value added (MVA) index (Panel C). Each panel shows the results for respectively low and high natural resource dependence. The top panels, Panel A.1 and Panel A.2 of Figure 4, show that VAT adoption has a positive effect on the share of world manufacturing exports index only for resource-poor economies. The effect on VAT revenues is rising and statistically significant at 68 percent confidence levels for these economies but flat and not statistically different from zero for resource-rich economies. As mentioned earlier, one objective of VAT adoption is to promote value chain creation by replacing the cascading effect of turnover or sale taxes favoring vertical integration. In resource-poor economies, the VAT has been successful in encouraging the industrialization process. In contrast, in resource-rich economies, our results indicate that the introduction of the VAT has a muted effect on promotion of manufacturing.

The second and third panels (Panels B & C) of Figure 4 confirm that the heterogeneity of the effect of VAT introduction on manufactured exports per capita index (Panel B), and the share of world MVA index.

Panel A1. Low Natural Resource Dependence

Panel A2. High Natural Resource Dependence

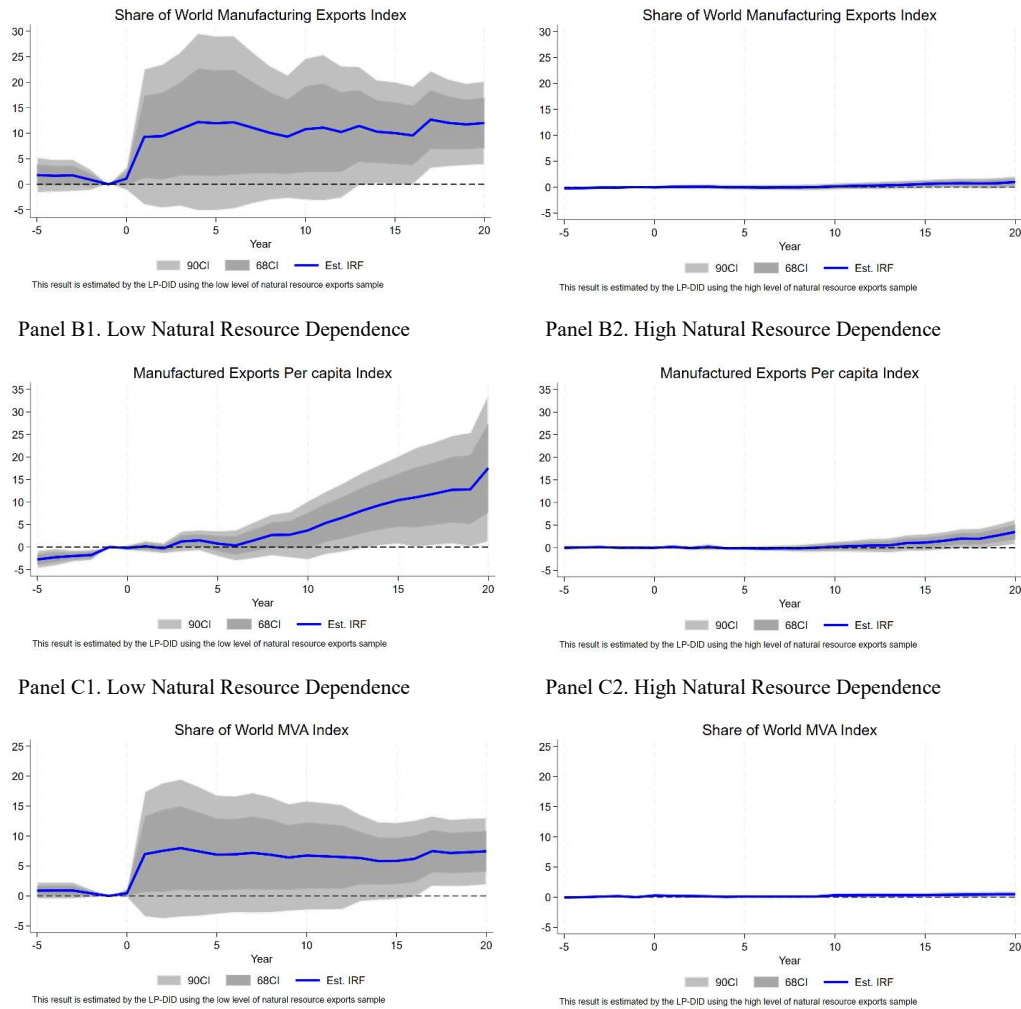


FIGURE 4. IMPULSE RESPONSES OF INDUSTRIALIZATION MEASURES FOLLOWING VAT ADOPTION

Notes: The figure presents the impulse response of the dynamic effects of VAT adoption on various industrialization indices, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 display the trajectory of the Share of World Manufacturing Exports Index, which captures the extent to which a country is integrated into global manufacturing trade, for countries with low and high levels of natural resource exports, respectively. Panels B1 and B2 examine the Manufactured Exports Per Capita Index, an indicator of a country's relative presence in global export markets, for the same subgroups. Panels C1 and C2 present the estimated effects on the Share of World Manufacturing Value Added (MVA) Index, which reflects a country's contribution to global industrial output and serves as a proxy for international industrial competitiveness. The classification into low- and high-resource dependence groups is based on the cross-country distribution of average natural resource exports during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average natural resource export share falls within the bottom or top 25th percentile of this early-period distribution.

Indeed, Panel B.1 of Figure 4 shows that the effect of VAT introduction on manufactured exports per capita index is rising consistently over time and is

statistically significant at conventional levels for the sub-sample of resource-poor economies. Instead, Panel B.2 of Figure 4 shows that the effect on manufactured exports per capita index is flat and not statistically significantly different from zero.

Similarly, Panel C.1 and Panel C.2 of Figure 4 show that the share of world MVA index is rising and statistically significant for resource-poor economies and flat and non-statistically significant for resource-rich economies, respectively.

The pattern of the responses of the various industrialization measures following VAT introduction indicate that the VAT promise in terms of value creation is valid for resource-poor but not for resource-rich economies. Our results are consistent with the notion that VAT introduction acts at the intensive rather than at the extensive margin. VAT introduction thus augments value chains where they pre-exist but does not help where value chains do not pre-exist.

IV. Inspecting the Mechanism

We inspect the mechanism behind our main results through which the introduction of VAT affects tax revenues and industrialization. We have posited that economic structure here specifically resource dependence shapes the effect of VAT introduction on these outcomes. Our main empirical results confirmed that conjecture by documenting the heterogeneous effects of VAT introduction along resource dependence. However, it could be argued that that the “resource” dimension of heterogeneity in the effect of VAT introduction might be linked to other factors not directly linked to economic structure.

As a first pass to inspect the mechanism, we use (final) consumption share, the level of income and the extent of rule of law instead of natural resource dependence. To go deeper into the inspection of the mechanism, we analyze the response of imports of goods and services, which are deductible of VAT under that tax regime.

The results presented in Figure SAI of the Supplementary Appendix show the effect of VAT adoption on various measures of tax revenues based on the consumption share split. Results are like those in Figure 3: economies with high consumption shares experience higher tax revenue mobilization after adoption of the VAT compared to economies with low consumption share. This result is consistent with the notion that the base of the VAT is only domestic consumption and that resource-rich economies tend to have low consumption shares. Results presented in Figure SAII of the Supplementary Appendix show the effect of VAT introduction on industrialization measures. These indicate that economies with high (low) consumption shares benefit from lower (higher) industrialization effects following VAT introduction. We explain this by noting that the samples constituting (high and low) resource dependent economies vs. (high and low) consumption share do not perfectly overlap. While the consumption share is helpful to highlight the mechanism by which the VAT can affect tax revenue mobilization, it is less relevant to explain the effect of industrialization following the introduction of the VAT for economies that differ in terms of resource dependence. In other words, economies with high (low) consumption share do not necessarily have a weak (strong) industrialization base to start with.

When turning to the results using the split along income levels presented in Figures SAIII and SAIV in Supplementary Appendix, the evidence suggests that the income level dimension does not help to explain the heterogeneous effect of the introduction of VAT along resource dependence on outcomes of interest. Indeed, the results in these figures do not show a robust improvement in tax revenue mobilization and industrialization for higher income groups following VAT introduction. Similarly, when splitting the sample along the degree of rule of law, evidence presented in Figures SAV and SAVI in Supplementary Appendix suggests economies with strong rule of law mobilize tax revenue somewhat more—than economies with weak rule of law—but do not systematically industrialize more

following VAT introduction. Overall, the mixed results presented earlier in this section (indirectly) confirm that the heterogeneity of the effect of VAT introduction linked to our main results has much more to do with elements of economic structure and specifically resource dependence—than other economic or institutional dimensions.

We also further inspect further the mechanism behind our main results by exploring whether imports of goods and services increase following the introduction of VAT. Indeed, imports are deductible under the VAT.¹⁹ That could lead to a shortfall in overall tax revenues and industrialization as we have documented. The response of imports of goods and services to introduction of the VAT could thus constitute an important channel of these lower outcomes. In Figure SAVII in Supplementary Appendix, we document that imports have statistically significantly increased in high resource-dependent economies (Panel A1) as opposed to low resource-dependent economies.²⁰ These results shed light on one important channel through which introduction of the VAT could be detrimental to taxation and industrialization outcomes. Of course, there are other potential channels such as the compliance cost of VAT which falls disproportionately on smaller firms. That channel could potentially help explain both lower revenue mobilization and industrialization. We leave the compliance channel of VAT and the differentiated effect on small and large firms for future research.

¹⁹ Incidentally, that deductibility lowers the cost of extractive activities which could further exacerbate resource dependence.

²⁰ Other Panels B, C and D of Figure SAVII in Supplementary Appendix use different split along consumption share, income level and rule law. The latter shows differentiated response of imports across different groupings of economies but less compelling in terms of conceptual explanation as to how VAT introduction plays out—along the dimension of the economic structure namely natural resource dependence.

V. Conclusion

We have explored the dynamic effects of VAT adoption on both tax revenue and industrialization. Results point to the heterogeneous effect of VAT on (non-resource) tax revenues along the degree of dependence on resource exports. Further, the VAT did not help these countries to diversify away from the natural resource sector contrary to its promise. This suggests that the VAT in those countries has failed and should be redesigned or adapted to these countries' characteristics. The results indicate a novel channel for the resource curse hinging on the interaction between economic structure and the design of tax systems—not on Dutch disease or political economy considerations.

Interestingly, China has departed from the standard design of the VAT. China's innovative design could potentially offer lessons for economies with a skewed economic structure and developing economies in general. China's distinctive approach to VAT credit refunds for exporters has attracted attention, particularly for its implications on global trade dynamics (Chandra and Long, 2013; Chor and Manova, 2012).²¹ Initially introduced in 1994 with a standard rate of 17 percent, China's VAT was designed in accordance with the destination principle, thereby entitling exporters to full VAT refunds. However, by 1996, concerns over the fiscal burden of these reimbursements prompted the authorities to introduce rebates—or equivalently partial refunds.²² These rebate policies have since evolved into a

²¹ Over the past decade, exports have consistently accounted for approximately 20 percent of China's GDP, whereas household consumption—VAT base—has hovered around 40 percent of GDP. VAT revenue was around 5 percent of GDP with the standard VAT rate at 17 percent, which has been decreased to 13 percent in 2019.

²² Partial refunds were extended at rates of respectively 3, 6, or 9 percent depending on the category of exported goods. Notably, such mechanisms existed before the VAT system, having been employed under the earlier turnover tax regime as early as 1985 (Chandra and Long, 2013), primarily to mitigate cascading tax effects.

flexible instrument of industrial policy,²³ alternating between export promotion of some goods and domestic revenue mobilization.²⁴

Further research could explore the experience of China in redesigning the VAT. Specifically, research could examine the consequences of such innovation—or equivalently, the departure from a strict application of the destination principle—on both tax revenue and manufacturing including for specific goods. More generally, our results suggest the need for a rethink of the destination principle inherent to the VAT especially in the context of economies that depend on resource exports.²⁵ The source principle could help shield resource dependent economies. Eventually, the relative power to tax between nations might dictate the move away from dominant tax principles.

²³ This policy has been the subject of several dispute settlements at the World Trade Organization.

²⁴ In response to the Asian financial crisis, rebate rates were raised gradually started in 1998 to respectively 5, 13, 15, and 17 percent. They were subsequently reduced starting in 2004 to respectively 5, 8, 11, 13, and 17 percent. The rebate rates were increased again starting in 2009 following the global financial crisis, and later simplified in 2012. Additional adjustments were implemented in 2018 and 2019, aligning the rebate system with successive reductions in the standard VAT rate—from 17 percent to 16 percent in 2018, and to 13 percent in 2019.

²⁵ On December 1 2024, China eliminated any VAT refund for the exportations of aluminum and copper—Announcement No 15 of 2024. One of the explanations provided by the authorities was to achieve sustainable development.

Appendix

Table A. DESCRIPTIVE STATISTICS, VARIABLES, AND UNITS

Variable	Units	Years	OBS	Mean	SD	Min	Max
Value Added Tax Revenue ²⁶	% of Non-Resource GDP	1980-2021	3,787	5.239	3.118	0.000	19.577
Non-Resource Revenues ²⁷	% of Non-Resource GDP	1980-2021	5,985	16.629	7.704	0.121	64.770
Total Resources Excluding Grants and Social Security ²⁸	% of Non-Resource GDP	1980-2021	6,464	17.753	8.670	0.121	100.418
VAT introduction	Year	1966-2025	11,050	1994.488	13.788	1954.000	2025.000
Share in Global Manufacturing Added Index ²⁹	[0,100]	1990-2021	4,864	4.647	13.383	0.000	100.000
Manufactured Exports Per capita Index ³⁰	[0,100]	1990-2021	4,864	8.965	17.309	0.000	100.000
Total natural resources rents	% of merchandise exports	1962-2024	4,864	2.648	10.315	0.000	100.000
Merchandise exports	Trillion current US\$	1960-2023	7,298	30.215	33.923	0.000	803.848
GDP	Trillion current US\$	1960-2023	11,484	0.038	0.152	0.000	3.544
Agricultural raw materials exports ³¹	% of merchandise exports	1962-2024	11,356	0.187	1.050	0.000	27.721
Ores and metals exports ³²	% of merchandise exports	1962-2024	8,904	22.848	320.502	-17.640	23773.130
Fuel exports ³³	% of merchandise exports	1962-2024	7,774	5.990	10.837	0.000	98.947
GDP per capita	PPP, cons US\$	1990-2023	6,587	21618.11	23932.45	510.82	174339.10

²⁶ These are typically categorized under “taxes on goods and services,” but some sources or countries may report VAT collected at borders under “international trade taxes.”

²⁷ Non-resource revenues are government revenues not derived from natural resources such as oil, gas, or minerals. They include taxes on income, profits, and capital gains from non-resource sectors; taxes on goods and services such as VAT and excise duties; trade taxes unrelated to resource exports; and non-tax revenues like administrative fees, fines, and dividends from non-resource state-owned enterprises.

²⁸ This refers to all tax revenues (direct and indirect) minus social security contributions. Social contributions are sometimes treated as a separate category, sometimes included in tax revenue (especially in earlier IMF GFS data), or even excluded entirely, depending on the country and source. For consistent cross-country analysis, data is often reported both inclusive and exclusive of social contributions

²⁹ Measures the value of a country’s manufactured exports divided by its population. It shows how integrated individuals are in global manufacturing trade

³⁰ Indicates a country’s share of total global manufactured exports. It reflects the country’s global export impact.

³¹ “Agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).”

³² “Ores and metals comprise the commodities in SITC sections 27 (crude fertilizer, minerals nes); 28 (metalliferous ores, scrap); and 68 (non-ferrous metals).”

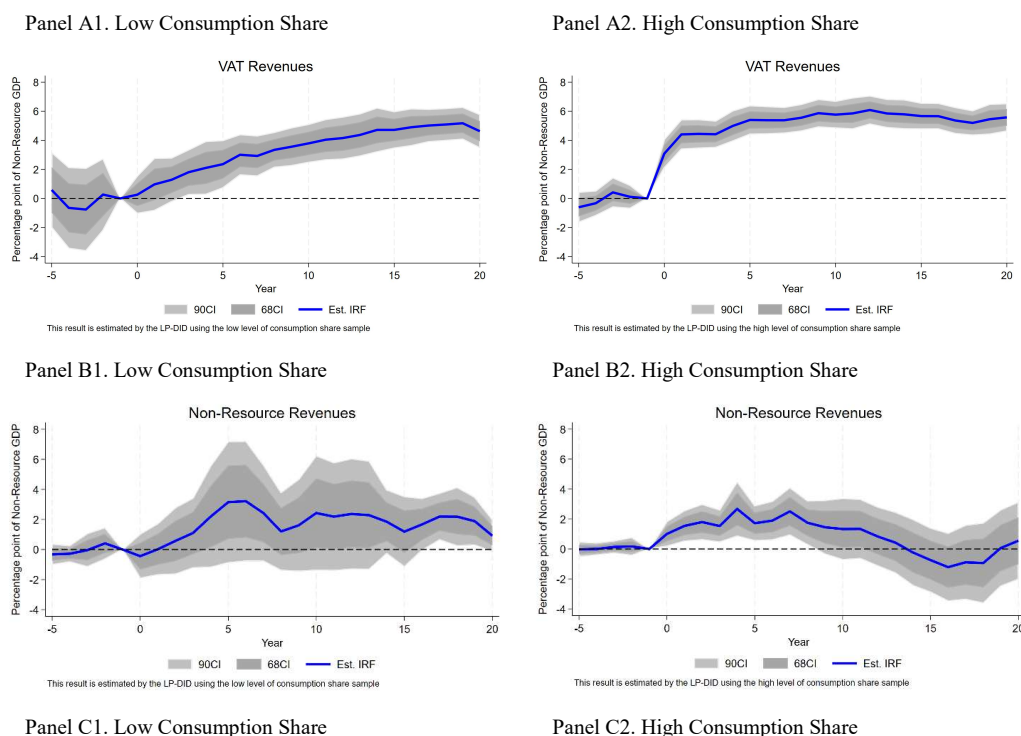
³³ Fuels comprise the commodities in SITC section 3 (mineral fuels, lubricants and related materials).

Rule of Law	z-score	1996-2023	5,078	-0.03	1.00	-2.59	2.12
Imports of goods and services	% of GDP	1960-2023	8,802	41.78	27.28	0.016	429.36
Consumption ³⁴	% of GDP	1960-2023	7,678	8.742	15.963	0.000	158.493

Notes: Total natural resource rents are defined as the aggregate value of agricultural raw materials exports, ores and metals exports, and fuel exports. In the original dataset, tax revenue variables are expressed as a percentage of total GDP. For analytical consistency, these values are rescaled relative to non-resource GDP, where non-resource GDP is calculated as the difference between total GDP and total natural resource rents.

Source: Author calculations.

Supplementary Appendix (Online)



³⁴ “Final consumption expenditure (formerly total consumption) is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure (general government consumption). This estimate includes any statistical discrepancy in the use of resources relative to the supply of resources.”

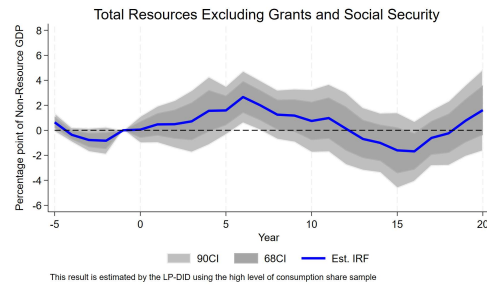
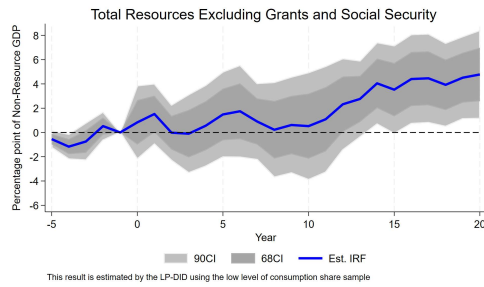
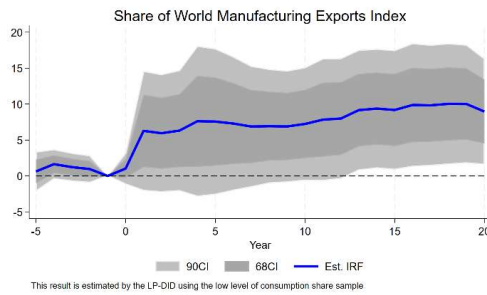


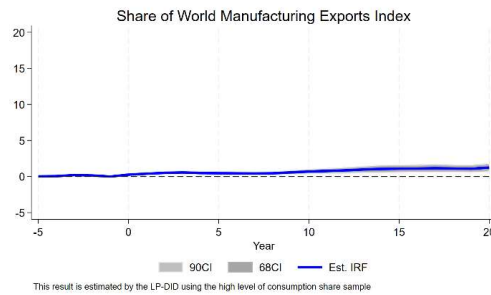
FIGURE SAI. IMPULSE RESPONSES OF TAX REVENUES FOLLOWING VAT ADOPTION

Notes: The figure presents the dynamic impacts of VAT adoption on tax revenues expressed as a share of non-resource GDP, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 examine VAT revenues for countries with low and high levels of consumption share, respectively. Panels B1 and B2 investigate non-resource tax revenues for the same subgroups. Panels C1 and C2 depict the effects on total public revenues excluding grants and social security contributions, again distinguishing between countries with low and high natural resource export dependence. The classification into low- and high-resource dependence groups is based on the cross-country distribution of average consumption share during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average natural resource export share falls within the bottom or top 25th percentile of this early-period distribution.

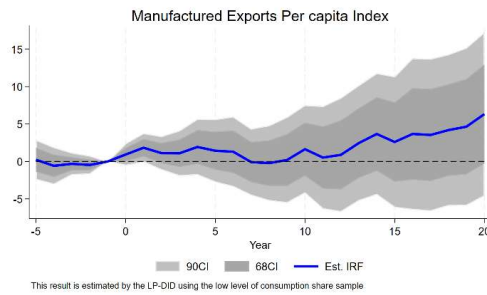
Panel A1. Low Consumption Share



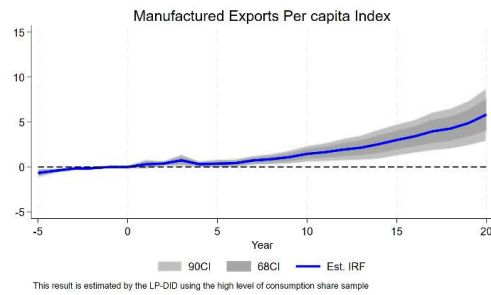
Panel A2. High Consumption Share



Panel B1. Low Consumption Share



Panel B2. High Consumption Share



Panel C1. Low Consumption Share

Panel C2. High Consumption Share

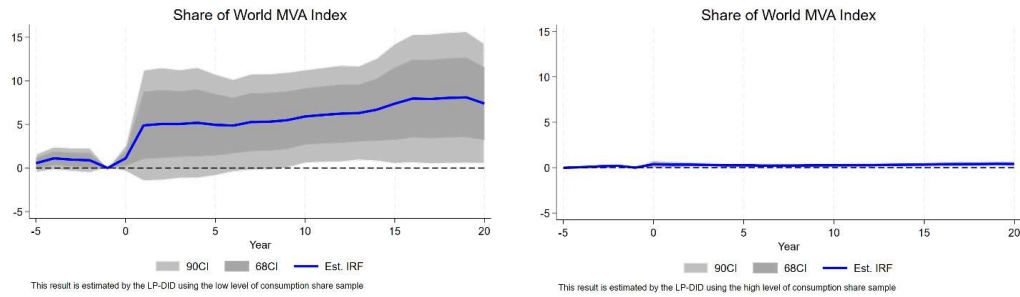
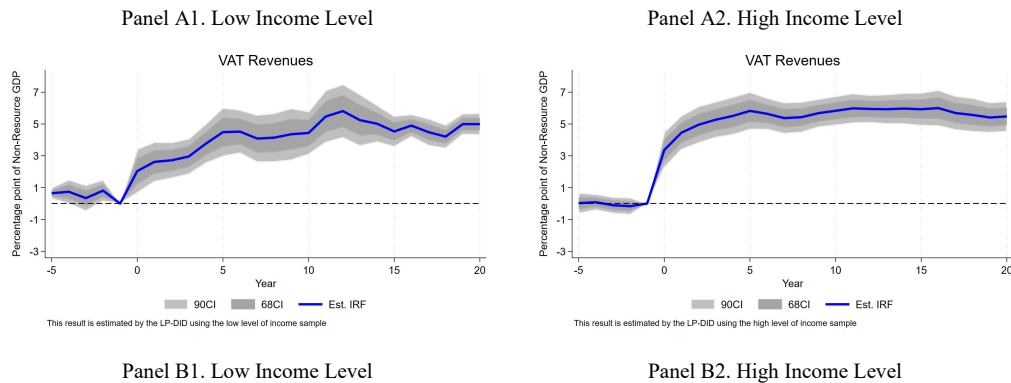


FIGURE SAIL. IMPULSE RESPONSES OF INDUSTRIALIZATION MEASURES FOLLOWING VAT ADOPTION

Notes: The figure illustrates the dynamic effects of VAT adoption on various industrialization indices, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 display the trajectory of the Share of World Manufacturing Exports Index, which captures the extent to which a country is integrated into global manufacturing trade, for countries with low and high levels of consumption share, respectively. Panels B1 and B2 examine the Manufactured Exports Per Capita Index, an indicator of a country's relative presence in global export markets, for the same subgroups. Panels C1 and C2 present the estimated effects on the Share of World Manufacturing Value Added (MVA) Index, which reflects a country's contribution to global industrial output and serves as a proxy for international industrial competitiveness. The classification into low- and high-consumption share groups is based on the cross-country distribution of average consumption share during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average consumption share falls within the bottom or top 25th percentile of this early-period distribution.



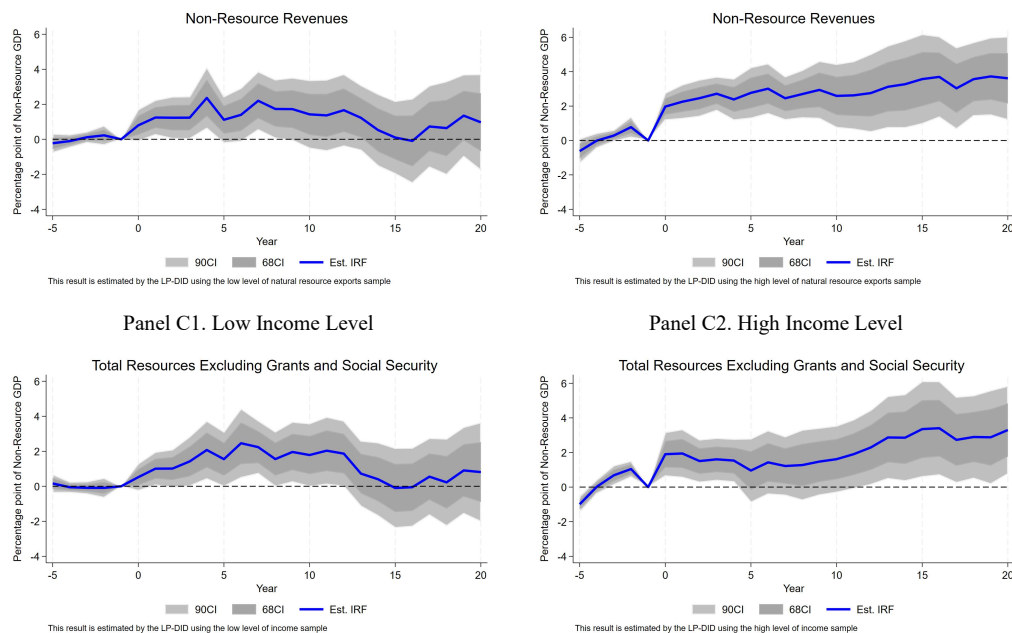
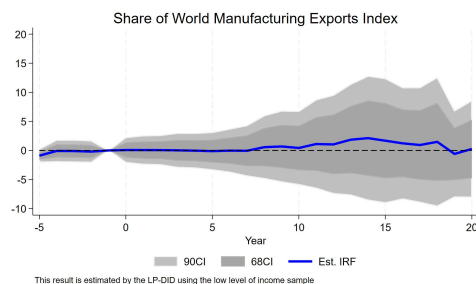


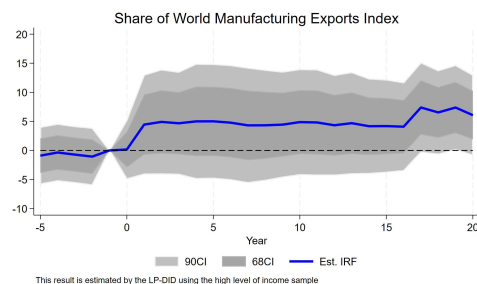
FIGURE SAIII. IMPULSE RESPONSES OF TAX REVENUES FOLLOWING VAT ADOPTION

Notes: The figure presents impulse responses of various measures of tax revenues (VAT revenues, non-resource revenues, total tax revenues excluding grants and social security) expressed as a share of non-resource GDP. The impulse responses are estimated using the Local Projections Difference-in-Differences method. Panels A1 and A2 examine VAT revenues for countries with low and high levels of income, respectively. Panels B1 and B2 investigate non-resource tax revenues for the same subgroups. Panels C1 and C2 depict the effects on total public revenues excluding grants and social security contributions, again distinguishing between countries with low- and high- income levels. The classification into low- and high-income groups is based on the cross-country distribution of average income during the first five years in which GDP Per capita (PPP, cons US\$) data are available (1990-1994). Specifically, countries are grouped according to whether their average GDP per capita falls within the bottom or top 25th percentile of this early-period distribution.

Panel A1. Low Income Level



Panel A2. High Income Level



Panel B1. Low Income Level

Panel B2. High Income Level

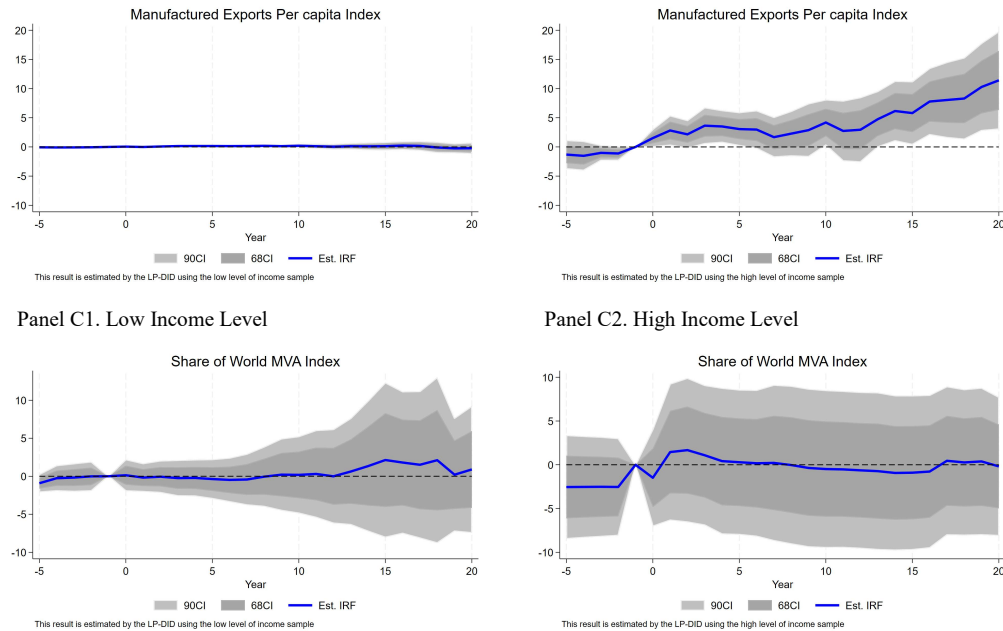
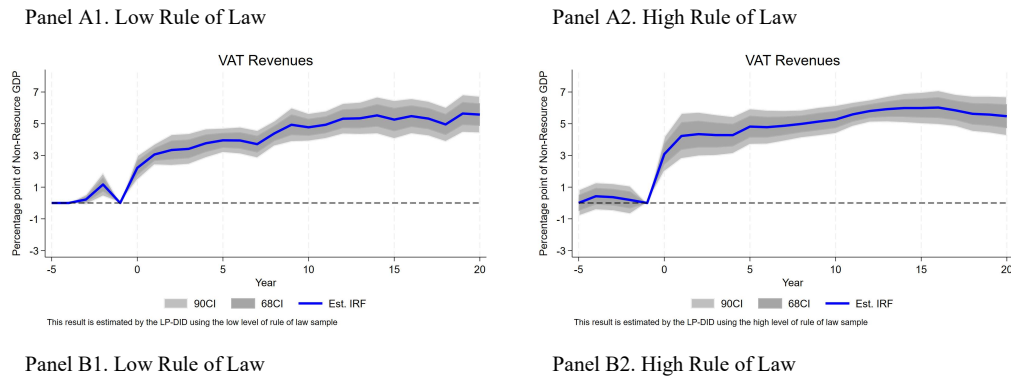


FIGURE SAIV. IMPULSE RESPONSES OF INDUSTRIALIZATION MEASURES FOLLOWING VAT ADOPTION

Notes: The figure presents the impulse response of the dynamic effects of VAT adoption on various industrialization indices, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 display the trajectory of the Share of World Manufacturing Exports Index, which captures the extent to which a country is integrated into global manufacturing trade, for countries with low and high levels of income, respectively. Panels B1 and B2 examine the Manufactured Exports Per Capita Index, an indicator of a country's relative presence in global export markets, for the same subgroups. Panels C1 and C2 present the estimated effects on the Share of World Manufacturing Value Added (MVA) Index, which reflects a country's contribution to global industrial output and serves as a proxy for international industrial competitiveness. The classification into low- and high-income groups is based on the cross-country distribution of average income during the first five years in which GDP Per capita (PPP, cons US\$) data are available (1990-1994). Specifically, countries are grouped according to whether their GDP per capita falls within the bottom or top 25th percentile of this early-period distribution.



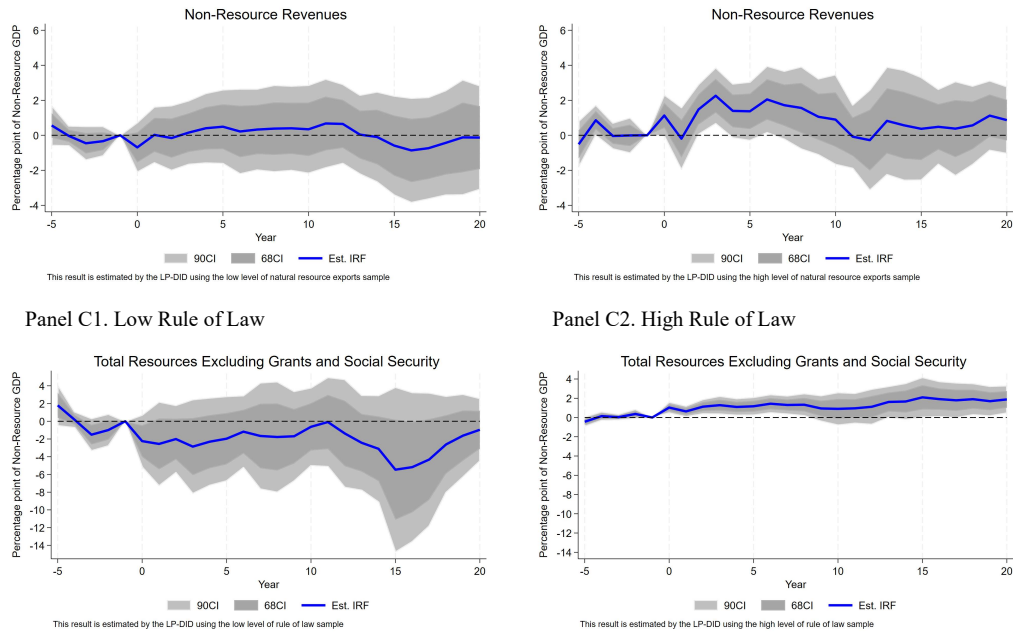
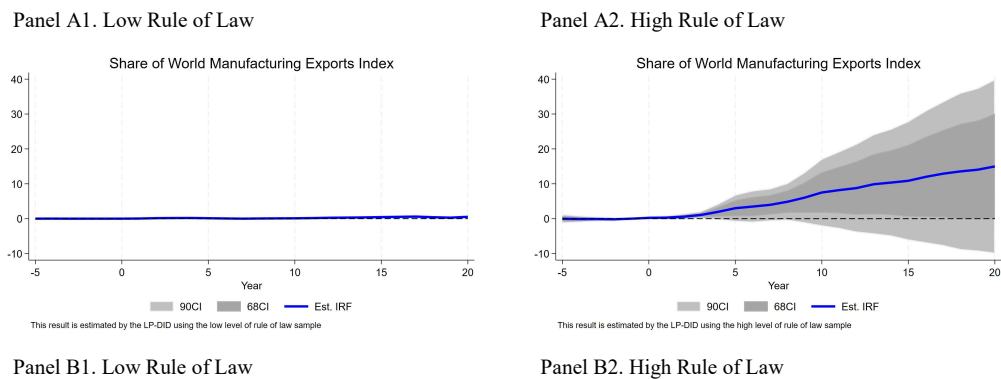
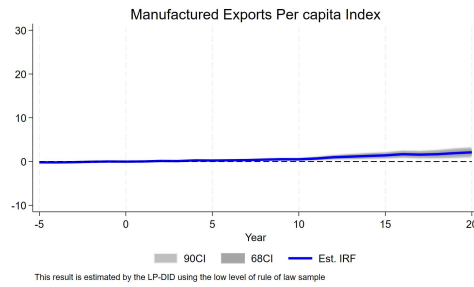


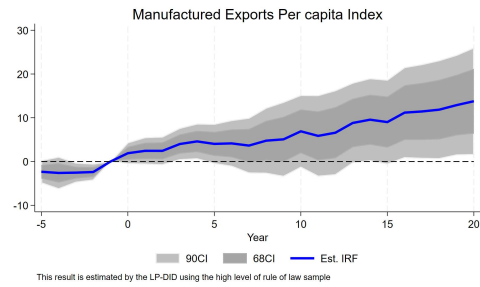
FIGURE SAV. IMPULSE RESPONSES OF TAX REVENUES FOLLOWING VAT ADOPTION

Notes: The figure presents the dynamic impacts of VAT adoption on tax revenues expressed as a share of non-resource GDP, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 examine VAT revenues for countries with low and high levels of rule of law, respectively. Panels B1 and B2 investigate non-resource tax revenues for the same subgroups. Panels C1 and C2 depict the effects on total public revenues excluding grants and social security contributions, again distinguishing between countries with low- and high- rule of law levels. The classification into low- and high-rule of law groups is based on the cross-country distribution of average rule of law index during the first five years in which rule of law data are available (1996-2000). Specifically, countries are grouped according to whether their average rule of law index falls within the bottom or top 25th percentile of this early-period distribution.





Panel C1. Low Rule of Law



Panel C2. High Rule of Law

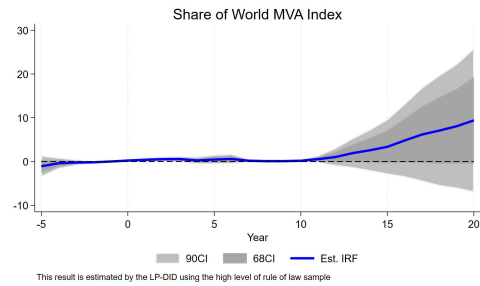
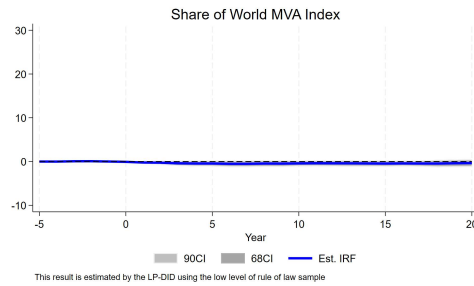
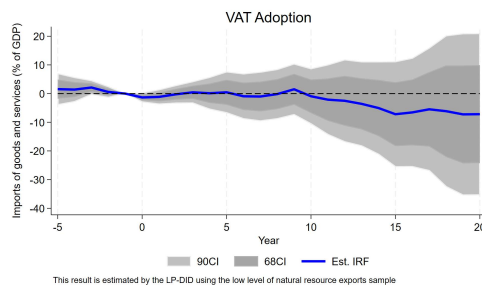


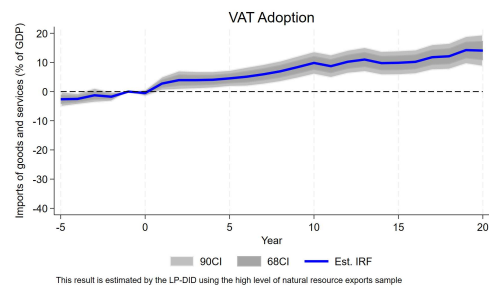
FIGURE SAVI. IMPULSE RESPONSES OF INDUSTRIALIZATION MEASURES FOLLOWING VAT ADOPTION

Notes: The figure illustrates the dynamic effects of VAT adoption on various industrialization indices, estimated using the Local Projections Difference-in-Differences approach. Panels A1 and A2 display the trajectory of the Share of World Manufacturing Exports Index, which captures the extent to which a country is integrated into global manufacturing trade, for countries with low and high levels of rule of law, respectively. Panels B1 and B2 examine the Manufactured Exports Per Capita Index, an indicator of a country's relative presence in global export markets, for the same subgroups. Panels C1 and C2 present the estimated effects on the Share of World Manufacturing Value Added (MVA) Index, which reflects a country's contribution to global industrial output and serves as a proxy for international industrial competitiveness. The classification into low- and high-rule of law groups is based on the cross-country distribution of average rule of law index during the first five years in which rule of law data are available (1996-2000). Specifically, countries are grouped according to whether their average rule of law falls within the bottom or top 25th percentile of this early-period distribution.

Panel A1. Low Natural Resource Dependence



Panel A2. High Natural Resource Dependence



Panel B1. Low Consumption Share

Panel B2. High Consumption Share

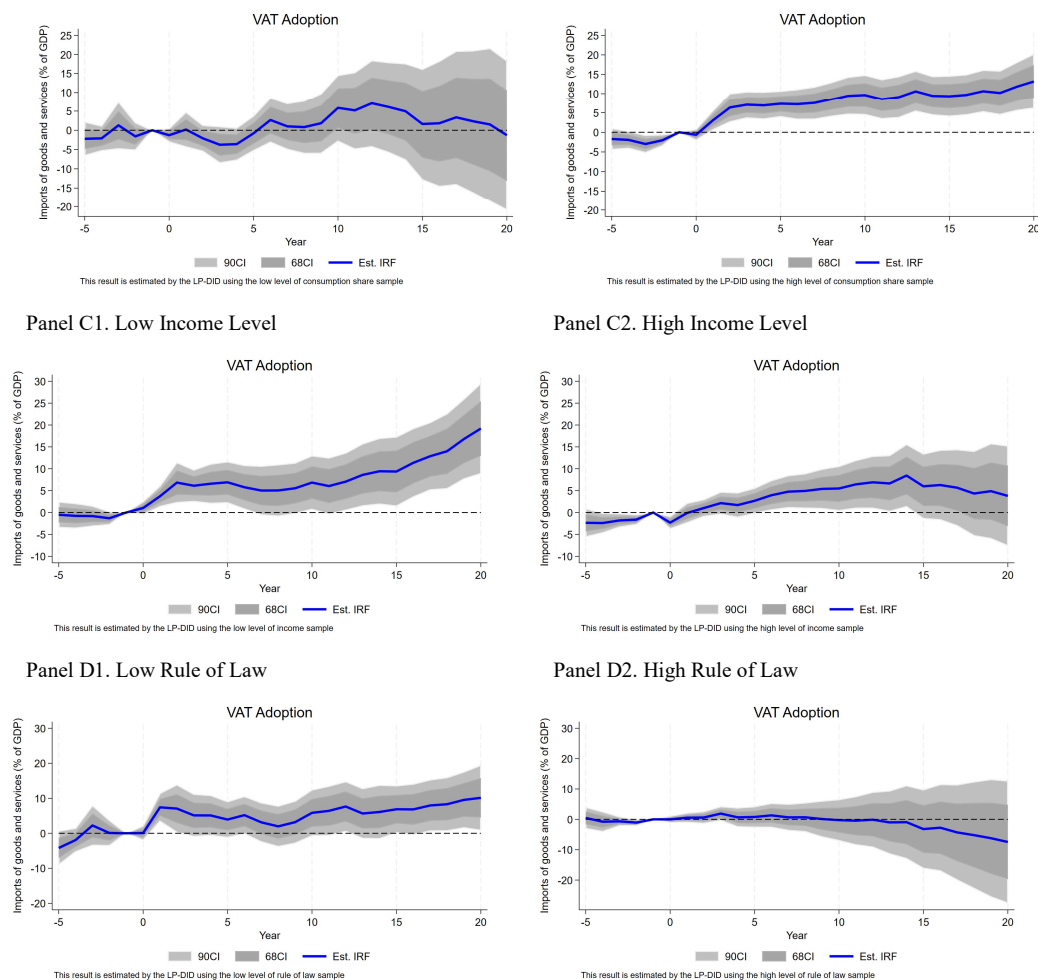


FIGURE SAVII. IMPULSE RESPONSES OF IMPORTS FOLLOWING VAT ADOPTION

Notes: The figure presents impulse responses of various measures of imports of goods and services (% of GDP). The impulse responses are estimated using the Local Projections Difference-in-Differences method.

Panels A1 and A2 examine imports of goods and services for countries with low and high levels of natural resources, respectively. The classification into low- and high-resource dependence groups is based on the cross-country distribution of average natural resource exports during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average natural resource export share falls within the bottom or top 25th percentile of this early-period distribution.

Panels B1 and B2 examine imports of goods and services for countries with low and high levels of consumption share, respectively. The classification into low- and high-consumption share groups is based on the cross-country distribution of average consumption share during the first five years in which tax revenue data are available (1980-1984). Specifically, countries are grouped according to whether their average consumption share falls within the bottom or top 25th percentile of this early-period distribution.

Panels C1 and C2 examine imports of goods and services for countries with low and high levels of income, respectively. The classification into low- and high-income groups is based on the cross-country distribution of average income during the first five years in which GDP Per capita (PPP, cons US\$) data are available (1990-1994). Specifically, countries are grouped according to whether their average GDP per capita falls within the bottom or top 25th percentile of this early-period distribution.

Panels D1 and D2 examine imports of goods and services for countries with low and high levels of rule of law, respectively. The classification into low- and high-rule of law groups is based on the cross-country distribution of average rule of law index during the first five years in which rule of law data are available (1996-2000). Specifically, countries are grouped according to whether their average rule of law falls within the bottom or top 25th percentile of this early-period distribution.

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