Assessing the influence of three policies on Vietnam's economic development: Electricity infrastructure, globalization, and privatization

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Abstract

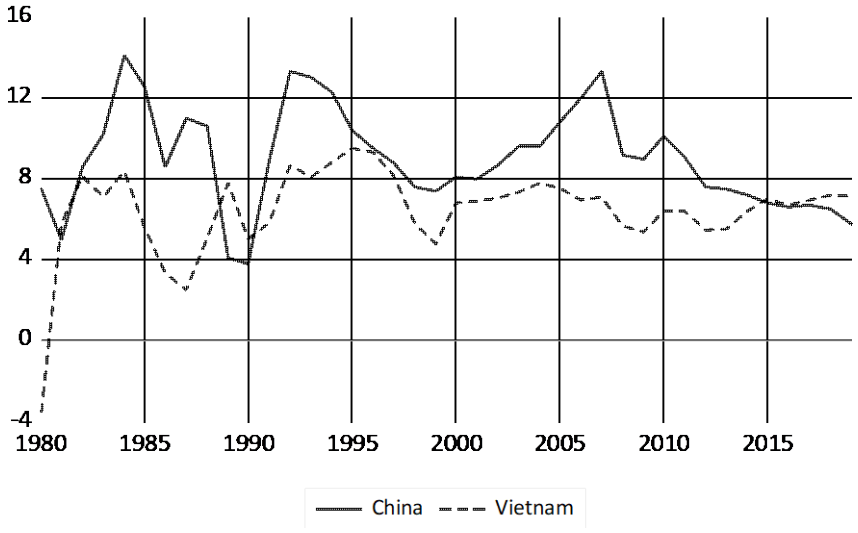
We assessed three key policies – electricity infrastructure, globalization, and privatization – to understand their respective contributions to Vietnam's economic growth from 1980 to 2018. Vietnam's economic development from 1980 onward can be divided into two distinct periods. The first period, from 1980 to 1997 (Period I), was marked by high but unstable growth. The second period, from 1998 to 2018 (Period II), saw sustained high growth with stability. To understand how these three factors influenced GDP growth during these two periods, we applied vector autoregressive (VAR) analysis alongside impulse response analysis. Our findings indicate that in Period I, while both globalization and energy infrastructure had immediate and notably positive impacts on GDP growth rates, their simultaneous influence led to instability in GDP growth during this period. However, in Period II, the impact of energy infrastructure and openness on GDP growth remained positive but relatively small. The privatization policy replaced earlier policies and had a major lasting impact on the economy. Concurrently, the Vietnamese economy demonstrated increased resilience to policy shocks, and the privatization policy played a crucial role in the stable, high growth experienced in 1998 and beyond.
(185 words)

Keywords: development, energy, globalization, privatization, reform
JEL: O15, O53, O55

1. INTRODUCTION

Identifying factors contributing to economic growth is a central concern of the field of Development Economics. As a widely acknowledged example of a "development success story," Vietnam is an important place to study this issue. In 1980, the country was among the poorest in the world. Since that time, per capita GDP growth has been second only to China, averaging more than six percent a year to 2020 and being largely unaffected by such events as the Asian Financial Crisis of 1997 or the Global Financial Crisis of 2007-8. Already by 2008, *The Economist* had labelled Vietnam, alongside China, as "Asia's other miracle" (Economist 2008). By 2014, 40 million people – roughly half the population – had been lifted out of poverty, access to electricity and secondary education was effectively 100 percent, and the nation had ascended to "lower-middle-income" status. Today, having weathered the Covid pandemic and with the economy growing at a robust 8 percent in 2022, Vietnam's reputation as a model of sustained economic growth seems more secure than ever. The following figure shows annual growth rates in Vietnam and China between 1980 and 2018.

Figure 1. GDP growth rate



Regarding Vietnam, three things emerge from this figure. First is the transition from a period of economic contraction in the late 1970s and the beginning of rapid economic growth by 1982. Second is the high average rate of growth across the entire period of more than 6.4 percent. And third is the existence of a clear break point in 1997, where growth rates stabilized.

Table 1. Average growth rates and their s.d.

	Vietnam		China	
Period	**Ave. growth rate (%)**	**s.d.**	**Ave. growth rate (%)**	**s.d.**
I. 1980 - 1997	6.3	3.18	9.6	3.05
II. 1998 - 2019	6.6	0.79	8.5	1.87

As a result, the history of Vietnam's economic growth can be divided in two periods, one which we term "unstable high growth" and the other "stable high growth." In the first period, while growth rates reached as high as eight or nine percent, they also fell as low as two or three. In other words, there are large fluctuations. Conversely, during the "stable high growth" period, rates remained relatively constant. The comparison with China in the same period, where the standard deviation in annual growth rates was more than double that of Vietnam, is instructive. Thus the "Vietnamese miracle" is not just high rates of economic growth, but more specifically the achievement of *stable* high growth in the period after 1998.

How can we account for Vietnam's growth since 1980? Many studies on Vietnam's economic development have concentrated on the connection between energy consumption and economic growth. For instance, Tang et al. (2016) identified Granger causality, showing that energy consumption drives economic growth. In contrast, Binh (2011), Canh (2011), and Loi (2012) discovered a different causal relationship, indicating that GDP leads to changes in energy consumption. Additionally, Anwar and Nguyen (2010) explore the link between globalization, represented by foreign direct investment, and economic growth.

Instead of establishing causality, this paper aims to assess the relative significance of three development policies - electricity infrastructure, globalization, and privatization - in their contribution to Vietnam's economic growth post-1980 and their role in shaping the era of "stable high growth" after 1998. In essence, this study concentrates on the effectiveness of three critical economic development policies that have been previously examined independently for their impact on economic growth.

In summary, we employed autoregressive analysis in combination with impulse response analysis. During Period I, both globalization and energy infrastructure had an immediate and notably positive effect on GDP growth rates. Notably, globalization had twice the impact on GDP growth compared to energy infrastructure. Collectively, these factors explained 97% of the fluctuations in GDP growth during that period, underscoring that policy changes in these domains were significant driving forces of the volatile GDP growth rates in that timeframe.

In Period II, the favorable impacts of energy infrastructure and globalization on GDP growth continued, albeit to a lesser extent. Meanwhile, the introduction of privatization initiatives started to have a more noticeable influence on GDP growth compared to the other two factors, although these effects remained relatively modest when contrasted with Period I. In fact, during this period, these factors only accounted for 40% of the variations in GDP growth.

The sustained and remarkable high growth in Vietnam, often termed the "Vietnam miracle" since 1998, is notably significant. In a broader perspective, our study underscores the essential roles that globalization and privatization have played in the growth of the Vietnamese economy since 1980. This finding aligns with the conventional understanding of Vietnam's economic development, which places significant emphasis on globalization and privatization. Additionally, it emphasizes the pivotal role of energy infrastructure in laying the foundation for future growth.

The remainder of this paper is organized as follows. Section 2 provides historical background along the three axes of 2.1: Electricity Infrastructure, 2.2: Globalization, and 2.3: Privatization. Section 3 presents our empirical analysis, including 3.1: Methods; 3.2: Data; and 3.3: Results. Section 4 discusses these results in their historical context, and Section 5 concludes.

2. Historical background of three policies

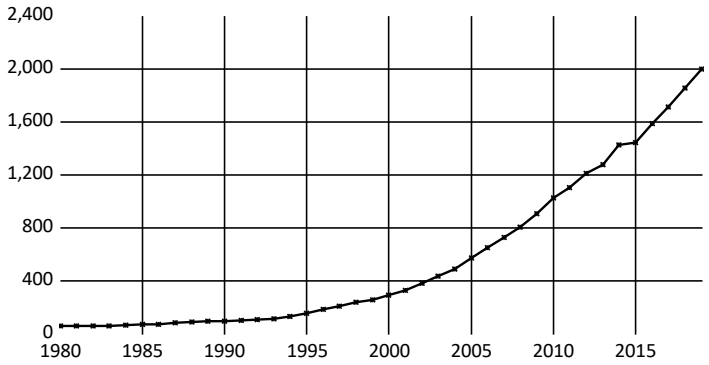
Here we'll give a brief overview of Vietnam's economic development since 1980 from a historical perspective. We will focus on three main policies: electricity infrastructure, globalization, and privatization.

2.1 Electricity infrastructure

We assess the state of electricity infrastructure policy by examining annual per capita electric power consumption data. This data is sourced from the World Bank and supplemented with information from Our World in Data (Ritchie and Roser 2022; WB 2015). These statistics reflect two critical aspects of electricity infrastructure: the ability to generate electricity and the capacity to deliver it to various consumer sectors, including industrial, agricultural, commercial, and domestic users. Vietnamese planners inherited from their Soviet advisors a belief in the fundamental importance of electricity infrastructure for the construction of an advanced socialist economy. Together, in 1960 they drew up the nation’s first “Power Development Plan” (PDP, Quy hoach Phat trien Dien luc) modeled on similar plans for the electrification of the USSR that had first been issued in 1920. The PDPs, published every ten years, still set out the main features of the

nation's future energy landscape. The centerpiece of the first PDP and a "priority project" of the nation's first Five Year Plan was the Thac Ba hydroelectric facility. Despite the threat of American bombs, construction on the dam proceeded throughout the war years and it entered operation in 1972. Even with the war still raging, by the early 1970s, Vietnamese officials had already formulated plans to exploit the soon-to-be-reunified nation's energy resources: the coal fields in the northern province of Quang Ninh, the hydroelectric potential of the Da, Sesan, and Dong Nai river basins, and, as their extent became clear, the newly-discovered gas fields off of Vung Tau.

Figure 2. Electric power per-capita consumption (KWh)



Unfortunately, constructing the nation's new electricity infrastructure would take capital, expertise, labor, and time. Thus, the immediate postwar years saw consumption of electricity remain at exceptionally low levels as the nation repaired and reallocated existing equipment and struggled with dependence on imports of Soviet oil and gas. One response was the imposition of brutally simple rationing schemes that saw households allocated power one day out of three. Throughout the period, however, the state poured resources into the construction of electricity infrastructure.

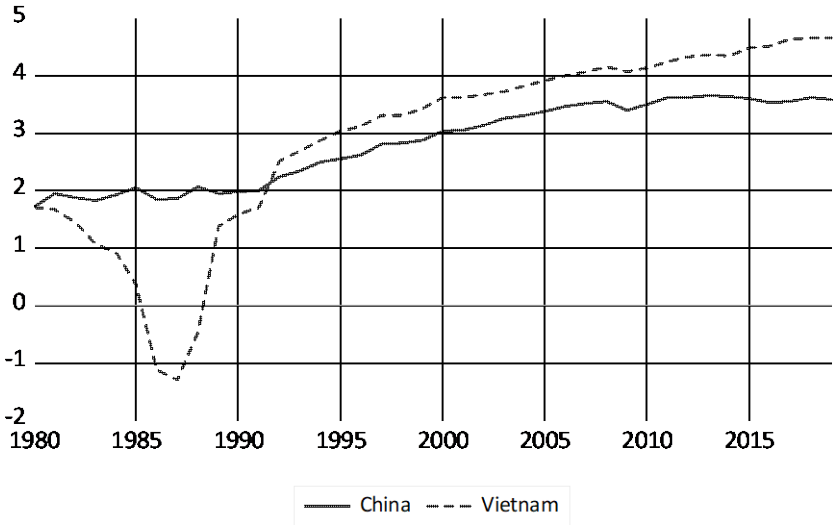
Vietnamese policymakers also prioritized the development of a modern, high-voltage transmission grid. The most salient example is the 1487 km-long 500 KV high-voltage transmission line begun in 1990 and completed in 1994. At the time of its construction, it was the longest high-voltage line in the world. The immediate function of the line was to link the north's hydropower to the south's industrial capacity. More broadly, the line provided impetus for the extension and connection of local grids that helped bring rates of electrification from just 2.5 percent of the population in 1975 to more than 78 percent by 1997 (ADB 2019; WB 2023a). Since then, the state has continued to prioritize the construction of high-voltage transmission lines, adding a second circuit to the original N-S line in 2005 and a third in 2022. The lines are part of a long-term effort to facilitate the

efficient allocation of electricity from a constantly shifting mix of sources that after 2018 included a rapidly increase in solar and wind electricity production.

2.2 Globalization

To measure the openness of the Vietnamese economy we rely on the data from Penn World Table 10, as shown in Figure 3, which represents the total value of exports and imports as a percentage of GDP (Penn 2020).

Figure 3. Globalization measure (ratio scale)

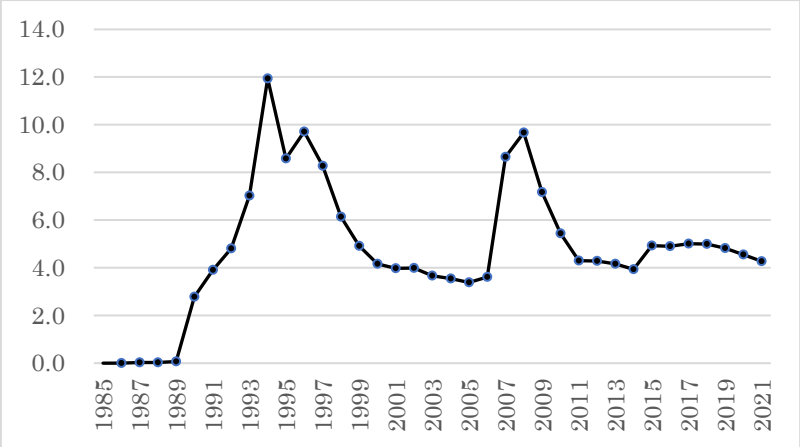


Through the 1980s, imports, exports, and aid and investment inflows were confined largely to the country's Eastern Bloc allies, most notably the USSR, but also the German Democratic Republic and Czechoslovakia. In addition to flows that were explicitly labelled aid, trade was also conducted on terms preferential to the Vietnamese, constituting an effective subsidy. Flows of trade and aid with the Eastern Bloc, which had already begun to drop in the early 1980s, plunged in 1985 when Mikhael Gorbachev announced the end Soviet support for the Vietnamese economy. One result was the passage of a first Vietnamese law on foreign investment in 1987 and an aggressive effort to court trade and investment from new partners, particularly in Asia. Trade and investment flows with countries like Singapore, Malaysia, Taiwan, and Japan help explain how Vietnamese trade rebounded rapidly from the termination of Eastern Bloc aid and had begun a period of steady increase by 1992 (Beresford and Đặng 2000; Fforde and De Vylder 2020).

The 2000s brought a series of bilateral and multilateral agreements on trade such as the 2001 Bilateral Trade Agreement with the US and in 2007 Vietnam's membership in

the WTO. These agreements brought the gradual dismantling of remaining barriers to trade and investment. Perhaps the most significant development of the period was the increase in trade and investment with China. Starting from essentially zero in the early 1990s, China rapidly became Vietnam's most important trading partner, with trade between the two countries in 2018 reaching USD 106.7 billion, or 22.2 percent of the total import-export value. Other major trade partners included South Korea, with 13.7 percent of total trade, the United States with 12.6 percent; and Japan with 7.9 percent. Foreign Direct Investment (FDI) flows also demonstrate Vietnam's integration into the Asia-Pacific region's economy. Singapore, Korea, China, and Taiwan are the primary sources of foreign investment capital, as shown in Figure 4. Consequently, Vietnam has transitioned from being one of the least open economies in the 1980s to ranking among the top ten most open economies globally by 2021, as reported by MOF in 2019 and WB in 2022.

Figure 4. Foreign direct investment, net inflows as share of GDP (%)

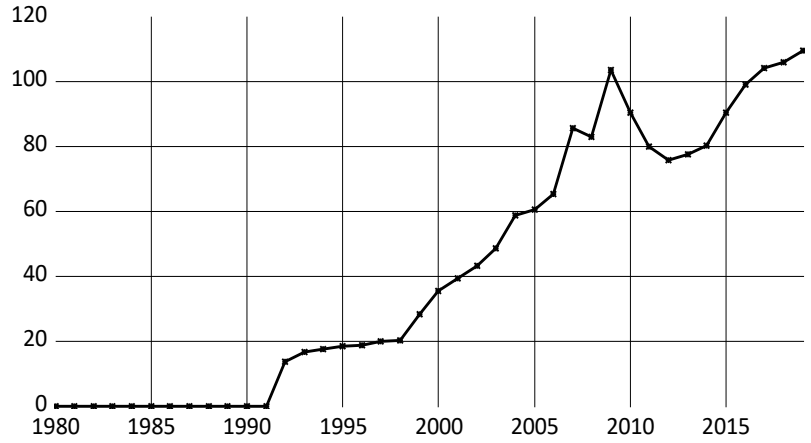


2.3 Privatization

To measure the degree of privatization of the Vietnamese economy, we used statistics from the World Bank on the share of domestic credit to the private sector (WB 2023b). The data presented in Figure 5 below reflect the fact that prior to 1990 there was no legal basis for recognizing private enterprise in modern Vietnam. Following the formation of the Democratic Republic of Vietnam in 1945, its Communist-led government proceeded to nationalize enterprises, collectivize agricultural production, and create a system of centralized control of the economy. After reunification in 1976, the same system was imposed on the Southern half of the country so that in theory, at least, the state controlled the production, allocation, and distribution of goods from the countryside to the cities. In

practice, the need to maintain the war effort compelled the state to tolerate a degree of flexibility, experimentation, and off-plan activity from the beginning. After 1976, the collectivization of agriculture in the south faced serious resistance and was quietly abandoned.

Figure 5. Privatization Measure: Domestic credit to private sector (% of GDP)



Meanwhile, in the north, the black market flourished, now enriched by a flood of goods "liberated" from the south and by unofficial trade conducted by Vietnamese students and guest workers in the various Eastern Bloc countries (Beresford and Đặng 2000; T. Dang 2018; Fforde and De Vylder 2020). Thus, data for the period 1980-1990 hide the degree to which Vietnam's centrally planned economy was entangled with a thriving, if officially unsanctioned market economy whose size can only be guessed at.

The first official steps towards an open market economy can be traced to 1981, when the state introduced an end-product contract system for household production units and recognized the role of the informal private sector in areas such as retail trade and small production. 1988 saw more thoroughgoing reform that signaled the effective end of the collective system as farmers were granted long-term land-use contracts, absolved of any labor obligations to the collective, and allowed to sell all their produce freely at market rates (Raymond 2008). Finally, the Land Law of 2003 established the basis for the new land finance system and land use market. Parallel with reforms of agriculture, the state gradually increased the autonomy of State-Owned Enterprises (SOE) and relinquished control over pricing and production in all but a few sectors. Under state direction, beginning in the early 1990s SOEs merged, consolidated, and shed hundreds of thousands of employees; by 2005, the total number of SOEs had dropped from 12,000 to just over 4000 (Beresford 2008).

As SOEs were closed, private enterprises took their place. In 1990 new laws had provided the legal foundation for private enterprise and regularized activities that had gone on de facto for decades. This combination of state withdrawal from the economy and legislative reform help explain the rise in domestic lending to private enterprise that began in 1998. While SOEs continue to play a key role in strategic sectors of the domestic economy (e.g., energy, construction, telecommunications, and banking), much of the growth since the 1990s has come from the private sector, which as of 2020 accounted for more than 80 percent of employment and the quasi-totality of export revenues (N. L. Dang and Nguyen 2020; GSO 2021). Despite a short drop in the level of lending associated with the Global Financial Crisis in 2008, the rapid recovery to represent more than 100 percent of GDP confirms the remarkable growth of Vietnam's private sector since the 1990s.

3. Impulse response analysis

In this analysis, we aim to determine the most significant impact on Vietnam's economic development among the three government policies: electricity infrastructure, globalization, and privatization. To accomplish this, we employ an economic policy evaluation method known as Impulse Response Analysis (IRA), which is commonly used in macroeconomics to assess the effects of government policies. It's worth noting that, as far as we know, IRA has not been previously applied to assess historical policies like the ones we're studying here.

In general, IRA is performed in three steps. First, the stationarity of the series is tested. In the second step, a vector autoregressive (VAR) model is set up and the coefficients are estimated. Finally, an IRA is carried out. We also report the variance decomposition, which shows the proportion of variations in an endogenous variable that is explained by a shock or innovation.

3.1 Data and Unit root test

We use the following four series from 1980 to 2019, which we have already discussed in Section 2 for historical background.

- Economic development measure (**GDPG**): Real GDP growth rate (%) from IMF.
- Sustainable energy measure (**PERELECONS**): Log values of per capita electric power consumption (kWh per capita) from World Bank[1].

[1] Since the original data was from 1971 to 2014, it was extrapolated to 2018 based on per capita electric power generation (kWh per capita) data.

- Globalization measure (**TROPEN**): Log values of (Export+Import)/GDP (%) from Penn World Table 10.0.
- Privatization measure (**PRIVZ**): Log values of domestic credit to private sector (% of GDP) from World Bank.

Note that the logarithm of the series is taken to justify the unit difference and to express the first difference in the series as a rate of annual change. The graphs are as follows.

Figure 5. Summary of series (ratio scale)

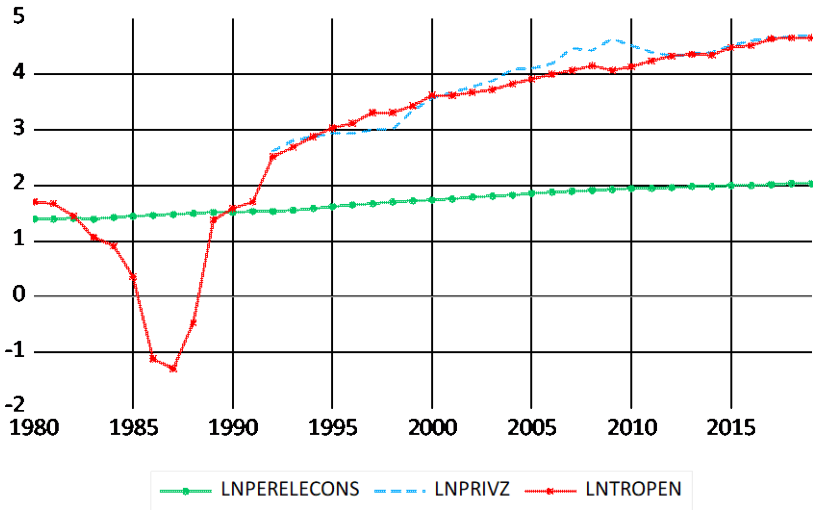


Fig.5 clearly indicates that each series has a unit root. This is tested by applying the Augmented Dickey-Fuller (ADF) test. The ADF test is applied to the data series described above, except for GDPG, which is TROPEN, PRIVE, and PEELECONS. Note that the GDP growth rate series is already known to be stationary. The results are reported as below.

Table 2. ADF test results

Level series	ADF test statistics	Optimal lag	p-value
TROPEN	-1.859942	6	0.6522
PRIVZ	-0.990075	0	0.9289
PERELECONS	-2.048586	7	0.5535

1st. differece series	ADF test statistics	Optimal lag	p-value
DTROPEN	-6.374401	5	0
DPRIVZ	-4.533219	0	0.0067
DPERELECONS	-2.964281	2	0.048

*Note: The optimal lag of PRIVZ is zero means that $\sum_{k=1}^{L} \delta_k \Delta y_{t-k}$ term expressed below is eliminated. The equation for Augmented Dickey Fuller Test (ADF test) is[2]:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \beta t + \sum_{k=1}^{L} \delta_k \Delta y_{t-k} + \varepsilon_t$$

where y_t is a time-series variable. α is constant, $\boldsymbol{\beta}$ is the coefficient of the time trend and $\gamma, \delta_k (k = 1, \dots, L)$ are the coefficients on the lag order of the autoregressive process. The null hypothesis for a unit root is γ=0. Optimal lags of ADF test equation are determined by Akaike Information Criterion (AIC) or Schwarz Information Criterion (SIC).

The p-values of ADF test results show that PRIVZ and PERELECONS cannot reject the null hypothesis at the 1% significant level. In case of TROPEN the null hypothesis is rejected at the significant level of 5%. For the 1st- difference of series, TROPEN and PRIVZ reject the null hypothesis at the 1 % and PERELECONS rejects the null hypothesis at the significance level of 5%. Let us denote the first difference of series as DTROPEN, DPERELECONS and DPRIVZ, are stationary as shown by the ADF test. However, even if VAR model contains both stationary variables and unit root variables, the OLS estimators of VAR model are still consistent (Hamilton (1994), Ch.18).

3.2 Vector autoregression analysis[3]

The regular vector autoregression (VAR) model with p lags, denoted by VAR(p), can be written in a general case[4] as follows:

$$\mathbf{y}_t = \mathbf{A}_0 + \mathbf{A}_1 \mathbf{y}_{t-1} + \mathbf{A}_2 \mathbf{y}_{t-2} + \cdots + \mathbf{A}_p \mathbf{y}_{t-p} + \mathbf{C}\mathbf{x}_t + \mathbf{u}_t$$

where

$\boldsymbol{y}_t$: $n \times 1$ column vector of endogenous variables

$\boldsymbol{x}_t$: $m \times 1$ column vector of exogenous variables

$\boldsymbol{A}_0$: $n \times 1$ column vector of constant term

$\boldsymbol{A}_i$: $n \times n$ matrix of lag coefficients to be estimated $(i = 1,2, \cdots, p)$

[2] For a comprehensive exposition of ADF, see Enders (2015).

[3] The econometrics software, EViews 13, was used for our estimation. The EViews code is available in its online supplementary material.

[4] Our estimation model has no exogenous variables.

$\boldsymbol{C}$: $n \times m$ matrix of exogenous variable coefficients to be estimated

$\boldsymbol{u}_t$: $n \times 1$ column vector of disturbances.

In our model, the column vector is defined as follows:

$$\boldsymbol{y}_t = \left(y_{TR,t}, y_{PR,t}, y_{ELE,t}, y_{GDPG,t} \right)'$$

where " ′ "denotes transposition of a vector, $y_{i.t}$ indicates the series at the year t and TR, PR, and ELE stand for the first difference series; DTROPEN, DPRIVZ and DPERELECONS, respectively, to avoid further complication of series names.

Under the assumption that the time path $\mathbf{y}_t$ is stationary[5], $\mathbf{u}_t$ satisfies the following white noise disturbance process:

$$i) \quad E(\mathbf{u}_t) = \mathbf{0}, ii)\, V(\mathbf{u}_t) = E(\mathbf{u}_t \mathbf{u}_t') = \Sigma, iii) E(\mathbf{u}_t \mathbf{u}_{t-s}') = \mathbf{0} \text{ for } s > 0.$$

Assumptions *i*) through *iii*) imply that the vector of disturbances is contemporaneously correlated with full rank matrix Σ, but uncorrelated with the leads and lags of the disturbances and uncorrelated with all the right-hand side variables. Furthermore, each equation is estimated by the ordinary least squares method.

3.3 Impulse response analysis and Variance decomposition

We use the above four annual time series data; TR, PR, ELE and GDPG from 1980 to 2019 and conduct the impulse response analysis (IRA) and the variance decomposition (VD) to each period respectively.

Imagine that there's a one standard deviation shock affecting TR. This shock immediately influences equation 1. However, it's important to note that this shock will also affect the other endogenous variables - PR, ELE, and GDPG - but not right away. In this VAR system, variables have lags, meaning that endogenous variables are influenced by their past values (lags of p periods). In simpler terms, these endogenous variables are explained by what happened in the past, not simultaneously. So, when a shock or innovation occurs, like a TR shock, its impact on TR is felt immediately, but its impact on the other three variables is observed in the subsequent period.

In the IRA mentioned earlier, the TR shock (innovation) influences PR, ELE, and GDPG in the subsequent time period. This occurs because we employed a reduced-form VAR, which only considers past variable values as independent variables in each equation.

[5] See, in detail, Key Concept 14.5 in Stock and Watson (2007).

In reality, TR can simultaneously impact PR, ELE, and GDPG. In other words, any change or shock in TR within the first equation affects PR, ELE, and GDPG at the same time. However, in such cases, these shocks or innovations can be seen as having a shared component that is correlated and can't be attributed to a specific variable.

To resolve this common component issue, we need to rearrange the VAR equations to identify the shocks. For instance, in the first equation, TR has no other variables simultaneously affecting it; in the second equation, PR is solely affected by TR at the same time; in the third equation, ELE is influenced by TR and PR; and finally, GDPG is affected by all other variables simultaneously. This order is represented as TR $\Rightarrow$ PR $\Rightarrow$ ELE $\Rightarrow$ GDPG. The causality result uncovered by Tang et al. (2016) partially aligns with this sequence. The order of variables is crucial. If we were to change the order to PR => TR => ELE => GDPG, the interpretation of the effects would be completely different. This sequence is often known as the "Cholesky decomposition order."

In addition to the IRA analysis, we've included estimates of variance decompositions (VD). These VD estimates help us understand how much of the variation in the endogenous variables can be attributed to shocks or innovations. Just like in the IRA analysis, we apply the Cholesky decomposition order to identify these shocks. The IRA and VD analyses are conducted for two different time periods in the context of the Vietnamese economy. It's important to highlight that in the Cholesky decomposition order, the measure of energy supply (ELE) is consistently placed as the first variable. This choice stems from the unwavering commitment of the Vietnamese government to prioritize the development of electricity infrastructure since 1960, even amidst significant changes in trade and privatization policies, as discussed in section 2. Essentially, this means that energy consumption measures have remained relatively unaffected by other factors.

3.2.1 Period I: 1980 to 1997

We begin by establishing a VAR model and estimating its coefficients. With these outcomes, we then proceed to perform both the IRA and the VD. The optimal lag for the VAR model was determined using either the Akaike Information Criterion (AIC) or the Lag exclusion test. It's important to note that, due to data constraints, the maximum lag that we could consider for the VAR analysis was limited to 3.

Table 3. Test results for VAR (2)

	Hypothesis Test	Result
Stationarity	ADF	: All serises are stationary.
Stability	Inverse Roots of AR Chara.	: All roots are inside the unit cercle.
Normality	Joint Normality Test	: Jointly Normal.
Autocorrelation	Autocorr. LM Test	: No serial correlations in any lag length.
	VAR(2):1980~1997	

The lag exclusion test indicates that the ideal lag is 2, resulting in a VAR(2) model. The series of test results displayed in Table 3 confirms that our VAR(2) model is statistically sound for conducting IRAs and VDs.

The results are as follows: In Figure 6 below, we observe that shocks of one standard deviation (s.d.) in both TR and ELE lead to GDPG increases of 2 s.d. and 1.44 s.d. respectively in the first period. However, these ELE and TR shocks diminish and weaken in the second and third periods.

Figure 6.

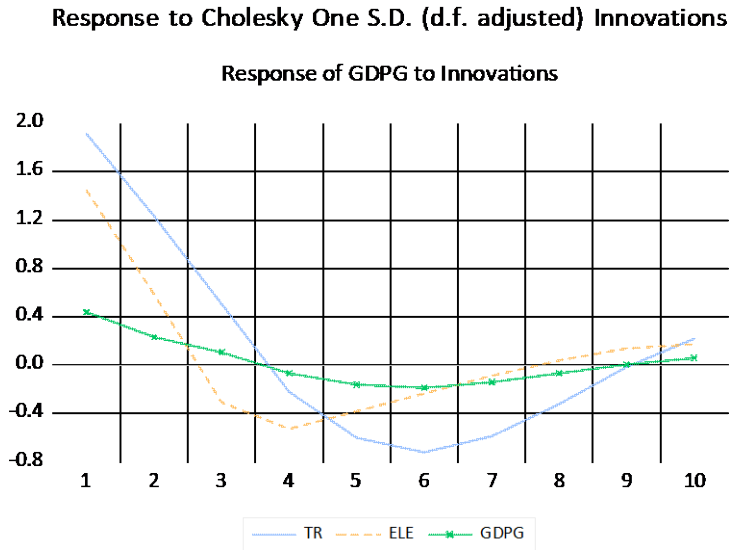
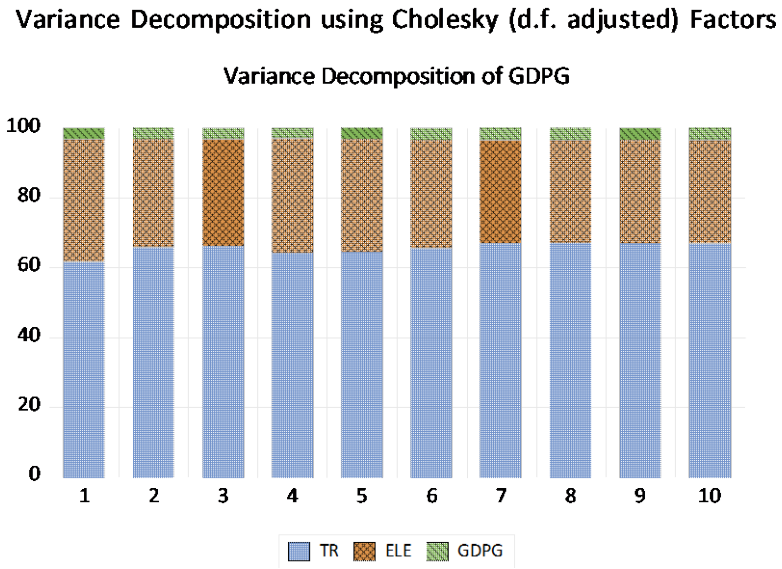


Figure 7.



In Figure 7, we can see that during the initial period, approximately 60% of the per-

period variation in GDPG is accounted for by TR shocks, and roughly 37% is attributed to ELE shocks throughout this period. In simpler terms, these two policy-related shocks collectively account for 97% of the per-period variation in GDPG.

From these findings, we can conclude that both sustainable energy supply and globalization shocks have exerted a substantial influence on GDPG during this period. However, it's noteworthy that globalization's impact has been considerably more significant than that of energy infrastructure. This disparity in impact has contributed to notable fluctuations in growth rates during Period I, as indicated in Figure 1.

3.2.2 Period II:1998 to 2019

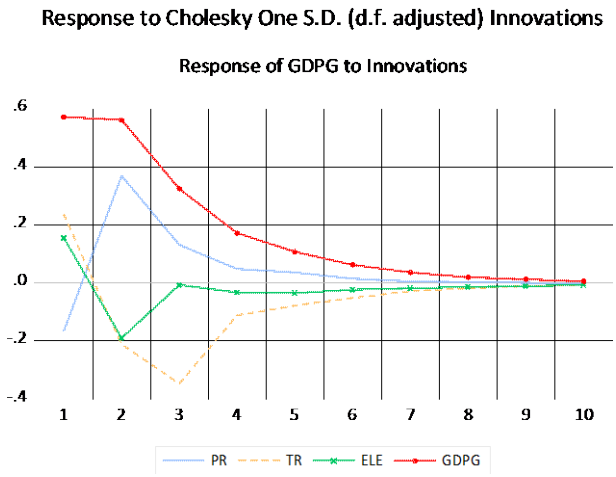
In Period II, we created a 4-series VAR model that includes PR, TR, ELE, and GOPG. Based on the Akaike Information Criterion (AIC), it suggested a 3-lag model. However, when we evaluated 3- and 2-lag VAR models, we found that they were not stable, with eigenvalues exceeding 1. This instability implies that the IRA is not dependable in these models. Consequently, we opted for a 1-lag model, and the test statistics for VAR(1) are presented in Table 4, affirming that VAR(1) is also statistically reliable.

Table 4. Test results for VAR (1)

	Hypothesis Test	Result
Stationarity	ADF	: All serises are stationary.
Stability	Inverse Roots of AR Chara.	: 8 roots are inside the unit cercle.
Normality	Joint Normality Test	: Jointly Normal.
Autocorrelation	Autocorr. LM Test	: No serial correlations in any lag length.
	VAR(1):1998~2019	

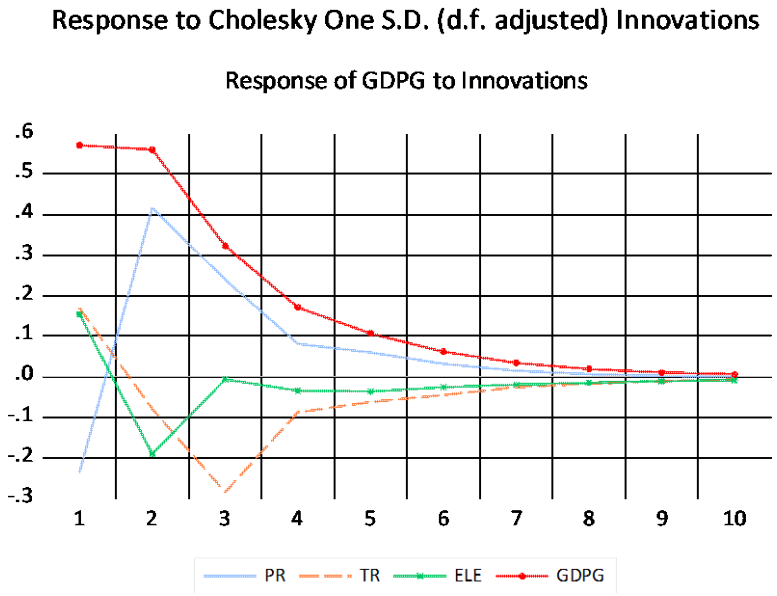
The IRA and VD results are plotted below. The order of the Cholesky decomposition order was set as follows: ELE ⇒ PR ⇒ TR ⇒ GDPG.

Figure 8.



We also try the ordering: ELE ⇒ TR ⇒ PR ⇒ GDPG. As shown below, it does not change appreciably.

Figure 9.

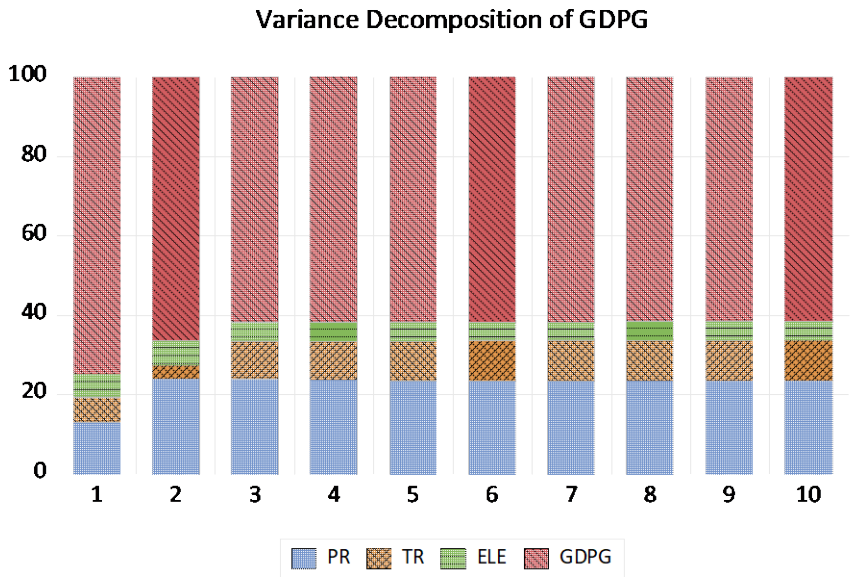


In contrast to Period I, both PR and ELE contribute relatively small positive shocks of 0.2 s.d. to GDPG in the initial period. These effects diminish, and in the second period, ELE and TR deliver negative shocks of 0.2 s.d. and 0.3 s.d. to GDPG, respectively, and continue with these negative shocks throughout the remaining period. On the other hand, PR initially produces a negative 0.2 s.d. shock but then switches to a positive 0.4 s.d. shock, maintaining these positive shocks to GDPG for the rest of the period.

In essence, measures of globalization play crucial roles in Vietnam's economic development, not only during Period I but also in Period II. On the other hand, ELE initially has a positive impact on GDPG similar to TR in Period I, but it consistently brings negative shocks in Period II. In Figure 10 below, we can see that these three factors account for only 25% of the per-period variation in GDPG in the first period. Even in the subsequent periods, these three factors explain just 40% of the per-period variation in GDPG. In simpler terms, the per-period variation in GDPG is primarily explained by GDPG itself. This marks a stark contrast to Period I, where the majority of the 97% of the period-to-period variation in GDPG was attributed to shocks in the two policy instruments. This fact helps clarify the stable growth experienced in Period II.

Figure 10.

Variance Decomposition using Cholesky (d.f. adjusted) Factors



3.3 Analytical results

Here is a summary of the results of the above analysis:

1. In Period I, both energy infrastructure and globalization policies initially had a significant positive impact on GDP growth, but their effects gradually diminished and turned negative over time.
2. The variance decomposition analysis reveals that these two policies explained 97% of the period-to-period variations in GDP growth rates during Period I. In other words, they caused substantial fluctuations in GDP growth during this period.
3. Globalization's impact has been considerably more significant than that of energy infrastructure in Period I.
4. In Period II, both energy infrastructure and globalization policies initially had a positive impact on GDP growth, but this impact was relatively small and quickly turned negative, persisting in a negative direction.
5. The introduction of a new policy measure in Period II, privatization, initially had a small negative impact, which later turned positive and continued in a positive direction. The initial negative shocks to GDPG after privatization indicate that the economy couldn't immediately adapt to the new conditions. However, over time, the economy gradually adapted, leading to a positive effect on GDPG. A similar pattern can be observed in the trade balance, resembling a J-curve effect.

6. The VD analysis confirms that the effects of these three policy measures on GDP growth become relatively small in Period II. Figure 10 illustrates that, unlike Period I, these three factors only explain 40% of the period-to-period variations in GDP growth during Period II. This suggests that the Vietnamese economy has become resilient to policy shocks, contributing to the remarkable stability of GDP growth in Period II.

4. CONCLUSION

Studying economic growth is a crucial aspect of Development Economics. In the case of Vietnam, its impressive economic progress since 1980 is commonly attributed to the policies of privatization and trade liberalization linked to the *Doi moi* reforms introduced in 1986. Infrastructure investment, especially in electricity infrastructure, has been a focal point in this context. To evaluate the relative importance of these three government policies in driving economic growth, we employed autoregressive and impulse response analyses, examining two distinct periods of Vietnamese growth since 1980: Period I (1980 to 1997), characterized by high yet unstable growth, and Period II (1998 to 2018), marked by sustained high growth.

Our findings reveal that in both periods, the energy infrastructure policy played a crucial role, but its impact on GDP was less significant in Period II. During the initial period, globalization policies had a decisive impact on GDP. Conversely, in the second period, both privatization and globalization policies, with a particular emphasis on privatization, played more crucial roles. This finding strongly aligns with traditional explanations of Vietnamese economic development, which have emphasized globalization and privatization implemented by the Vietnam Communist Party.

Finally, theoretical explanations are needed to study the structural changes during these two periods. One possibility lies in Takahashi et al. (2012). They measured the capital intensity of the capital goods and consumer goods sectors based on Japan's input-output table. As a result, a reversal of capital intensity occurred in Japan around 1975, when the capital intensity of the consumer goods sector exceeded that of the capital goods sector. For the next two decades, Japan enjoyed stable growth. The well-known paper by Uzawa (1964) demonstrated that an economy can achieve stable growth if the consumer goods sector is capital intensive. Consequently, the next step in research is to measure the capital intensity of both the consumer goods and other sectors using Vietnam's Input-Output table, and to verify these empirical results.

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CONFLICT OF INTEREST STATEMENT

The authors decline no conflict of interest.

DATA AVAILLABILITY STATEMENT

The data underlying this article are available in its online supplementary material.

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