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Did Vietnam's market-based labor export policy aid its economic take-off? A synthetic control approach

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Abstract

Vietnam's market-based labor export policy (LEP) was adopted in 1991. Using the synthetic control method, I estimated the effect of this LEP on Vietnam's per capita GDP. The results show that the gap between the actual and synthetic per capita GDP widened ten-fold from 1991 to 2000. The average annual growth effect over the first four years was 2.2 times that of the last five years. The findings imply that the market-based LEP positively influenced the early stages of Vietnam's economic reform and was a cause of Vietnam's economic take-off.

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1 Introduction

Labor export from lower- to higher-income countries is a long-standing phenomenon. Labor export increases the inflow of remittances to labor-exporting countries, especially in Asia, contributing to their economic growth (Imai et al., 2014; Islam, 2021). After the 1990s, many lower-income Asian countries adopted policies promoting labor export, and the remittance inflows increased markedly and steadily (Francois et al., 2022).

The remittance plays a significant and diverse role in the economic landscape of developing countries. Recent studies confirm the link between remittance inflows and labor productivity growth, particularly in manufacturing sector. Labor productivity or manufacturing growth, in turn, is widely recognized as a significant driver of economic growth in developing countries (Haraguchi et al., 2017; Szirmai and Verspagen, 2015). Al Mamun et al. (2015), using data from world's 61 largest remittance-receiving countries, find a positive impact of remittances on labor productivity, especially in countries with more significant remittance inflows and larger labor forces. Dzansi (2013), using a sample of 40 remittance-dependent economies, shows that one of the mechanisms through which remittance inflows drive economic growth in labor-exporting countries is by positively affecting the growth of their manufacturing sector.

Remittance inflows not only affect productivity and manufacturing growth but also contribute to the financial development of remittance-receiving countries (which refers to the efficiency and depth of a country's financial system, including the banking sector and the capital market.) and investment in domestic firms, which in turn affects economic growth (Eggoh et al., 2019; Le, 2011).

Interestingly, the impact of remittances on economic growth is contingent on the stage of economic development. Yoshino et al. (2020), analyzing panel data for 22 Asia-Pacific middle-income countries from 1990 to 2019, found that remittance inflows were significant in the early stages of economic development. This finding implies that the lower the economic level, the more significant the effect of remittance inflows on economic growth.

However, relevant empirical research has not reached a consistent conclusion regarding the causal relationship between labor export or remittances and economic growth (Cazachevici et al., 2020). Song et al. (2021) used panel data for 20 developing countries over the period 1980-2016 and showed that remittances also have the potential to lead to income inequality and impede economic growth. After analyzing an unbalanced panel data of 80 developing countries from 1970 to 2014, the latest study by Francois et al. (2022) argued that the heterogeneity of remittance-investment and remittance-consumption relationships across countries explains the opposed impact of remittances on real gross domestic product (GDP). Furthermore, Catrinescua et al. (2009) also pointed out that the contrasting results of cross-country studies on the relationship between remittances and long-run economic growth are mainly attributed to differences in countries' economic and institutional characteristics.

Therefore, it is imperative to undertake a nation-specific empirical investigation for a delineated temporal framework to assess the ramifications of labor export strategies. Diverging from research paradigms that predominantly focus on an aggregate perspective, this study investigates the impact of remittances, engendered through a market-based labor export policy, on the early stages of economic development from a singular country's standpoint.

In 1986, Vietnam announced the Doi Moi reforms, and its economy began to transition from a planned one to a market-based one. In 1991, with the collapse of the Soviet Union, Vietnam enacted a market-based social enterprise-led LEP. Since then, Vietnam's economy has expanded remarkably. According to the World Bank Open Data repository (https://data.world

bank.org/), Vietnam's per capita GDP grew at an average annual rate of 6.1% during 1992-2000, two times higher than the 2.7% of 1986-1991. The implementation of a market-based LEP is likely a prime reason for Vietnam's economic success in the early stages of its development. I conducted a comparative case study to understand the impact of Vietnam's market-based LEP on its economic take-off. The results indicate that after launching the new LEP, Vietnam's per capita GDP grew significantly. As the execution of the policy progressed and the number of laborers exported continued to rise, the growth of per capita GDP became more pronounced.

2 Background

Starting in the 1980s, the Vietnamese government sent laborers to socialist countries through sector agreements. Vietnam signed labor cooperation agreements with East Germany, Bulgaria, and Czechoslovakia in 1980 and with the Soviet Union in 1981. From 1980 to 1990, approximately 0.277 million workers were sent to these socialist countries (Hong, 2021). In 1991, along with the dissolution of the socialist bloc, the government promulgated Decree No. 370/HDBT. This policy decentralized the labor export business by introducing a licensing system for dispatching companies, which were now responsible for developing overseas markets, recruiting workers, pre-deployment training, and management from deployment to repatriation, for a fee from the dispatched workers. Since then, the market-based LEP has been active in Vietnam. Between 1991 and 2000, especially through decrees in 1995 and 1999, labor exports were relaxed and enhanced.

Figure 1 shows the number of migrant workers and per capita GDP in Vietnam between 1980 and 2000. As noted above, approximately 300,000 workers were exported in the 12-year period from 1980 to 1991, which is more than twice the number of workers exported from 1991 to 2000. Nevertheless, before 1991, labor exports were used to pay Vietnam's increasing debt to advanced socialist countries and did not contribute significantly to Vietnam's economic growth. In contrast, after 1991, with the introduction of the market-based LEP, Vietnamese workers were sent to higher-income countries, such as Japan, South Korea, and the United States, leading to steady and sustained growth in remittance inflows. The ratio of remittances to GDP (current US dollars) increased from 0.4% in 1991 to 4.3% in 2000, with an annual average of 2.3% during that 10-year period (data were extracted from the World Bank Open Data repository). [1] The average annual per capita GDP between 1991 and 2000 was $2,256, 1.6 times higher than the $1,402 before 1991. Moreover, the average annual GDP growth rate per capita was 3% before 1991, which doubled after that year.

3 Methodology and Data

To estimate the average impact of the market-based economy LEP on Vietnam's real GDP, I used the synthetic control method developed and extended by Abadie and Gardeazabal (2003), Abadie et al. (2010), and Abadie et al. (2015). In recent years, the synthetic control method has been widely used because it allows for precise quantitative inferences in small-sample comparison studies (Abadie et al., 2015). This technique creates a counterfactual treatment unit

[1] The official records of Vietnam's remittance started in 1991 and included only inflows through official channels, such as the banking system and post offices. Therefore, the actual remittance inflows could be higher than the officially documented data.

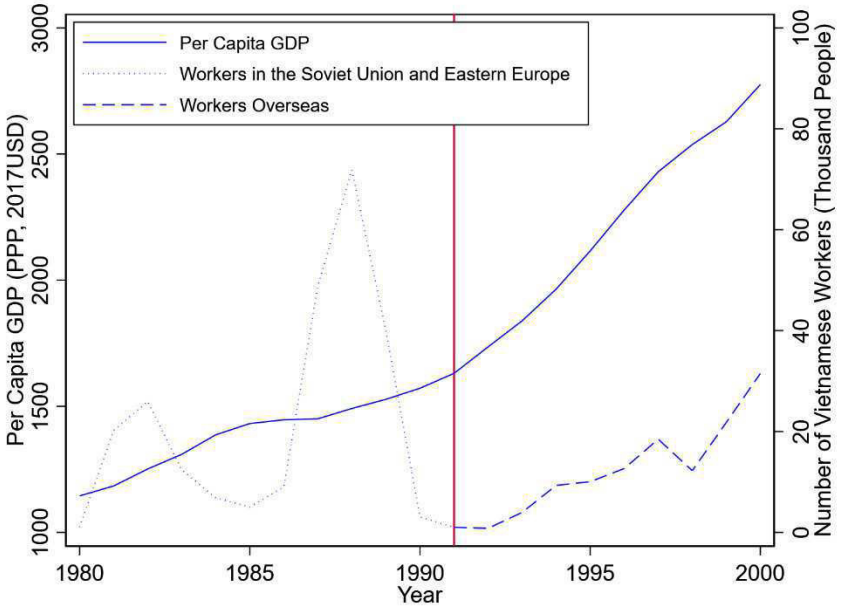

Figure 1: Trends in Vietnam's per capita GDP and number of export workers. Source: Data on the number of workers come from Hong (2021), and data on GDP come from Feenstra et al. (2015).

by combining multiple untreated units (called donors) in a weighted manner. The effect of the intervention can be assessed by comparing the counterfactual treatment unit with the treated unit. Using this method, I created a synthetic Vietnam that represents what Vietnam's per capita GDP would have been if the LEP had not been enacted, to assess the effects of the policy's implementation.

Given the economic growth of J+1 countries over the period $t \in \{1, T\}$ within a counterfactual analysis framework, g_{it}^N represents the per capita GDP of the country i at time t if the LEP is not implemented, while g_{it}^I represents the per capita GDP of the country i at time t under the implementation of the LEP. Assuming the country i starts implementing the LEP at t=T_0, the per capita GDP of this country in the period $\{1, T_0\}$ is unaffected by the LEP, thus $g_{it}^I = g_{it}^N$. After the implementation of the LEP, during $\{T_0+1, T\}$, let $\alpha_{it} = g_{it}^I - g_{it}^N$ represent the change in per capita GDP brought about by the LEP for the country i at time t. The objective of this paper is to estimate α_{it}. For countries that have precisely implemented the LEP, their per capita GDP under this condition, g_{it}^I can be observed. However, the corresponding data g_{it}^N, assuming the country did not implement the LEP, is entirely unobservable. To address this, by constructing a "counterfactual" variable representing g_{it}^N, I suppose the following equation for g_{it}^N:

$$g_{it}^N = \delta_t + \boldsymbol{\theta}_t Z_i + \boldsymbol{\lambda}_t \mu_i + \varepsilon_{it} \tag{1}$$

where δ_t represents the time-fixed effects impacting the per capita GDP of all countries; $\boldsymbol{\theta}_t$ is a vector (1×r) of unknown parameters; $\mathbf{Z}_i$ is a vector (r×1) of observed covariates unaffected by the LEP; $\boldsymbol{\lambda}_t$ is a vector (1×F) of unobserved common factors; $\boldsymbol{\mu}_i$ is a vector (F×1) of unobservable country-specific fixed effect; ε_{it} is an unobservable temporary shock with a mean of zero.

Assuming the first country (i=1) implemented the LEP, the other J countries in the control group did not implement this policy. To estimate the g_{it}^{N} for Vietnam had it not implemented the LEP, it is necessary to simulate the characteristics of the treatment group through the weighted results of the control group countries. Therefore, a (J×1) vector of weight $\mathbf{W}$= (w_2, …, w_{J+1}) must be determined to satisfy for any j, $w_j \geq 0$, and $\sum_{j=2}^{J+1} w_j = 1$. The specific value of each vector represents a specific weight for the J countries. For each control group country, the value of outcome variable, indexed by $\mathbf{W}$, is as follows:

$$\sum_{j=2}^{J+1} w_j g_{jt} = \delta_t + \boldsymbol{\theta}_t \sum_{j=2}^{J+1} w_j \mathbf{Z}_j + \boldsymbol{\lambda}_t \sum_{j=2}^{J+1} w_j \boldsymbol{\mu}_j + \sum_{j=2}^{J+1} w_j \varepsilon_{jt} \tag{2}$$

Assuming there exists a specific weight $\mathbf{W}^*$ = (w_2^*, … , w_{J+1}^*) such that:

$$\sum_{j=2}^{J+1} w_j^* g_{j1} = g_{11}, \sum_{j=2}^{J+1} w_j^* g_{j2} = g_{12}, \cdots, \sum_{j=2}^{J+1} w_j^* g_{jT_0} = g_{1T_0} \text{ and } \sum_{j=2}^{J+1} w_j^* \mathbf{Z}_j = \mathbf{Z}_1 \tag{3}$$

If $\sum_{t=1}^{T_0} \lambda_t' \lambda_t$ is nonsingular, then:

$$g_{1t}^{N} - \sum_{j=2}^{J+1} w_j^* g_{jt} = \sum_{j=2}^{J+1} w_j^* \sum_{s=1}^{T_0} \lambda_t \left(\sum_{n=1}^{T_0} \lambda_n' \lambda_n \right)^{-1} \lambda_s' (\varepsilon_{js} - \varepsilon_{1s}) - \sum_{j=2}^{J+1} w_j^* (\varepsilon_{jt} - \varepsilon_{1t}) \tag{4}$$

Under general conditions, the right-hand side of Equation (4) will tend to zero (Abadie et al., 2010). Therefore, during the implementation period of the LEP, $\sum_{j=2}^{J+1} w_j^* g_{jt}$ can be used as an unbiased estimate of g_{1t}^{N} to approximate g_{1t}^{N}, and the estimated policy effect is:

$$\hat{\alpha}_{1t} = g_{1t} - \sum_{j=2}^{J+1} w_j^* g_{jt} \tag{5}$$

To obtain $\hat{\alpha}_{1t}$, it is first necessary to determine the weight vector $\mathbf{W}^*$ that makes Equation (3) hold. This requires that the characteristic vector of the first country lies within the convex combination of other countries' characteristic vectors, but such a solution is often difficult to find in real data, so an approximate solution must be determined to establish $\mathbf{W}^*$. This paper chooses to minimize the distance between $\mathbf{X}_1$ and $\mathbf{X}_0\mathbf{W}$, $\| \mathbf{X}_1 - \mathbf{X}_0\mathbf{W} \|$, while satisfying for any j=2, …, J+1, $w_j \geq 0$, and $\sum_{j=2}^{J+1} w_j = 1$. $\mathbf{X}_1$ is the (k×1) vector of predictors for Vietnam before LEP. $\mathbf{X}_0$ is a (k×J) matrix, where its jth column is the corresponding characteristic vector of country j before LEP.

I employ $\| \mathbf{X}_1 - \mathbf{X}_0\mathbf{W} \|_{\mathbf{V}} = \sqrt{(\mathbf{X}_1 - \mathbf{X}_0\mathbf{W})'\mathbf{V}(\mathbf{X}_1 - \mathbf{X}_0\mathbf{W})}$, where $\mathbf{V}$ is a (k×k) symmetric positive semi-definite matrix, and the choice of $\mathbf{V}$ affects the MSPE. The optimal choice of $\mathbf{V}$ is to assign appropriate weights to the variables in $\mathbf{X}_1$ and $\mathbf{X}_0$ to minimize the MSPE of the outcomes, $\frac{1}{T_0}\sum_{t=1}^{T_0} \left(g_{1t} - \sum_{j=2}^{J+1} w_j^*(\mathbf{V}) g_{jt} \right)^2$. Based on data characteristics, following the approach of Abadie et al. (2010), this paper selects $\mathbf{V}$ to minimize the MSPE of the per capita

GDP before LEP, so that the synthetic economic growth path of Vietnam closely approximates the actual economic growth trajectory of Vietnam before LEP. The synthetic Vietnamese per capita GDP obtained through weighting simulates the scenario where Vietnam did not implement the LEP. The difference in per capita GDP between the real and synthetic Vietnam is the quantitative impact of the LEP on Vietnam's per capita GDP.

As key predictors, I use the per capita GDP (in millions 2017 US$) as well as:

Population (in millions)–represents the size of the country's population. Population, which affects the scale of the economy and the labor market, is a mandatory variable in models of economic growth (Becker, 1999; e Souza et al., 2016).

Human capital index–is a proxy for human capital measured by average years of schooling in Barro and Lee (2013) and derives returns to education from parameter estimation of the Mincer equation in Psacharopoulos (1994). Alongside the population, human capital is indispensable in explaining economic growth (Barro et al., 2001; Cohen and Soto, 2007).

Per capita capital stock (in millions 2017 US$)–measures the amount of physical capital at constant 2017 national prices (in million 2017 USD). Capital stock is central to explaining economic growth (Chatterjee, 2005).

Government consumption (% of GDP)–percentage share of government consumption in GDP. Landau (1986) found a negative correlation between government spending and economic growth in less developed countries. Incorporating government expenditures into endogenous growth models allows a better understanding of how fiscal policy, taxes, and public expenditures affect economic growth (Barro, 1990).

Gross capital formation (% of GDP)–percentage share of gross capital formation in GDP. Gross capital formation, which leads to productivity growth, is a fundamental component of economic growth (Solow, 1957; Topcu et al., 2020).

Merchandise exports (% of GDP)–percentage share of merchandise exports in GDP. Merchandise exports map both its dependence on foreign markets and its sensitivity to fluctuations in the global economy. Export-led economies typically have more significant gains in economic growth than inward-looking economies. Their gains outweigh domestic and foreign capital and labor. (Balassa, 1978; Feder, 1983).

When selecting donors, I chose countries with similar economic processes as Vietnam. I used all Southeast and South Asian states. The control countries included East Asian countries because they are geographically, culturally, or politically similar to Vietnam.[2] Table 1 indicates that 5 out of 22 potential donor countries/regions contribute their weight to the synthesis of Vietnam. Data from the Penn World Table (Feenstra et al., 2015) were employed to create the synthetic controls.

Furthermore, Table 2 indicates that the difference in per capita GDP between actual and synthetic Vietnam is approximately $4, while the values of the other predictor variables are relatively matched.

4 Results

4.1 Baseline Results

[2] Afghanistan in South Asia, North Korea in East Asia, and Timor-Leste in Southeast Asia are not included in the control countries due to missing data.

Table 1: Donor pool country/region weights in the synthetic Vietnam

Country/Region	Weight	Country/Region	Weight
Bangladesh	0	Maldives	0.065
Brunei	0	Mongolia	0.070
Cambodia	0.137	Myanmar	0.698
China	0.031	Nepal	0
Hong Kong	0	Pakistan	0
Macao	0	Philippines	0
India	0	Korea	0
Indonesia	0	Singapore	0
Japan	0	Sri Lanka	0
Laos	0	Taiwan	0
Malaysia	0	Thailand	0

Table 2: Economic growth predictor means before No.370/HDBT

Variables	Actual	Synthetic
Per capita GDP (in millions 2017 US$)	1381.433	1385.094
Population (in millions)	60.985	61.203
Human capital index	1.739	1.454
Per capita capital stock (in millions 2017 US$)	1599.298	3894.834
Government consumption (% of GDP)	0.171	0.117
Gross capital formation (% of GDP)	0.077	0.091
Merchandise exports (% of GDP)	0.013	0.022

Figure 2 includes a graph of per capita GDP for Vietnam and synthetic Vietnam from 1980 to 2000. Synthetic Vietnam closely tracks per capita GDP prior to the introduction of the LEP. The impact of the LEP is estimated as the difference in per capita GDP between Vietnam and synthetic Vietnam observed in the post-introduction period. The gap between the treated and the control countries after 1991 suggests that the market-based LEP positively impacted the Vietnamese economy. This effect appears to be somewhat small in the first four years but increases over time.

Figure 3 reports the annual estimates of the gap between actual and synthetic Vietnam after the policy was introduced. It demonstrates that from 1980 to 1991, there is almost no gap in per capita GDP between actual and synthetic Vietnam. In contrast, from 1991 to 2000, when the growth of per capita GDP in synthetic Vietnam decelerated, per capita GDP in actual Vietnam continued to accelerate at a high rate. The gap between the two widened from $42 in 1991 to $427 in 2000 at an average annual rate of $43; the per capita GDP gap widened ten-fold in 9 years. I then calculated the p-values of the estimated effects of introducing the LEP (Figure 4) to confirm the statistical significance of this gap and to depict the outcomes. The

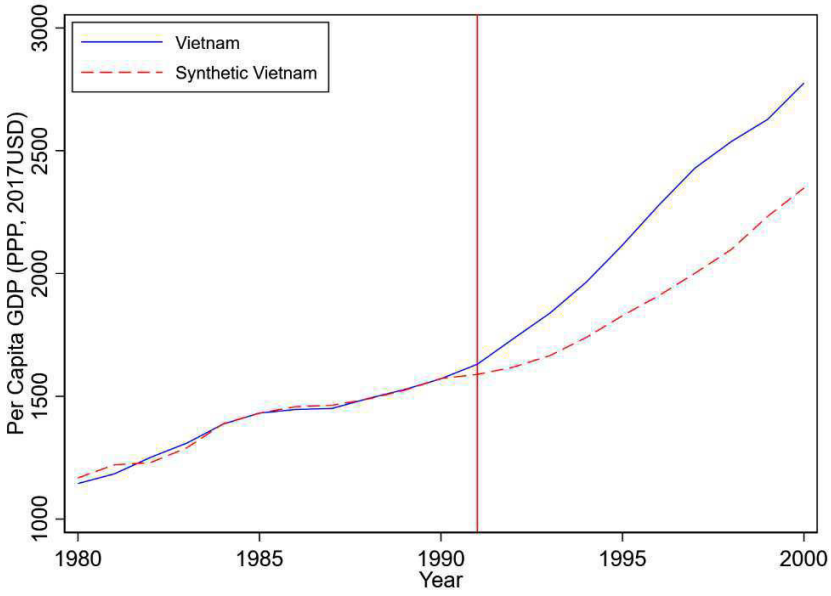

Figure 2: Trends in per capita GDP between Vietnam and synthetic Vietnam.

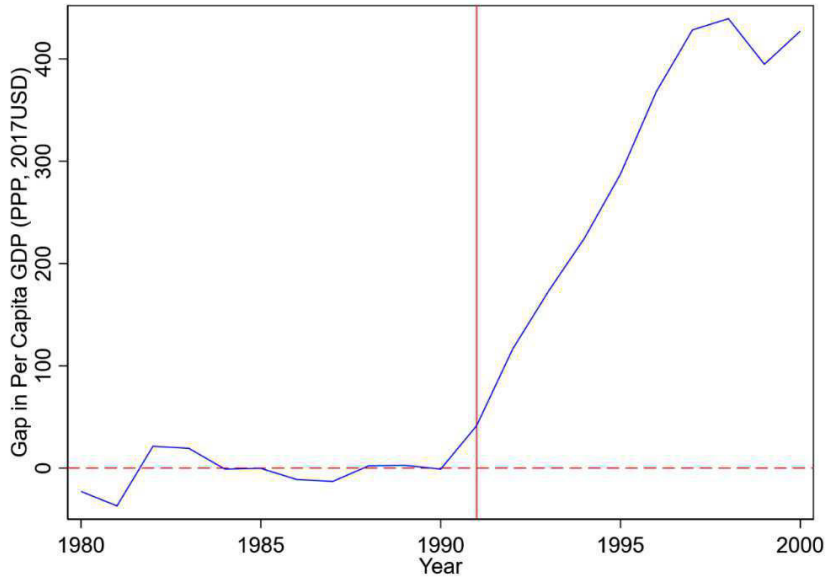

Figure 3: Per capita GDP gap between Vietnam and synthetic Vietnam.

figure indicates that the estimated p-values for the period of 1991 to 1992 exceeded the conventional statistical significance threshold; however, the estimated p-values for 1992 are close to the 10% statistical significance threshold. Starting in 1993, the effect of the LEP became statistically significant. According to the p-values, the probability that the effect occurred from 1993 to 1995 is less than 10% and very close to 5%. From 1996 onward, the p-value remains at 0.000 as the estimated effect rises.

The results imply that the market-based LEP positively impacted Vietnam's per capita GDP, especially after 1993. One limitation of the findings is that the effects estimated using synthetic

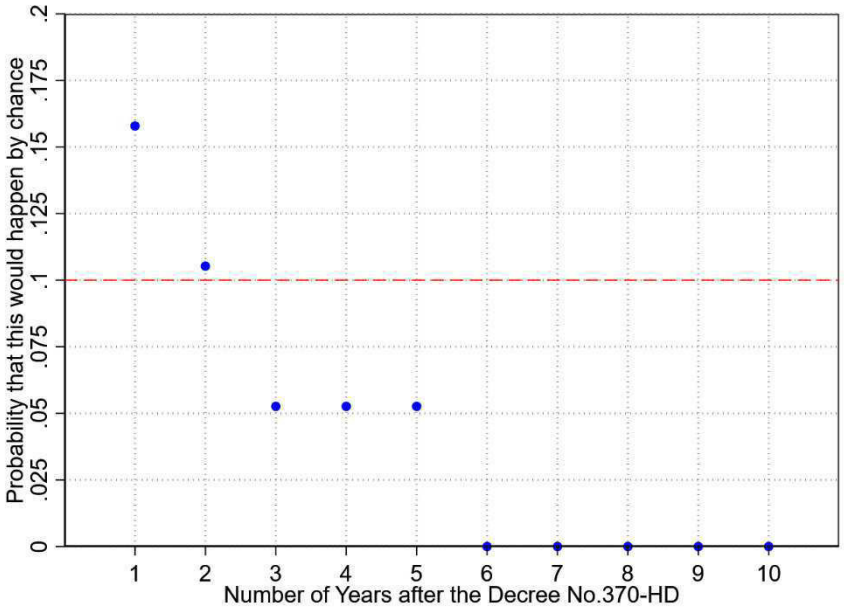

Figure 4: Adjusted p-values for the estimated effects of the per capita GDP gap.

control methods are less reliable over time. An important confounding factor in the reprocessing period was the escalation of Vietnam's LEP, which stimulated more labor exports. There are two essential policy updates before 2000: in 1995 and 1999. This confounding factor may have led to an overestimation of the effect after 1995. However, in 1995, Decree No. 370/HDBT contributed seven times more to the treatment effect than it did in 1991, with an average annual contribution of $62. Further, the treatment effect increased by an average $28 per year from 1995 to 2000. This means that the implementation of No. 370/HDBT was one reason for Vietnam's economic take-off.

4.2 Placebo Studies

To further assess the reliability of the baseline results, I implemented two kinds of placebo studies. First, I performed an "in-time placebo" analysis and repeated the synthetic control method but reassigned the treatment time to 1986. Figure 5 depicts the "in-time placebo" results. The pre-treatment period used for the analysis is 1980 to 1985, and synthetic Vietnam fits the trend of actual Vietnam's per capita GDP between 1980 and 1985. Figure 5 indicates that after 1986, there was a small gap between synthetic and actual Vietnam, and after 1988, the per capita GDP of synthetic Vietnam was slightly lower than that of actual Vietnam.[3]

Second, I conducted an alternative placebo study in which the treatment time was reallocated to a comparison country. The treatment effect was considered statistically significant for Vietnam by comparing the treatment effect size across countries. Figure 6 presents the distribution of the post-pre root means square prediction error (RMSPE) ratios for Vietnam and

[3] The Doi Moi reforms did not lead to rapid economic growth in the early years. This fact is consistent with my results. Although, starting 1988, Vietnam's actual per capita GDP seems to be higher than that of synthetic Vietnam (Figure 5), the gap is widening. The probability of the effects happening by chance is 0.810 in 1988, 0.238 in 1989, and 0.190 in 1990.

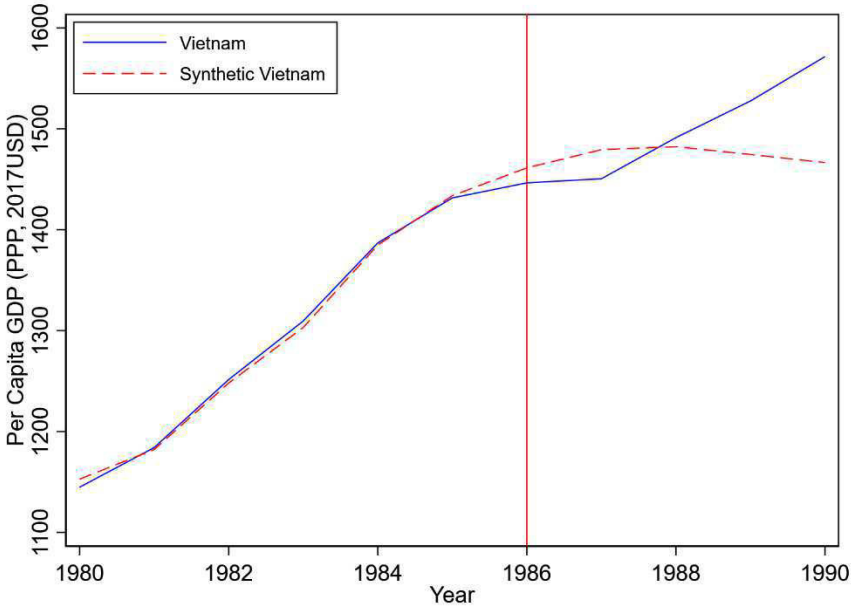

Figure 5: In-time placebo trends in per capita GDP.

the control countries. As explained by Abadie et al. (2015), although the RMSPE measures the magnitude of the gap in the outcome variable between each country and its synthetic counterpart, a large post-intervention RMSPE does not mean a significant effect of the intervention if the pre-intervention RMSPE is large. Looking at the ratio obviates choosing a cut-off for the exclusion of ill-fitting placebo runs (Abadie et al., 2010). In Figure 6, the post-pre RMSPE ratio in Vietnam is higher than in other countries. For Vietnam, the post-policy gap is approximately 21 times larger than the pre-policy gap. This means that the probability of obtaining an RMSPE ratio as large as Vietnam is 1/23 = 0.043 if a country in the sample is randomly selected to allocate the intervention.

4.3 Robustness Test

Following Abadie et al. (2015), I tested the sensitivity of the main outcomes to changes in country weights using a technique called the leave-one-out estimate. Figure 7 demonstrates that the findings of the baseline analysis are robust to the exclusion of any donor country that received weight from the control countries. The most miniature effect of the leave-one-out estimate is the one that excludes China. Even for this smallest estimate, the effect is substantially significant. From 1991 to 2000, Vietnam's per capita GDP grew on average by $127 per year, approximately 8% of the 1991 baseline level, while synthetic Vietnam's per capita GDP grew at 6% per year on average. In 2000, synthetic Vietnam's per capita GDP was about 9% lower than actual Vietnam's per capita GDP. Other leave-one-out synthetic controls exhibit similar or slightly more minor effects than the baseline outcomes.

5 Conclusion

I used the synthetic control method to evaluate the impact of implementing Vietnam's LEP—rooted in the market economy—on the country's relatively short-term economic growth over the 1992-2000 period. Before the policy was introduced, although Vietnam had reformed its

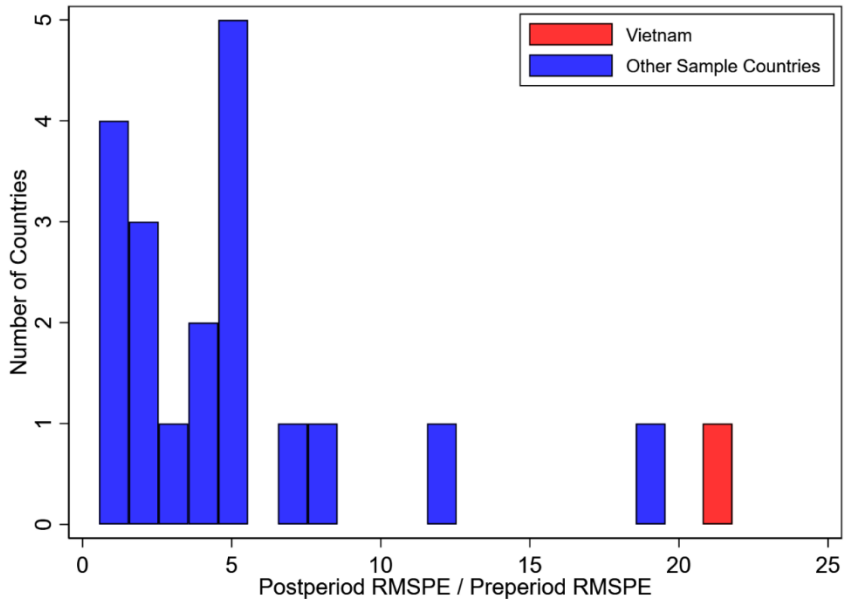

Figure 6: Histogram of post-pre RMSPE ratios.

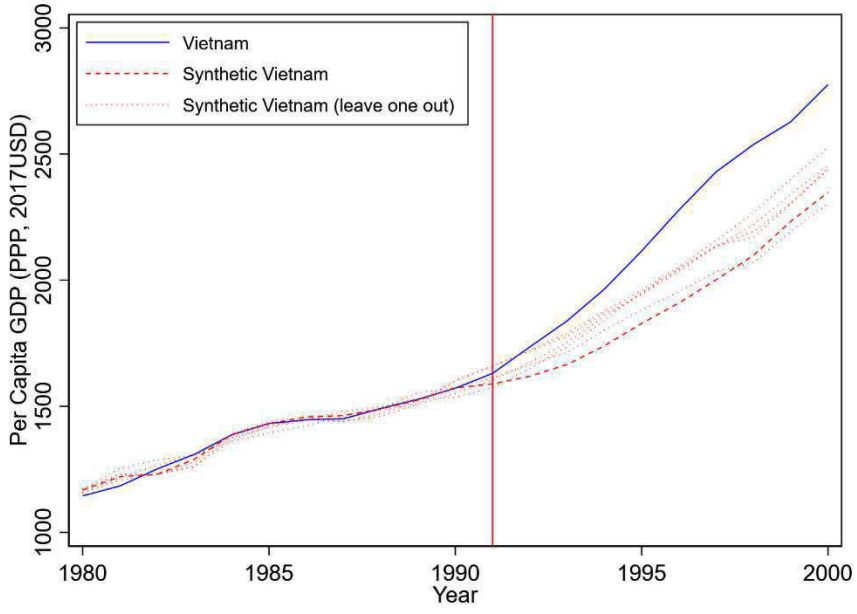

Figure 7: Leave-one-out distribution of the synthetic Vietnam.

economic system, per capita GDP did not improve significantly. In terms of labor export, the state-led approach was still maintained. After launching the market-based LEP, market efficiency was brought into play. Migrant workers were sent to higher-income countries in a steady stream, while remittances flowed back into Vietnam from those workers, aiding Vietnam's economy take off in the early stages of economic reform.

After 2000, Vietnam started its industrialization reform and adopted labor export as its national strategy for industrial development. With the increasing number of exported migrant workers, labor export became a strategic policy for the long-term development of Vietnam's

economy. The long-term effect of labor export on Vietnam's economic growth needs to be further evaluated. In addition, the mechanical link between labor export or remittances and economic growth may manifest itself in several ways, such as increasing disposable income (Yang and Choi, 2007), reducing consumption volatility (Mondal and Khanam, 2018), generating employment opportunities (Hatemi-J and Uddin, 2014), as well as promoting accumulation of human and physical capital (Azizi, 2018; Benhamou and Cassin, 2021). The different roles these mechanisms play in the short- and long-term need to be explored in depth in future studies.

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