The long term impact of Vietnam war's veteran on economic governance

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The Long term Impacts of Vietnam War's Veterans on Provincial Economic Development*

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Abstract

I investigate the effects of Vietnam War's veteran on long run economic development in Vietnam. Using a unique dataset containing the number of war invalids at province levels, I find the number of war invalids from each province to be an important determinant of its current economic performance. To correct for potential biases arising from reverse causality, measurement error and unobservable province characteristics, I use an instrumental variable approach exploiting distance to the 17th parallel demilitarized zone. I also find that the importance of the war invalids for contemporary development is a result of its impacts on overall provincial economic governance and other disaggregated economic institutions, such as the pro-activity of provincial leadership, the quality of the legal institutions and services supporting business development.

JEL classification: O1, P3

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1 Introduction

The relationship between war and economic development has been controversial in economic history. Wars can have adverse impacts on later economic performance: war diverts resources from production, destroys physical capital and infrastructure and disrupts human capital accumulation. It may also destroy technology development and damage social fabric and endanger civil liberties (World Bank, 2003). At the same time, wars may also intensely impact the quality of institutions by creating political instability. These institutional effects of wars may in turn have negative impacts on long-run economic performance. However, war is likely to be beneficial to economic development by building new pro-growth institutions (Acemoglu et al, 2009).

Several recent empirical papers try to capture war impacts, including in Japan (Davis and Weinstein, 2002) and Vietnam (Miguel and Roland, 2010) and European countries (Organski and Kugler, 1977, 1980; Ichino and Winter-Ebmer, 2004) on long term economic development. Almost all of these studies find few persistent local impacts of wars on economic trends.

Davis and Weinstein (2002) find that the US bombing in major Japanese cities in the World War II had no long run impact on the population of those cities relative to prewar level. In the other study, Organski and Kugler (1977, 1980) show that the impacts of two world wars on European countries tend to prolong only 15-20 years, and these countries return to prewar growth trends after that. However, in another study, Ichino and Winter-Ebmer (2004) realize that in some European countries, people could not obtained higher education because of World War II suffered a considerable loss of subsequent earnings.

Although some studies have been done on the impacts of war on long run economic development cross and within countries, much less is known about the evolution of institutions after wars. They have tried to identify the specific institutional factors that matter most for economic growth, including property rights (Acemoglu, Johnson and Robinson, 2001), social capital and cohesion (Knack and Keefer, 1997) but which of these are affected by wars remains unclear. The

social and institutional legacies of conflict are arguably the most important but least understood of all war impacts (Blattman and Miguel, 2009).

Recently, Acemoglu et al (2009) examine the impact of the French Revolution of 1789 on neighboring countries. They show that the revolution destroyed the institutional underpinnings of the power of oligarchies and elites opposed to economic change; combined with the arrival of new economic and industrial opportunities in the second half of the 19th century, helping pave the way for future economic growth. The evidence suggests that areas that were occupied by the French and that underwent radical institutional reform experienced more rapid urbanization and economic growth, especially after 1850.

There is little doubt that Vietnam has suffered the tragedies of the twentieth century, especially of war, more than most countries. From 1946 to 1954, the war for independence from the French took a large but unknown number of military and civilian casualties, perhaps up to a half-million dead and one million wounded (Harrison, 1989). Warfare was soon resumed at even more deadly levels with the replacement of the French colonial army by military forces from the United States and other countries. Between 1965 and 1975, the acceleration of the war reached its peak with the presence of more than a half-million American soldiers and massive aerial bombing campaigns that traumatized the world (Harrison, 1993). From 1965 to 1973, eight million tons of bombs were dropped on Vietnam. This was over three times the amount of bombs dropped throughout the whole of the Second World War and worked out hundreds tons for every man, woman and child living in Vietnam. Although there are no reliable statistics on the Vietnamese war losses during the wars, it is expected that numbers from one to three million Vietnamese war dead (Lewy, 1978; Thayer, 1985; Turley, 1986; Shenon, 1995).

However, it is surprising that there is very little research that details the long term consequences of Vietnam War on economic development of Vietnam. Recent study by Miguel and Roland (2010) argues that wars cannot explain Vietnam's current economic development. They find that US bombing does not have a robust statistically significant negative impact on poverty rates, consumptions levels, infrastructure, literacy or population density. Do (2009) examines the impacts of Agent Orange on the prevalence of cancer in Vietnamese population after 30 years

after the end of the Vietnam War. He concludes that there is no significant difference in the prevalence of reported cancer which is detected between communes with some degree of exposure and those with none.

This paper is another attempt to provide an empirical examination of the importance of wars in shaping subsequent Vietnam's economic development and institutions. Particularly, I investigate the impact of Vietnam War's veteran, proxied by the number of invalids, on economic development and governance across provinces in Vietnam.

Contrary to Miguel and Roland (2010), I find the Vietnam War has negative impacts on long term provincial economic development. I find a robust negative relationship between the number of veterans, particularly the correlation of number of war invalids, and subsequent provincial economic performance. To better understand the reason behind the relationship between war invalids and current economic performance across provinces, I use instruments to estimate the causal effect of the number of war invalids on subsequent economic development. The instrument is the distance from each province to 17th parallel. The instrumented coefficients are negative and significant, suggesting that increased number of war invalids caused worse subsequent provincial economic performance. I then explore the potential channel of causality underlying the relationship between war invalids and find that war invalids can result in major effects on current provincial economic governance.

This paper makes two important contributions to literatures on economics of development. First, this is one of the first studies investigating the long term impacts of wars on institutional quality. Second, it proposes potential channels through which veterans can affect economic development that remain unexplored.

The paper is structured as follows. In the following section, I provide a brief description of history of Vietnam War and an overview of the manner in which North Vietnam recruit for their army. Section 3 documents the correlations that exist in the data, and Section 4 turns to potential channels of causality. Section 5 concludes.

2 Historical Background

2.1 Overview of Vietnam War[1]

The main feature of modern Vietnamese history was the mission for national unity and independence from foreign domination. In the 19th Century, Vietnam became a colony of the French. After the Vietnamese Communist forces, or Viet Minh, defeated the French colonial army at the Battle of Dien Bien Phu in 1954, Vietnam was granted independence. According to the Geneva Accords, Vietnam was partitioned temporarily into two parts, a communist in the North and a non-Communist in the South.

After consolidating their communist system, the Vietnamese communist in the North supported the establishment of National Front for the Liberation (NLF) in 1960 and promoted guerilla war in the South Vietnam. In response to the guerilla war, the United States began sending military advisors in support of the government in the South. Since 1965, North Vietnam had increasingly provided assistance to the NLF movement by sending its troops, arms and supplies, advisors, and regular units of the North Vietnamese Army which were transported via an extensive network of trails and roads which became well known as the Ho Chi Minh trail.

In August 1964, a US warship was reported to be attacked by North Vietnamese torpedo boats in the Gulf of Tonkin. Following this attack, American Congress passed the Southeast Asia Resolution which allowed President Lyndon Johnson to conduct military operations in the region without a declaration of war. On March 2, 1965, US aircraft began bombing targets in Vietnam and the first troops arrived.

In January 1968, the massive Tet Offensive launched by the North Vietnamese distressed the confidence of the American people and media who had thought the war was going well. As a result of Tet, President Lyndon Johnson opted not to run for reelection and was succeeded by Richard Nixon. Nixon's plan for ending US involvement was to build up the Army of the Republic of Vietnam (ARVN) so that they could fight the war themselves. As this process of "Vietnamization" began, US troops started to return home.

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[1] This section reviews some common facts about the Vietnam War, and does not intend to justify any aspects of the conflict.

The Paris Peace Accords were later signed on January 27, 1973 which officially ended US involvement in the Vietnam conflict. In early 1975 the North invaded the South and quickly consolidated the country under its control. Saigon was captured on April 30, 1975. North Vietnam united both North and South Vietnam to form the Socialist Republic of Vietnam.

2.2. Mobilization and the role of People's Army of Vietnam

To serve the quest of uniting country, the North of Vietnam tried to recruit soldiers from every class of society (Turley, 1980). The universal draft law, which was first carried out in 1960, required all men to have to register for military service in January as they turned age 18. They were expected to be drafted within 18 months following registration. Later, the draft age was lowered and the age eligible to serve was increase significantly. Young men were drafted as they finished school (Van Dyke, 1972).

The motives of the men joining the armed forces of the North were probably mixed and cannot be determined accurately. Certainly patriotism and in some cases Communist beliefs were the dominant motivations (George, 1961). Nationalist fervor during the French and American wars played an important role in ensuring the success of Vietnam's mass mobilization. During the escalation of the war, sporadic terror caused by the US bombing raids only served to strengthen the anti-American sentiments and increase popular commitment to the military struggle of the socialist regime (Van Dyke, 1972).

The leaders of North Vietnam used several strategies to persuade people to join the military forces. They promoted the idea that joining the army was prestigious. The advantages of this choice were conveyed by the privileges provided to young men: advancement to the next grade in school at the end of the military tour of duty without passing the examination, and admission into the Labor Youth Group, an organization valued mostly for its prestige (Van Dyke, 1972). Moreover, if a PAV soldier was killed or wounded, his family was protected and his children received preference in education and jobs (Kolko, 1985). Five percent of job in government agencies and state-owned factories were set aside for veterans (Teerawichitchainan, 2005).

In 1975, the size of PAV was estimated to be about one million. At the time, Vietnam's armed forces were ranked the fourth largest in the world (Beresford, 1988). In spite of the declining popularity in military service among the Vietnamese, the PAV continues to play significant role in shaping Vietnam's political, economic and social order (Pike, 1986). Since its establishment in 1940s, the PAV has always been a highly politicized and influential institution. During wartime, the Vietnam Communist Party used the PAV to politicize and mobilize the whole Vietnamese society. After the wars, the close ties between the PAV and the Communist Party continue to be maintained. At the same time, the Veteran's Association is considered one of the most powerful mass organizations (Pike, 1986).

3 Data description

To examine the impacts of Vietnam War's veteran on long term economic development, I use the number of war invalids. The number of war invalids of People's Army of Vietnam can be used as a proxy for the war impact with the argument that the number of war invalids will correlate closely with the number of veterans at each province. The war invalid data is taken from the Ministry of Labour, Invalids and Social Affairs for 63 provinces. This dataset covers all the invalids from the Vietnam War who receive compensation from the government. Therefore, this data only include all invalids from North Vietnam and the National Front for the Liberalization in the South (so-called Communist invalids)[2]. The statistics on Vietnam War's invalids are taken from year 2007. After the war, the number of invalids has been updated as new people present evidences showing that they are injured as serving in military work. Invalids who died are taken out of the list.

To our best knowledge, this dataset embodies the most complete, comprehensive and reliable summary available of number of war invalids in the Vietnam War. Of course, this number is not necessary to ensure an accurate number of war invalids because a quite large number of civilians

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[2] Other invalids from Army of the Republic of Vietnam (so-called non-Communist invalids) are not taken into account due to unavailable data. However, we assume that they do not make significant effects on economic performance across provinces. Veterans and families of veterans who worked for South Vietnam government did not receive any compensation for their loss and sufferings. After the war, people having relationship South Vietnam military and government were sent to reeducation camps. Their families were discriminated against and restricted in some opportunities of education and occupations (Lamb, 2002; Teerawichitchainan, 2005)

who do not have enough evidence to show that they were injured as serving in military work cannot listed as war invalids.

The data are summarized in Table 2, where the total number of war invalids is classified into two categories: war invalids and sick soldiers. Both of them can be disaggregated into their ability to work. The number of war invalids and sick soldiers with working ability declining from 21 to 60 per cent accounts for large part of the total number of war invalids, making of around 68 per cent of the total war invalids and sick soldiers.

Table 3 and Figure 1 present the geographic distribution of war invalids intensity in Vietnam in greater detail. While invalids intensity was highest in the Red River Delta, North coastal provinces and near the 17th parallel, it was also high in the "Iron Triangle" region of South Vietnam adjacent to Cambodia, the endpoint of the Ho Chi Minh Trail - a complex web of different jungle paths that enabled communist troops to travel from North Vietnam to areas close to Saigon. The war invalids are also high in some big cities of North Vietnam such as Ha Noi, Hai Phong and Nam Dinh which have been destroyed heavily by US bombing in the Linebacker campaign.

4 Empirical Results

4.1 Basic Results

I examine this relationship between war invalids with income by controlling for other provincial characteristics that are also potentially important for current income. Our baseline estimating equation is

$$Y_i = \alpha_0 + \alpha_1 \ln(invalids / pop)_i + C_i^{'} \delta + X_i^{'} \gamma + \varepsilon_i$$

where Y_i is the natural log of real per capita GDP in province i and $\ln(invalids/pop)_i$ is the natural log of the total number of war invalids normalized by population in 2007[3]. Per capita

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[3] The number of war invalids is normalized by population in 2007 to investigate more accurate the impacts of invalids on current economic performance. I also try another functional form such as

GDP data are for the year 2007 and from GSO (2009). $\mathbf{C_i}$ is a vector of dummy variables that indicate which regions a province belongs to. These are included to control for the other significant characteristics such as cultural characteristics. $\mathbf{X_i}$ is a vector of control variables. OLS estimates are reported in Table 5.

In column (1), we estimate the impact of war invalids without controlling for regional and national city dummy fixed effects. The estimated coefficient is not statistically significant. However, as Figure 2 shows, provinces in northeast, northwest and central highland regions where are remote and mountainous areas and concentrate a large proportion of ethnic minority may have a significant influence on income.

Vietnam is a multi-ethnic country with 54 ethnic groups. The *Viet* (*Kinh*) people account for 87 per cent of the country's population and mainly inhabit the Red River delta, the central coastal delta, the Mekong delta and major cities. The other 53 ethnic minority groups are scattered over mountain areas (covering two-thirds of the country's territory) spreading from the North to the South. Of which, the number of ethnic minority in northwest, northeast and central highland regions accounts for nearly 77 per cent of total ethnic minority as represented in Table 4.

The Vietnam War is mostly between Kinh people. Without regional fixed effects, the results will be biased to zero as cultural and historical factors of provinces in northwest, northeast and central highland regions that affect the motivation and of joining North Vietnamese army and also correlate with poor economic development in these provinces. This argument is confirmed as I control for regional fixed effects, the effect of log of invalids/pop increases by ten times and becomes statistically significant.

There is one province which is BRVT that may have significant impact on the result. The economic development of this province depends much on revenues from offshore oil extraction. However, if one removes this province, a highly significant, negative relationship still exists. It is confirmed by formal sensitivity and robustness tests.

$\log(GDP_{2007})_i = \alpha_0 + \alpha_1 \log(POP_{2007})_i + \alpha_2 \log(invalid)_i + \varepsilon_i$ to check whether income in each province has been driven by population. The result shows that coefficient of invalids is still significant at .01.

In addition to our key explanatory variables, I include a number of other location-based control variables. In the fourth column, I also include controls that capture the potential importance of geography and climate for long-term economic development: soil quality measured by proportion of agricultural land. I also include average monthly rainfall, average monthly temperature variables in Column (5). Column (6) reports the same specifications as reported Column (5), except that Distance to main economic centers variable is included in the regression equations.

In all the case of specifications with regional characteristics controlled, war invalids are negatively correlated with subsequent economic development. The estimated coefficient from the income regressions suggests that a one standard deviation decrease in war invalids increases income per capita in 2007 by 0.22 per cent. Moreover, the relationship between war invalids and income is robust to the inclusion of additional control variables. This is true whether the control variables are added individually or simultaneously.

Provinces near the 17th parallel and South Vietnam are the area where most of the fighting occurred, hence most deaths and wounded happened there. Therefore, it is relevant to assume the majority of injured people occur in provinces near 17th parallel. However, it is possible that after the war, invalids move around the whole country, especially to economic centres and other developed coastal regions. Consequently, it is likely to make the inference biased in the direction to overestimate impacts of the war in some provinces and underestimate the impacts in the others.

However, there are some reasons explaining why the problem is not too serious as expected. First, twelve provinces with higher number of war invalids, including Nghe An, Thanh Hoa, Ha Noi, Ha Tinh, Thai Binh, Quang Ngai, Nam Dinh, Hai Duong, Quang Nam, Binh Dinh, HCM, Hai Phong are the places which occur main battles and target bombing by US airforce. For example, Ha Noi and Hai Phong are bombed heavily from 1966-1968 and 1972 with the main target to destroy basically infrastructure and industry of North Vietnam. Hochiminh city, especially at the end of Ho Chi Minh trail, also suffers high bombing intensity by the US air

force to prevent North Vietnam sending troops and supporting National Front for the Liberation in the South. Main battles between North Vietnamese forces and Army of the Republic of Vietnam frequently occur in this area to seek to control Saigon (old capital of South Vietnam and renamed as HCM city). Thanh Hoa, Ha Tinh, Thai Binh, Nam Dinh, Hai Duong in the North and Quang Nam, Quang Ngai, Binh Dinh are provinces with high intensity of US bombing. These provinces are in the quintile of the most intensity of US bombs, missiles and rockets per km2 (Miguel and Roland, 2010). Second, due to health and physical limitation, I assume that almost all of them will stay in provinces where they live. Third, I also assume that the massive migration only happens within 20 years after the war. If so, we are looking the impacts of veterans on provincial economic development over the past 10 years.

4.2 Robustness and Sensitivity Analysis

I perform a number of sensitivity and robustness tests. Table 6 reports the robustness of the results to changes in the sample. I omit provinces that may be different from the rest of the sample to see if this influences the results. It is possible that the results are being driven by a group of provinces with characteristics that are unrelated to the Vietnam War. The first row of Table 6 reports the result with full sample. In the second row, I report the results when provinces in northeast, central highland and northwest regions are omitted from the sample. Since these provinces include a large share of ethnic minority, economic performance may be different from other provinces for reasons unrelated to the war. Omitting these provinces change the results substantially as explained above. The coefficient on invalids becomes negative and statistically significant. I also re-estimate the regression with two sub-samples, one for Northern provinces and another for Southern ones. It is often argued that provinces in the South have economic performance better than those of the North due to legacy of market-orientation. The Northern sample does not include northeast and northwest provinces. Doing this does not change the results. The coefficient on invalids remains negative and statistically significant.

I test whether the results are being driven by a small number of influential outliers. Table 7 reports the robustness of the results to changes in the sample of provinces. I omit provinces that may be different from the rest of the sample to see if this influences the results. I identify

influential observations using a number of standard rules that have been proposed in the literature. I omit these outliers and re-estimate the baseline equation. Overall, the results remain robust to this procedure.

4.3 Instrumental Variables: Reverse causality, Unobservable Province Characteristics and Measurement Error

Although the OLS estimates show that there is a relationship between war invalids and current economic performance, it remains unclear whether the number of war invalids has a causal impact on current income. An alternative explanation for the relationship is that provinces that were initially underdeveloped have more people forced to be drafted (and more killed and wounded), and these provinces continue to be underdeveloped today. Therefore, we observe a negative relationship between war invalids and current income, even though the war invalids did not have any effect on subsequent economic development. In this section, I use two strategies to evaluate whether there is a causal effect of war invalids on income. First, using historical data, I evaluate the characteristics of selection. As I will show, the evidence suggests that selection was important, but it was usually the provinces that were the most prosperous, not the most underdeveloped, have more people enlisting. Given this evidence, the strong relationship between war invalids and current income is not driven by selection. Instead, selection will tend to bias the OLS estimates towards zero. Second, I use the road distance from each province to 17th parallel as an instrument for the number of war invalids. The instrumental variable (IV) results confirm the OLS estimates.

4.3.1 Historical Evidence of Selection

Due to unavailability of GDP per capita at province level, data on initial population densities is used to check whether the more prosperous or less prosperous areas have more invalids. Acemoglu, Johnson and Robinson (2002) have shown that population density is a reasonable indicator of economic prosperity. I choose population densities in 1958 as a proxy of initial economic prosperity due to two reasons. First, this year is chosen four years after mass emigration of northerners to the South in 1954-55; therefore, it minimizes selection bias due to population adjustment across provinces. Second, this year is selected as two years before the

North's Central Committee issued a secret resolution authorizing an "armed struggle". This authorized the southern communists to begin large-scale operations against the South Vietnamese military. After that, North Vietnam supplied troops and supplies in earnest, and the infiltration of men and weapons from the north began along the Ho Chi Minh trail. In 1960, Hanoi authorized the creation of the National Liberalization Front as a common front controlled by the communist party in the South. It is expected that population density was only impacted significantly by the main battles and US bombing from 1960s.

Figure 7 shows the relationship between the natural log of population density in 1958 and ln(invalid/area). The data confirms the provinces that were the most prosperous in 1958, measured by population density, tend also to be the areas that were most impacted by the war invalids. Therefore, it is likely that reverse causality is not problematic.

However, because of lack of data of migration, this correlation is likely to be spurious. Since invalids can migrate to high developed provinces and wealthy provinces in the past are more likely to remain prosperous today, therefore, we observe high correlation between two trends.

4.3.2 Instrumental variables

The second strategy that I pursue is to use instrumental variables. There are some justifications for using the instrumental approach.

First, if important province characteristics are unobservable or immeasurable, then controlling for all quantifiable province characteristics will still not result in true estimates of the effect of the war invalids on development. Examples of a province's unobservable characteristics are its culture and historical factors. If unobservable province characteristics caused people in certain provinces to select to enlist and more people are likely to be wounded or killed, and if these characteristics persist today, causing poor economic performance, then the size of the estimated effect of war invalids on income will be biased away from zero. I include percentage of minority in each province as explanatory variable but it is unlikely to capture all unobserved omitted factors.

Second, one potential bias arises because of measurement error in the war invalid data. Classical errors-in-variables will lead to a bias towards zero. In addition, it is likely that the war dataset underestimate the number of war invalids, resulting in a form of non-classical measurement error (Nunn, 2008). Because of the high rates of people having been injured in the war but not be regarded as invalids, this form of measurement error may be significant.

Given the two potential biases it is unclear whether the estimated effects will be greater or less than the true effect. A standard solution to all of these problems is the use of instrumental variables. If a variable can be found that is correlated with war invalids, but is uncorrelated with both the province's unobservable characteristics and the forms of measurement error, then the IV procedure will yield consistent coefficient estimates.

I use the road distance from capital of each province to infamous seventeenth parallel as an instrument for number of war invalids. In the Vietnam War, the seventeenth parallel was the provisional military demarcation line and the border between North and South Vietnam established by the Geneva Accords of 1954 that ended the French colonial era in Indochina. The reasons to choose distance to 17th parallel are based on the arguments by Miguel and Roland (2010). In this paper, they argue that the damage by the war increases as one approach the former border divided Vietnam. The authors show that the heaviest bombing take place in the central region near the 17th parallel with Quang Tri is the province that is basically boomed flat during the wars with most of its capital and infrastructure destroyed. Provinces near north and south of Quang Tri also receive heavy US bombing but less intensity. Coastal regions of North Vietnam and other main cities such as Ha Noi and Hai Phong are heavily bombed. It is expected that provinces with high bombing intensity were suffering more invalids and casualties. If so, distance to the seventeenth parallel will be strongly significant predictor of number of invalids and casualties during the war.

Indeed, distance to 17th parallel is a powerful predictor of the number of war invalids. It is reasonable to believe that this instrument will not directly influence or be influenced by income other than through its effect on war invalids, when control is used for other variables. The high

correlation (r = -.58) between the instrument (distance to 17th parallel) and the endogenous variable (number of invalids) and the presumably very weak correlation, if any, between the instrument and the error term of the regression likely minimizes the bias for the IV-2SLS estimator[4].

I estimate the following system of equations using 2SLS,

$$Y_i = \beta_0 + \beta_1 Inv_i + R_i^{'}\delta + X_i^{'}\gamma + \varepsilon_{1i}$$
$$Inv_i = \pi_0 + \pi_1 Z_i + R_i^{'}\pi_2 + X_i^{'}\pi_3 + \varepsilon_{2i}$$

where Y is real per capita GDP; Inv is ln(invalids/pop); R is the vector of regional dummy variables; **X** is a vector of other control variables and Z is an instrument.

Table 8 reports the results of the IV estimates. In column (1), I report the OLS estimates. From columns (2) to (5), the IV estimates are reported. The real provincial GDP per capita in 1990 as the initial conditions of provinces at the early of the reform is controlled for. The estimated coefficients of the instruments in the second stage are of the expected sign. The further a province is from 17th parallel, the lower the number of war invalids from that province. All coefficients are statistically significant.

In the second stage, the estimated coefficient for ln(invalid/pop) remains significant and negative. The results of the Hausman test reject the null hypothesis that the OLS estimate of the coefficient of ln(invalid/pop) is consistent.

I rerun the regression with Northern and Southern samples separately. The results indicate that invalids have biggest impacts on the North and become insignificant on the South. The sample without northeast and northwest provinces does not change the results. The coefficient on invalids remains negative and statistically significant

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[4] If a proposed instrument is not strongly correlated with the suspected endogenous variables then it leads to a bias in the estimates. This is commonly known as the problem of weak instruments. I also use LIML Fuller Instrumental variable estimation method that is a bias-corrected limited information maximum likelihood estimator and provides the most unbiased estimates for inference purposes when the instrument is potentially weak (Stock, Wright and Yogo, 2002; Stock and Yogo, 2005). The regression provides similar estimates.

To be a valid instrument, distance to 17th parallel has to satisfy the so-called exclusion condition with an assumption that the instrument only affects current economic performance through war invalids. To investigate whether this condition holds, I consider two possible violations of the exclusion condition. One concern is distance to 17th is likely to correlate with distance to main economic centres (Hanoi or HCMC), which could possibly affect GDP per capita across provinces through several other channels, such as the acquisition of FDI, educational quality and access to international trade. Thus, our instrument could affect economic performance through distance to the main economic centres rather than through invalids. The other is our instrument may correlate with geographic conditions such as rainfall, temperature, arable land or urbanization that are likely to affect agriculture and economic development across provinces. I try to control some additional variables to check robustness[5]. However, we are never sure that we can control all other observable and unobservable variables which correlate with income and instrument variables.

I perform these tests by adding percentage of urban population, distance to the main economic centres, geographic factors as additional controls in our regression of war invalids. The magnitude of the coefficient in IV estimation does not change substantially if other controls are included, ranging from -0.24 to -0.3. The results in Column 6 of Table 9 show that our instrument is still significant in explaining war invalids when all other variables are controlled.

The magnitudes of the IV estimates are not much different from the OLS estimates. One explanation for this is that the attenuation bias, resulting from both the classical and non-classical measurement errors, cancels out the bias resulting from unobservable province characteristics. Thus, the OLS estimates are slightly biased towards zero, and instrumenting war invalids results in an increase in the estimate magnitude of the coefficient.

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[5] US bombing in the Vietnam War correlates with the distance to 17th parallel and is possible to affect the economic development across provinces after the war. To take into this possible impact, the income per capita in 1990 is controlled for to capture the initial condition of each province. Moreover, according to Miguel and Roland (2010), the U.S. bombing does not have a statistically significant negative impact on poverty rates, consumption, growth, long-run population density, infrastructure and literary after 25 years.

4.4 Channels of Causality

In an initial attempt to determine the channels of causality between the war invalids across provinces and their current level of development, I investigate the impact of invalids on economic performance by correlating ln(invalid/pop) with economic governance index. This index is constructed from a survey on the satisfaction of business community on a broad range of economic governance in Vietnam's provinces, carried out by the Vietnam Chamber of Commerce and Industry and Vietnam Competitiveness Initiative called the Provincial Competiveness Index (PCI) in 2007 (Malesky, 2007).

As a direct test of the hypothesis that the war invalids affects economic performance today through its effect on the quality of economic governance, I estimate the system of equations with heteroskedasticity-consistent standard errors of the following form:

$$Y_i = \beta_0 + \beta_1 Q_i + R_i' \delta + \varepsilon_{1i}$$
$$Q_i = \pi_0 + \pi_1 Inv_i + R_i' \varphi + \varepsilon_{2i}$$

where Y is log income; Q is a measure of the quality of domestic institutions, the provincial economic institutions in 2007; R is a vector of regional dummy variables; Inv is ln(invalids/pop).

The number of war invalids is considered excluded exogenous variables in that they are used as instrumental variables to extract the exogenous component of the institutions index but they are excluded from the second stage regression. The regression addresses the question: Does the aggregate governance index explained by the number of invalids explain cross-province differences in the logarithm of GDP per capita? If β_1 is significant, then this suggests that the number of war invalids influences economic development through institutions, which is consistent with our hypothesis.

I estimate the system of equations by two stages. Results are reported in column (3) of Table 10. The result supports the hypothesis of the war invalids affecting development through the quality of province institutions. In the first stage, ln(invalid/pop) is found to be negatively correlated with the economic governance index and the estimated coefficient is highly significant. The

estimated coefficient for the instrumented economic governance tends to be nine time higher than the magnitude of the estimated coefficient when OLS is used.

4.5 The effects of war invalids on disaggregated governance

The Provincial Competitive Index is a composite indicator which is contributed by ten sub-indices. I investigate how specific types of economic governance may be affected by war invalids by replacing my analysis of general economic governance variable with PCI sub-indices.

I proposed some channels through which war invalids create effects on current economic governance.

First, invalids can pass their ideological beliefs about socialist and old style centrally planning system on the next generation. Invalids in particular and People's Army of Vietnam in general have strong belief and offer an absolute loyalty to the leadership of Communist Party and the political system the Party chooses. Therefore, they could educate other young people what they have been learned and believed. Alesina and Nicola Fuchs-Schündeln (2007) in another study come up with similar conclusion. They investigate the effects of Communism on people's preferences on redistribution and show that East German significantly tend to have preferences for state intervention than a West German. Moreover, older East Germans, who live longer under the Communist regime, are more likely to believe in social conditions as a major determinant of individual fortune, which are a basic theory of the Marxist way of thinking, than younger East Germans. A possible explanation is suggested to the finding above is that East Germans, who are under the impacts of Communist philosophy, are used to thinking that it is "society's fault" if people are poor, unemployed or in need of help. Thus it is government's obligation to take care of these problems.

Second, after the war, invalids (and veterans) can work for local government agencies, especially those with working ability declining from 20-61 per cent, accounting for 63 per cent of total

invalids and sick soldiers. They can affect the effectiveness of local government operation[6]. Even the country has transformed to market economy more than 30 years but their habits of thought following the old planning systems are expected to be persistent and difficult to change.

Third, provinces with more human and physical capital destroyed heavily by the war (and more invalids) tend to be more dependent on budget transfer and resources from the central government. This makes them to be more vulnerable to factionalize political leadership and less likely to engage in their own initiatives to build up local market institutions (Malesky and Taussig, 2009). Figure 10 shows correlation between war invalids and average transfers normalized by population between 2005 and 2007. To make the result more precise, I exclude poor and underdeveloped provinces in Northeast and Northwest regions which receive a substantial large amount of budget transfer. The graph shows that correlation is strong and significant at 0.01 level.

Therefore, it is expected that local government at provinces with more war invalids are likely less to support market economy and so has trouble dealing so well with foreign and even domestic private investors. In this view, unfriendly market environment limit the upside growth in these provinces.

Table 11 reports the results of regressions estimated with different measures of governance quality used as the dependent variable. I regress each dependent variable on ln(invalid/pop). I also estimate each regression with the set of regional controls included. The coefficients on the key causal variables and standard errors have been displayed.

Confirming these arguments, the sign of the coefficients suggest that war invalids are negatively correlated with 'good' institutions. The strongest impacts of war invalids on the individual subindices are confidence in legal institutions, pro-activity of provincial leadership and private development services. Of which, the war invalids impact most on confidence in legal institutions.

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[6] Veterans, especially Party's members, often have been assigned relatively important positions in local government systems due to their loyalty and belief in the political system. See Rama, M., 2008. 'Making Difficult Choices: Vietnam in Transition' for more detail on decision making in the reform process in Vietnam.

The legal institution index measures the private sector's confidence in provincial legal institutions; whether firms regard provincial legal institutions as an effective vehicle for dispute resolution, or as an avenue for lodging appeals against corrupt official behavior. The provinces with less war invalids are likely to be more transparent in resolving dispute based on courts. The result shows that one standard decrease in the war invalids is associated with a 0.64 per cent increase in this index. Because these indices are generated by firm surveys, there is potential that perceptions biases, particularly halo effects, may be responsible for this relation (Malesky and Taussig, 2009). As a robustness test, I make a regression of the equation only with a hard indicator which is cases filled by non-state entities at provincial economic courts as a proxy for confidence in legal institutions that are not derived from the survey. The result is statistically significant.

The number of war invalids also affects the Pro-activity of Provincial Leadership. The result shows that provinces with higher invalids tend to be less creative in designing their own initiatives for private sector development and working with unclear national regulatory frameworks to assist local private firms. These provinces are also less support for private sector development by supplying services such as trade promotion, provision of regulatory information to firms, business partner matchmaking, provision of industrial zones or industrial clusters, and technological services for firms. However, the result is not robust as for case of using instrumental variables.

Since the number of war invalids concentrates more on the North, we expect the impacts of wars on Northern provinces are more severe. Therefore, I re-examine the impacts of war veterans on the North. The results also indicate that the leaders of provinces with more invalids become less pro-active and less favourable to private business development than the overall country performance.

5 Conclusion

Using the unique dataset on number of invalids, I find that Vietnam War's veterans, particularly the number of war invalids, to be an important determinant of economic development in each province more than 30 years after the end of the War. This result is robust to a number of sensitivity tests, including the addition of a number of explanatory variables that previous studies have found to be important determinants of economic development. I also used the distance to 17th parallel as an instrument to estimate the causal effect of the war invalids on provincial economic development. The IV results support the findings from OLS. The estimated effect of the war invalids on income remains negative and statistically significant, suggesting that the number of war invalids results in worse economic development. I then examined the channels of causality underlying the relationship between war invalids and economic development. I find that the relationship between the war invalid and current provincial economic performance can be explained by the war invalid's effect on the quality of provincial economic governance and other disaggregated economic governance indices, such as the pro-activity of provincial leadership, the quality of the legal institutions and services supporting business development. The result also shows that the effects are more profound in Northern provinces.

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Table 1. Descriptive Statistics

Variables	Number of Obs	Mean	Standard Deviation	Min	Max
Log Real GDP per capita 2007 (lngdppc07)	63	1.69	.481	.854	3.55
Log War invalids normalized by population 2007 (ln(invalid/pop))	63	-.57	.735	-2.30	.92
Provincial competitive Index 2007 (pci07)	63	58.76	6.75	43.9	76.02
Log Distance to 17th Parallel (Dis17)	63	6.48	0.67	3.63	7.21
Percentage of Agricultural land 2007	63	36.93	23.4	7.2	82.7
Average monthly rainfall (2004-2007)	63	1749.2	456.5	734	3294
Average monthly temperature (2004-2007)	63	24.43	2.3	18.3	27.7
Urbanization (percentage of urban population 2007)	63	23.73	16.08	7.38	86.71
Log Distance to main economic centers	63	4.91	2.30	4.91	2.30
Percentage of Minority	63	1.16	2.15	0	11.48

Table 2. Total invalids and sick soldiers in Vietnam War

Classification	Number	Percentage of total
War Invalids	**487,378**	**74.34**
with working ability declines from 21% - 60%	415,564	63.39
from 61% - 80%	55,934	8.53
more than 81%	11,937	1.82
more than 81% with severe injury	3,943	0.60
Sick soldiers	**168,235**	**25.66**
with working ability declines from 41% - 50%	17,480	2.67
from 51% - 60%	11,135	1.70
from 61% - 70%	120,273	18.35
from 71% - 80%	16,760	2.56
from 81% - 90%	1,713	0.26
from 91% -100%	83	0.01
more than 81% with severe injury	791	0.12
Total	**655,613**	**100**

Table 3. Total invalids and sick soldiers: Top 12 Provinces

Provinces	Number	Percentage of total
Nghe An	49961	7.6%
Thanh Hoa	48075	7.3%
Ha Noi	42372	6.5%
Ha Tinh	31977	4.9%
Thai Binh	28682	4.4%
Quang Ngai	26598	4.1%
Nam Dinh	24758	3.8%
Hai Duong	22244	3.4%
Quang Nam	21186	3.2%
Binh Ðinh	21123	3.2%
HCM	19219	2.9%
Hai Phong	16478	2.5%

Table 4. Share of ethnic minority over total ethnic minority

Regions	Percentage of total
Northeast	
Ha Giang	6.31
Tuyen Quang	4.14
Cao Bang	7.97
Lang Son	7.64
Lao Cai	4.29
Yen Bai	3.94
Bac Can	6.92
Thai Nguyen	2.11
Quang Ninh	1.03
Phu Tho	1.08
Bac Giang	1.03
Northwest	
Lai Chau	6.13
Son La	6.12
Hoa Binh	5.84
Central Highland	12.37
Total	76.91

Figure 1. Income and War invalid's distribution

Legend (left map):
(10,34.86]
(7.91,10]
(6.55,7.91]
(5.87,6.55]
(5.23,5.87]
(4.34,5.23]
(4.06,4.34]
(3.83,4.06]
(3.21,3.83]
[2.35,3.21]

Legend (right map):
(1.53,2.48]
(1.29,1.53]
(.92,1.29]
(.63,.92]
(.515,.63]
(.44,.515]
(.39,.44]
(.29,.39]
(.24,.29]
[.07,.24]
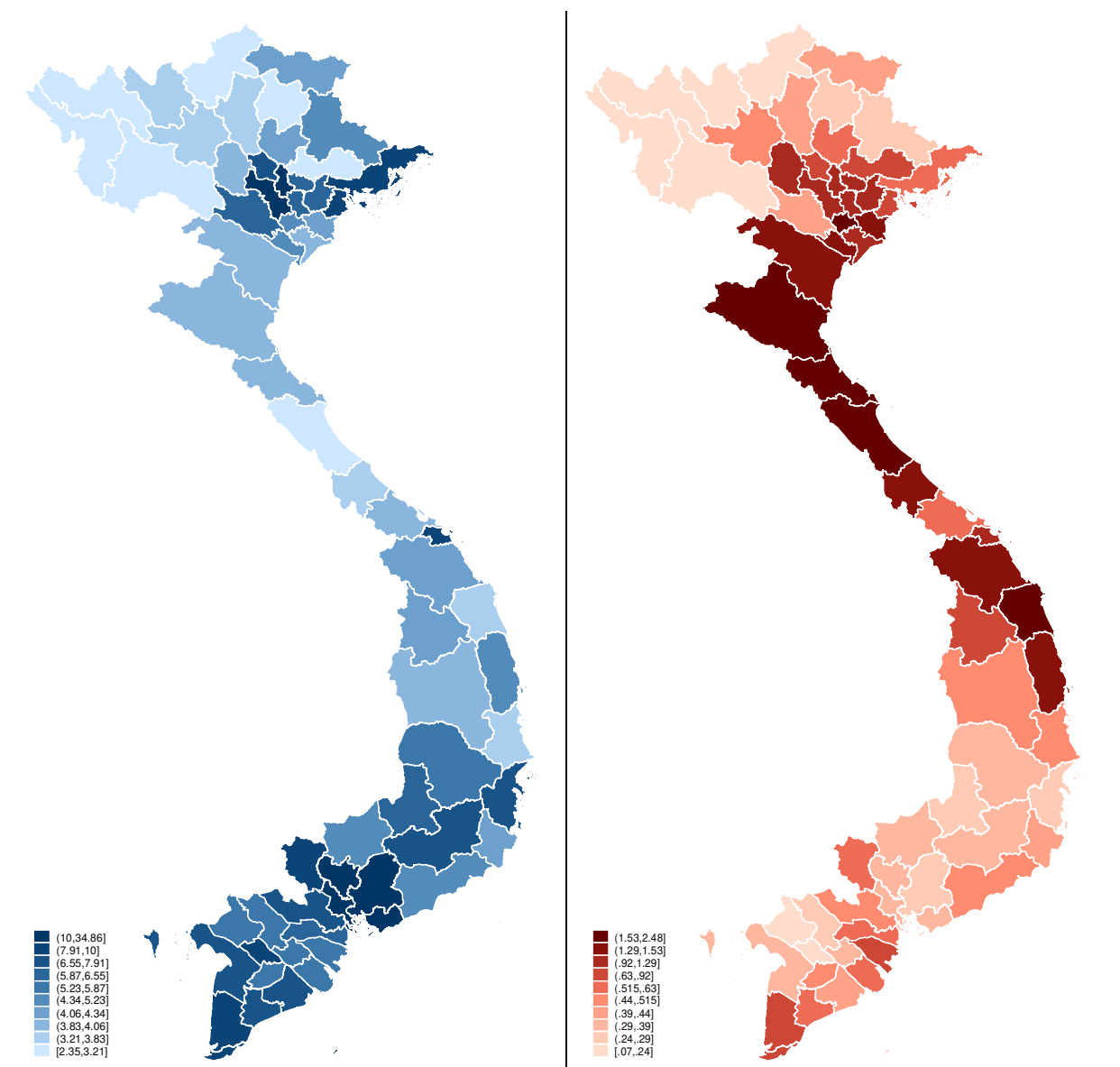
Note: The left-hand side is income per capita quintile distribution. The right-hand side is the quintile distribution of number of war invalids normalized by provincial population.

Figure 2. Ethnic minority distribution

Ethnic minority distribution
Vietnamese Population Census, 1989

(6,9.17]
(3.87,6]
(1.75,3.87]
(1.22,1.75]
(.78,1.22]
(.45,.78]
(.2,.45]
(.09,.2]
(.04,.09]
[0,.04]
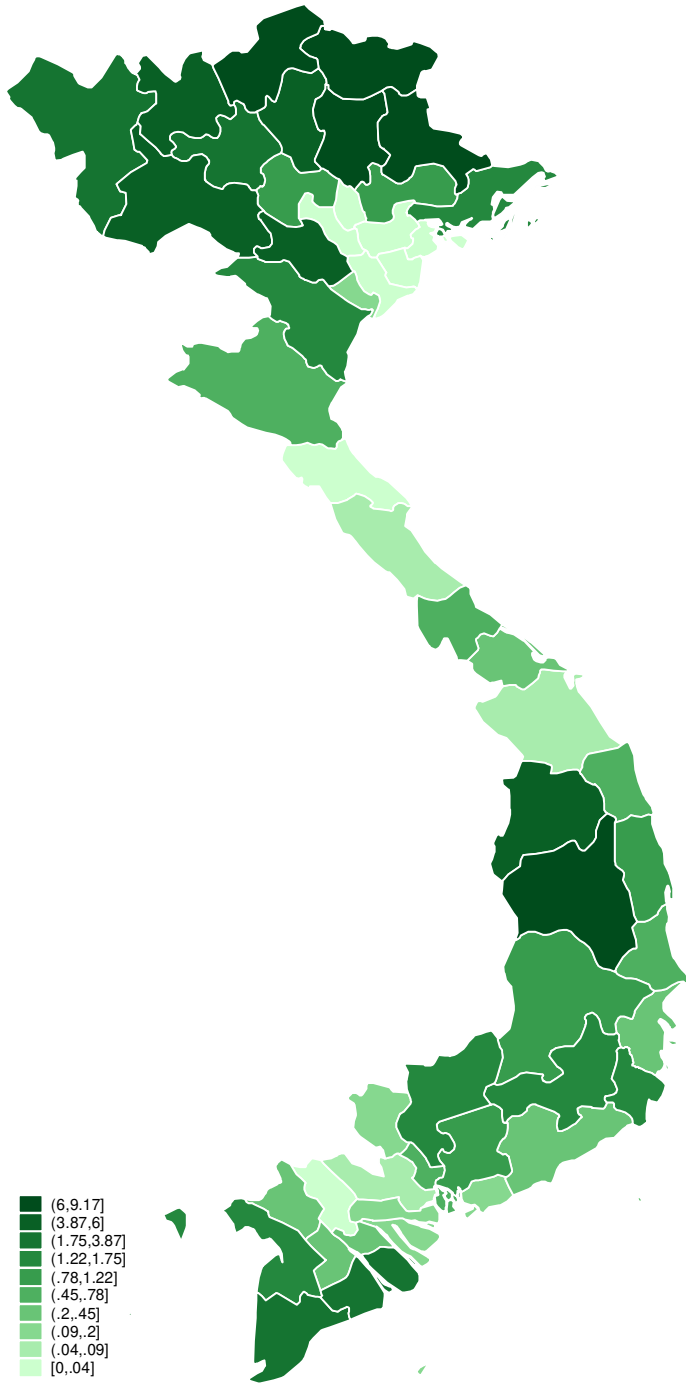
Figure 3. Vietnam War Map

The Vietnam War

Figure 4. Relationship between log War Invalids normalized by provincial population, ln(invalid/pop07), and Log Real GDP Per Capita 2007 without controlling for regional effects

coef = -.02299547, (robust) se = .091206, t = -.25

Figure 5. Relationship between log War Invalids normalized by provincial population, ln(invalid/pop07), and Log Real GDP Per Capita 2007 after controlling for regional and national city fixed effects

coef = -.20083707, (robust) se = .06908029, t = -2.91

Figure 6. Outliers and influential observations

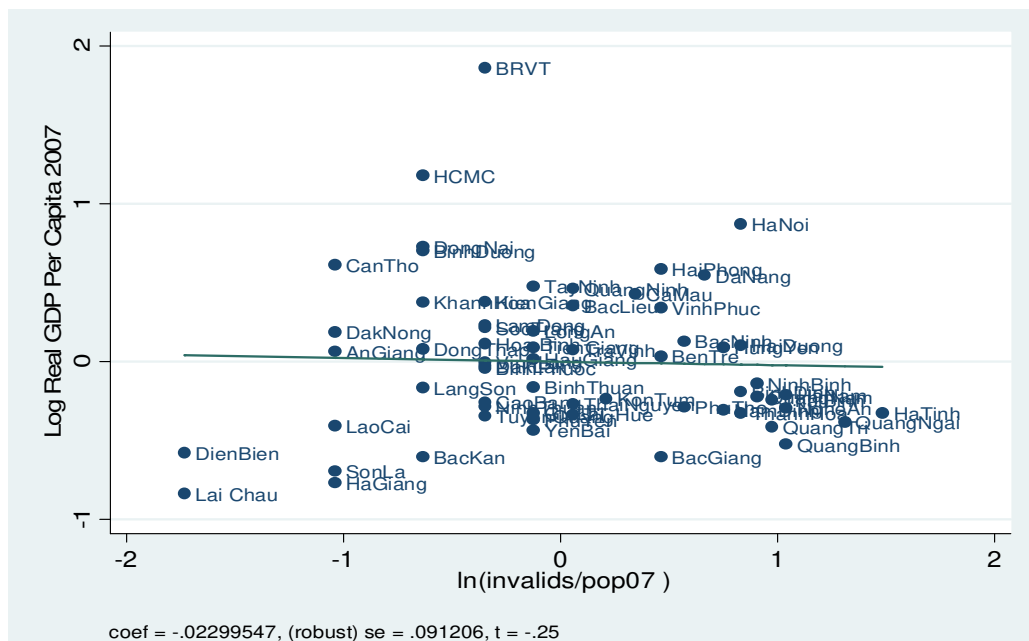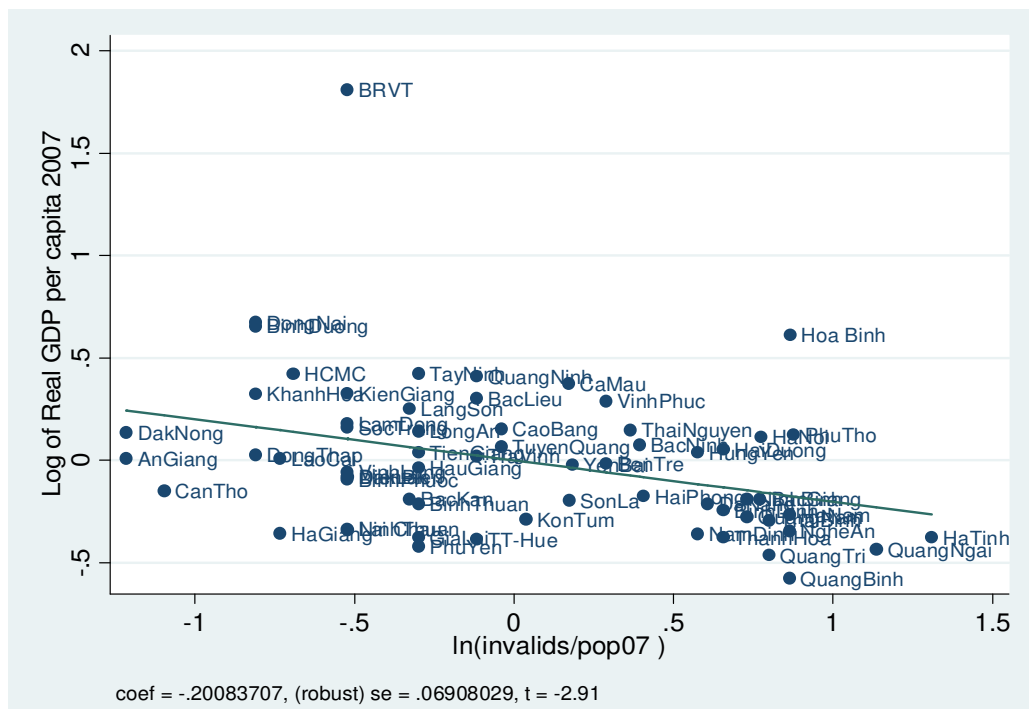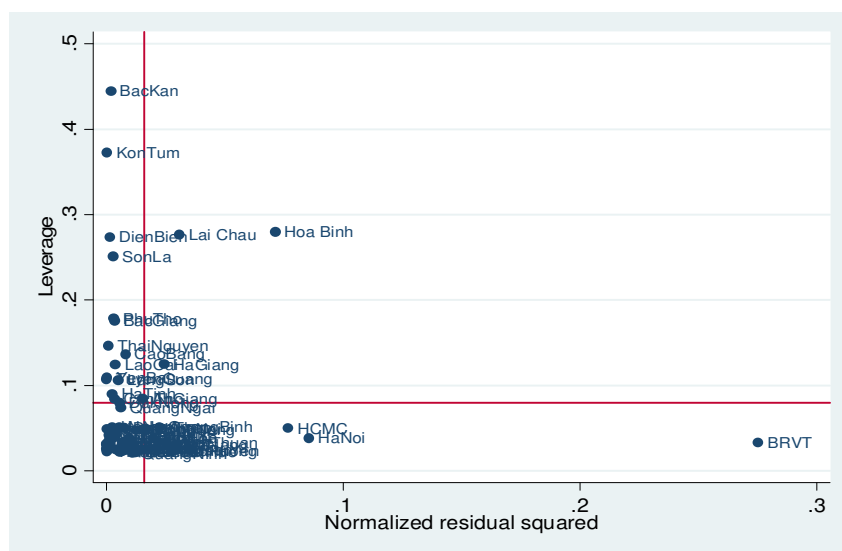Table 5. Relationship between War invalids and Income

	Dependent variable is log real per capita GDP in 2007					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(invalid/pop07)	-0.023	-0.22***	-0.26***	-0.195**	-0.192***	-0.2***
	(0.091)	(0.077)	(0.086)	(0.086)	(0.084)	(0.074)
Percentage of Minority			-0.04***	-0.026	-0.03	-0.02
			(0.014)	(0.013)	(0.015)	(0.015)
Agricultural land				0.003	0.002	- 0.004
				(0.002)	(0.003)	(0.003)
Average monthly temperature					0.015	0.024
					(0.035)	(0.033)
Average monthly rainfall					-0.0001	-0.0003
					(0.0001)	(0.0001)
Distance to main economic centers						-0.11***
						(0.03)
National city dummy	No	Yes	No	Yes	Yes	Yes
Regional fixed effects	No	Yes	Yes	Yes	Yes	Yes
Number obs.	63	63	63	63	63	63
R-squared	0.0012	0.49	0.37	0.5	0.52	0.59

Notes: Coefficients are reported with robust standard errors in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels. Regional fixed effects control for central highland, northeast and northwest regions. National city dummy variables control for Ha Noi, Ho Chi Minh, Can Tho, Hai Phong, Da Nang.

Table 6. Income and Invalids: Robustness to subsamples. Dependent variable is log real GDP per capita in 2007

Sample	coef	SE	N	R^2
Full	-0.02	0.08	63	0.012
Excluding northeast, central highland and northwest provinces	-0.39***	0.10	44	0.28
Only South	-0.30**	0.10	33	0.18
Only North (excluding northeast and northwest provinces)	-0.98***	0.19	16	0.49

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively. Standard errors are robust to arbitrary heteroskedasticity. Northeast region contains LaoCai, YenBai, PhuTho, HaGiang, TuyenQuang, CaoBang, BacKan, ThaiNguyen, LangSon, BacGiang and QuangNinh. Northwest includes HoaBinh, SonLa, DienBien and LaiChau. Control variable is percentage of ethnic minority.

Table 7. Robustness Tests. Omitting influential outliers. Dependent variable is log real GDP per capita in 2007

	coef	SE	N	R^2	Omitted Observations
Baseline	-0.26***	0.086	63	0.37	None
		Omitting influential outliers			
DFFITS	-0.267***	0.071	60	0.46	BRVT, HoaBinh, LaiChau
Cook's Distance	-0.267***	0.071	60	0.46	BRVT, HoaBinh, LaiChau
Welsch Distance	-0.267***	0.071	60	0.46	BRVT, HoaBinh, LaiChau
DFBETA	-0.273***	0.057	58	0.54	HaNoi, BRVT, AnGiang, HoaBinh, HCMC

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively against a two sided alternative. Standard errors are robust to arbitrary heteroskedasticity. Influential observations are omitted using the following standard rule. DFFITS: Omit if $DFFITS_i > 2(k/n)^{1/2}$ (Belsley, Kuh and Welsch (1980)). Cook's distance: Omit if Cook's Distance > 4/n (Cook (1977)). Welsch distance: Omit if Welsch distance > $3/\sqrt{k}$ (Welsch (1982)). Where n is the number of observations, 63, and k is the number of independent variables, 5. All regressions include regional dummy variables for central highland, northeast and northwest regions.

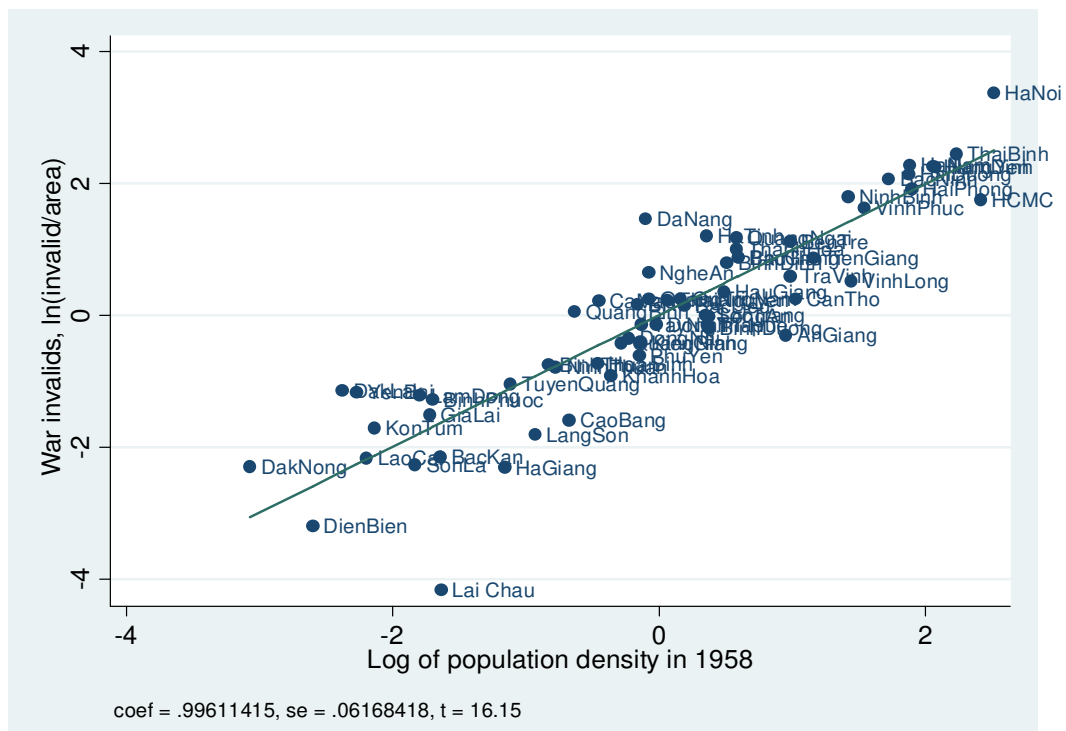Figure 7. Relationship between initial population density and war invalids

coef = .99611415, se = .06168418, t = 16.15

Figure 8. Relationship between log war invalids normalized by provincial population and Distance to 17th Parallel

coef = -.00135585, se = .00022325, t = -6.07
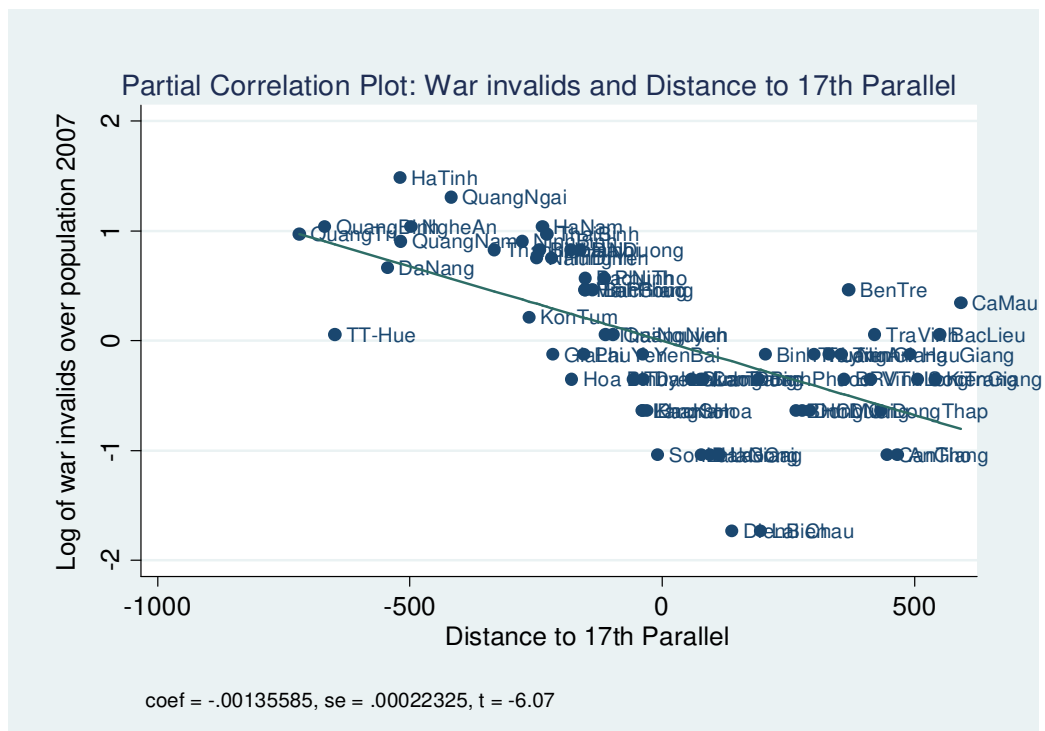
Table 7. Bivariate Correlation between distance to 17th parallel and other variables

Variables	1	2	3	4	5	6	7
1. Distance to 17th	1						
2. Log Distance to main economic centers	-0.26*	1					
3. Average monthly rainfall (2004-2007)	-0.395*	0.274*	1				
4. Average monthly temperature (2004-2007)	0.154	-0.095	0.015	1			
5. Urbanization (percentage of urban population 2007)	-0.007	-0.374*	0.111	0.228	1		
6. Percentage of Agricultural land 2007	0.498*	-0.287*	-0.291*	0.522*	-0.069	1	
7. Log real GDP per capita in 1990	0.231	-0.461*	-0.073	0.525	0.674*	0.318*	1

Note: *, significant at 5 per cent.

Table 8. IV Regressions with different samples

	OLS	Base Sample	Excluded North	Excluded South	Excluded Northeast and Northwest
	(1)	(2)	(3)	(4)	(5)
ln(invalid/pop)	-0.26***	-0.25***	-0.35	-0.61**	-0.28***
	(0.086)	(0.1)	(0.22)	(0.28)	(0.11)
F-stat	8.56	30.94	25.59	13.51	32.14
Number obs.	63	63	33	30	49
Distance to 17 parallel		-0.53***	-0.48**	-0.27*	-0.48***
		(0.14)	(0.2)	(0.14)	(0.13)
Percentage of Minority		-0.06	-0.06	-0.1**	0.02
		(0.04)	(0.03)	(0.05)	(0.05)
Initial condition (real GDP per capita in 1990)		-0.33*	-0.27	0.03	-0.42**
		(0.17)	(0.17)	(0.27)	(0.19)
F-stat		11.66	11.22	18.78	10.33
Hausman test (p-value)		0.000	0.000	0.000	0.000
F statistics on excluded IV		14.15	5.84	3.9	13.59
Stock-Yogo critical values:	5.53/16.38				

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively against a two sided alternative. Robust standard errors are in the brackets. Hausman p-values for endogenous tests are reported. The null hypothesis is that specified endogenous variable is exogenous. Regional fixed effects control for central highland, northeast and northwest regions. F statistics on excluded IV for weak-instrument tests are also reported. The null hypothesis in this case is that the instrument is weak. Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 25 percent and 10 percent maximal IV size. The null hypothesis of weak instruments is rejected in the case that the *F* statistics on excluded IV exceeds the Stock-Yogo critical values.

Table 9. IV Regressions with Additional Controls

	OLS	IV	IV	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Second Stage. Dependent variable is log Real GDP per capita 2007							
ln(invalid/pop)	-0.26***	-0.25***	-0.3**	-0.24*	-0.24*	-0.24*	-0.29**
	(0.086)	(0.1)	(0.13)	(0.14)	(0.13)	(0.13)	(0.12)
Percentage of Minority	-0.04***	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.014)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
F-stat	8.56	30.94	23.51	28.79	16.94	15.24	18.11
Number obs.	63	63	63	63	63	63	63
First Stage. Dependent variable is Log war invalids normalized by population 2007							
Distance to 17 parallel		-0.53***	-0.51***	-0.49***	-0.49***	-0.49***	-0.52***
		(0.14)	(0.17)	(0.18)	(0.13)	(0.17)	(0.17)
Percentage of Minority		-0.06	-0.07*	-0.06	-0.06	-0.05	-0.06
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Initial condition (real GDP per capita in 1990)		-0.33*	-0.32*	-0.02	-0.51**	-0.12	-0.12
		(0.17)	(0.16)	(0.19)	(0.23)	(0.2)	(0.18)
Average monthly rainfall			-0.0003				-0.0003*
			(0.0002)				(0.0002)
Average monthly temperature			-0.04				-0.01
			(0.05)				(0.04)
Urbanization				-0.01**		-0.02**	-0.01***
				(0.005)		(0.007)	(0.007)
Agricultural land			-0.003	-0.004	-0.003	-0.007*	-0.008*
			(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Distance to main economic centers					-0.09*	-0.12**	-0.1**
					(0.05)	(0.05)	(0.05)
F-stat		11.66	10.93	9.36	10.81	12.02	10.92
Hausman test (p-value)		0.000	0.000	0.000	0.000	0.000	0.000
F statistics on excluded IV		14.15	8.72	7.37	7.8	8.43	9.78

Stock-Yogo critical values: 5.53/16.38

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively against a two sided alternative. Robust standard errors are in the brackets. Hausman p-values for endogenous tests are reported. The null hypothesis is that specified endogenous variable is exogenous. Regional fixed effects control for central highland, northeast and northwest regions. F statistics on excluded IV for weak-instrument tests are also reported. The null hypothesis in this case is that the instrument is weak. Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 25 percent and 10 percent maximal IV size. The null hypothesis of weak instruments is rejected in the case that the *F* statistics on excluded IV exceeds the Stock-Yogo critical values.

Table 10. Impacts on income through provincial economic governance

|	OLS	OLS	Two-stage
	(1)	(2)	(3)
Panel B. Dependent variable is log Real GDP per capita 2007			
Provincial Competitive Index 2007	0.016*		0.102**
	(0.009)		(0.05)
Ln(invalid/pop)		-0.26***	
		(0.086)	
Percentage of Minority	-0.013	-0.04***	0.05
	(0.013)	(0.014)	(0.04)
F-stat	7.15	8.56	2.97
Number obs.	63	63	63
Panel A. Dependent variable is Provincial Competitive Index 2007			
ln(invalid/pop)			-2.55**
			(1.26)
Percentage of Minority			-0.84*
			(0.34)
Regional fixed effect			Yes
F-stat			6.57

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively against a two sided alternative. Robust standard errors are in the brackets. Regional fixed effects control for central, northeast and northwest regions.

Table 11. War invalids and various measures of governance quality

Dependent Variable	OLS		IV	
	coef	se	coef	se
	For whole sample			
Overall economic institutions	-2.55**	1.26	-2.9	1.79
	Regulation in business environment			
Entry Costs	0.08	0.16	0.54	0.33
Bias to the State Sector	-0.1	0.16	0.008	0.23
Labor training	-0.18	0.30	0.065	0.37
Pro-activity of Provincial Leadership	-0.68**	0.29	-0.97**	0.39
Private Business Development	-0.72**	0.29	-0.47	0.48
Time Costs of Regulatory Compliance	0.05	0.15	-0.27	0.22
	Property rights			
Land Access and Security of tenure	-0.09	0.136	-0.45**	0.17
	Accountability			
Confidence in Legal Institutions	-0.63***	0.19	-1.01***	0.29
Hard Legal Institutions	-0.29**	0.14	-0.41*	0.23
Informal Charges	-0.11	0.12	-0.3**	0.14
Transparency of business information	-0.05	0.21	0.03	0.21
Regional Dummies	Yes			
	For Northern provinces			
Overall economic institutions	-3.25	3.01	-8.05***	2.85
	Regulation in business environment			
Entry Costs	-0.13	0.27	1.59	1.59
Bias to the State Sector	-0.52**	0.22	-0.79	0.54
Labor training	0.28	0.49	0.36	1.04
Pro-activity of Provincial Leadership	-1.2**	0.5	-2.84***	1.00
Private Business Development	-0.8	0.63	-2.47***	0.86
Time Costs of Regulatory Compliance	0.55	0.55	-0.52	0.76
	Property rights			
Land Access and Security of tenure	0.26	0.3	0.37	0.55
	Accountability			
Confidence in Legal Institutions	-0.58	0.52	-1.46	0.84
Hard Legal Institutions	-0.37	0.36	-1.23	0.86
Informal Charges	-0.52**	0.25	-1.46**	0.46
Transparency of business information	-0.65	0.57	-0.84	0.53
Regional Dummies	Yes			

Notes: ***, ** and * indicates significance level of 1%, 5% and 10% respectively against a two sided alternative. Regional fixed effects control for central highland, northeast and northwest regions for the whole sample and northeast and northwest for Northern provinces. Instrumental variable is distance to 17th parallel.

Figure 9. Relationship between number of war invalids and budget transfers
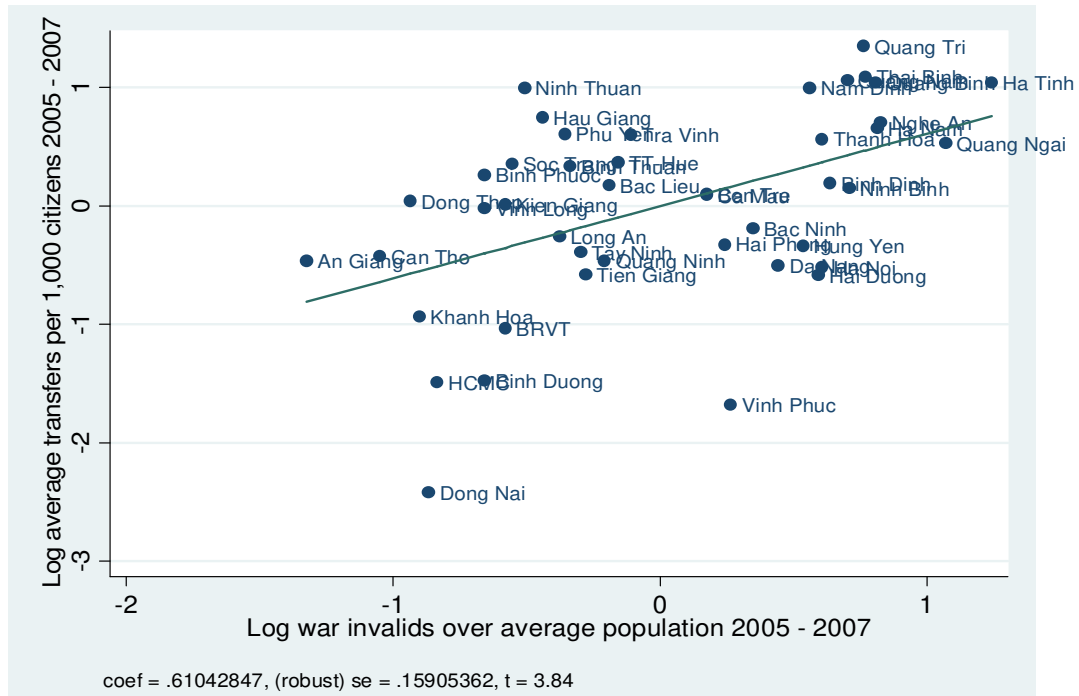
Note: Data on transfers is from the 2005-2007 annual budgets. The sample excludes Northeast, Northwest and Central Highland regions, which contains LaoCai, YenBai, PhuTho, HaGiang, TuyenQuang, CaoBang, BacKan, ThaiNguyen, LangSon, BacGiang, QuangNinh, HoaBinh, SonLa, DienBien, LaiChau, GiaLai, DacLac, DacNong, KonTum, LamDong. Source: www.mof.gov.vn

Appendix Table 1: Data Description and Sources

Log Real GDP per capita: Log of provincial real GDP per capita in 2007. Source: GSO (2009)

Population density in 1958: Source: Vietnam Statistical Yearbook 1972, National Institute of Statistics and General Statistics Office (GSO). Due to some changes in administrative borders, some provinces do not exist in both North and South Vietnam in 1958 and some present provinces are merged from some 1958 provinces. For example, in 1958, Vietnam was composed of 25 provinces in the North and 43 in the South, compared to current 30 in the North and 34 in the South. Districts of old provinces in the South may be merged with other neighbour provinces. We construct 1958 population data by matching old provinces with new ones.

Distance to main economic centers: Distance from capital of each province to nearest main economic centers (Hanoi or HCM) by road. Source: Author's own calculation.

Agricultural land: Percentage of agricultural land over total land in each province. Source: GSO (2009)

Urbanization: Percentage of urban population over total population in each province in 2007. Source: GSO (2009)

Distance to 17th parallel: Distance from the capital of each province to 17th parallel by road. Source: Author's own calculation.

Province is national-level city: Dummy variable representing Ha Noi, Ho Chi Minh city, Can Tho, Hai Phong, Da Nang. Source: Author's own calculation

Ethnic minority in provinces: Percentage of ethnic minority over total population at each province in 1989. Source: Vietnam Population Census (1989)

Temperature: Average monthly temperature over 2004 – 2007 period, measured in degrees Celsius. Source: Provincial Statistical Yearbook, various years.

Rainfall: Average monthly temperature over 2004 – 2007 period, measured in millimeters. Source: Provincial Statistical Yearbook, various years.

War invalids: Including both number of war invalid and diseased soldiers. Source: Ministry of Labour, Invalids and Social Affairs (2008).

Initial condition: Log of provincial real GDP per capita in 1990. Source: GSO

Provincial Economic Governance: Ranking of economic governance in Vietnam's 63 provinces by the Vietnam Chamber of Commerce and Industry and Vietnam Competitiveness Initiative (PCI Survey 2007). Data is from the Provincial Competiveness Survey available at www.pcivietnam.org

Entry Costs: A measure of: i) the time it takes a firm to register and acquire land; ii) the time to receive all the necessary licenses needed to start a business; iii) the number of licenses required to operate a business; and iv) the perceived degree of difficulty to obtain all licenses/permits. Source: PCI Survey 2007.

Land Access and Security of Tenure: A measure combining two dimensions of the land problems

confronting entrepreneurs: how easy it is to access land and the security of tenure once land is acquired. Source: PCI Survey 2007.

Transparency and Access to Information: A measure of whether firms have access to the proper planning and legal documents necessary to run their businesses, whether those documents are equitably available, whether new policies and laws are communicated to firms and predictably implemented, and the business utility of the provincial webpage. Source: PCI Survey 2007.

Time Costs and Regulatory Compliance: A measure of how much time firms waste on bureaucratic compliance, as well as how often and for how long firms must shut their operations down for inspections by local regulatory agencies. Source: PCI Survey 2007.

Informal Charges: A measure of how much firms pay in informal charges, how much of an obstacle those extra fees pose for their business operations, whether payment of those extra fees results in expected results or 'services,' and whether provincial officials use compliance with local regulations to extract rents. Source: PCI Survey 2007.

SOE Bias and Competition Environment: A measure focusing on the perceived bias of provincial governments toward state-owned enterprises, equitized firms, and other provincial champions in terms of incentives, policy, and access to capital. Source: PCI Survey 2007.

Proactivity of Provincial Leadership: A measure of the creativity and cleverness of provinces in implementing central policy, designing their own initiatives for private sector development, and working within sometimes unclear national regulatory frameworks to assist and interpret in favor of local private firms. Source: PCI Survey 2007.

Private Sector Development Services: A measure of provincial services for private sector trade promotion, provision of regulatory information to firms, business partner matchmaking, provision of industrial zones or industrial clusters, and technological services for firms. Source: PCI Survey 2007.

Labor and Training: A measure of the efforts by provincial authorities to promote vocational training and skills development for local industries and to assist in the placement of local labor. Source: PCI Survey 2007.

Legal Institutions: A measure of the private sector's confidence in provincial legal institutions; whether firms regard provincial legal institutions as an effective vehicle for dispute resolution, or as an avenue for lodging appeals against corrupt official behavior. Source: PCI Survey 2007.

Hard Legal Institutions: A measure of cases filled by non-state entities at provincial economic court. Source: PCI Survey 2007.

Sample

Ha Noi, Hai Phong, Da Nang, HCMC, Can Tho, Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, TT-Hue, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Dong Thap, An Giang, Tien Giang, Vinh Long, Ben Tre, Kien Giang, Tra Vinh, Soc Trang, Bac Lieu, Ca Mau, Binh Phuoc, Tay Ninh, Ninh Thuan, Long An, Quang Ninh, Hau Giang, BRVT, Bac Ninh, Binh Duong, Binh Thuan, Dong Nai, Ha Nam, Hai Duong, Hung Yen, Nam Dinh, Ninh Binh,

Thai Binh, Vinh Phuc, Bac Kan, Bac Giang, Cao Bang, Dak Lak, Dak Nong, Dien Bien, Gia Lai, Hoa Binh, Kon Tum.