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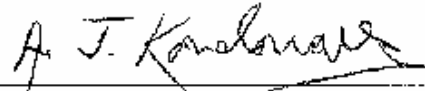
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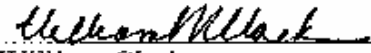
REGIONAL GROWTH DISPARITIES IN VIETNAM

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DEPARTMENT OF ECONOMICS

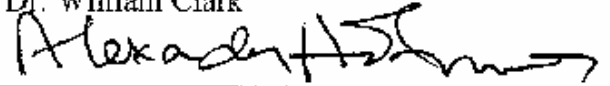
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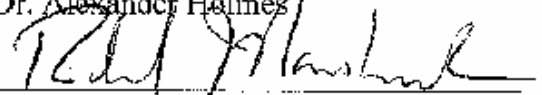
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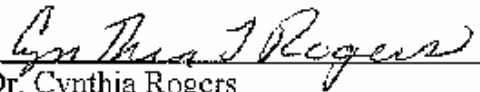
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*This dissertation is dedicated
to the memory of my father, who emphasized the importance of education, and
instilled in me the inspiration to set high goals and the confidence to achieve them.*

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COMMONLY USED ACRONYMS

AIC	Akaike Information Criterion
AICc	Corrected Version of Akaike Information Criterion
BMA	Bayesian Model Averaging
EBA	Extreme Bounds Analysis
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GSO	General Statistics Office
HCMC	Ho Chi Minh City
IZ	Industrial Zone
KISS	Keep It Sophisticatedly Simple
PCI	Provincial Competitiveness Index
R&D	Research and Development
SIC	Schwarz Information Criterion
VNCI	Vietnam Competitiveness Initiative
VND	Vietnam Dong
WB	World Bank

VIETNAMESE WORDS AND TERMS

“dai hoi Dang”	National party congress
“doi moi”	Renovation (economic policy)
“dong cua”	Closed door (economic policy)
“kinh te ke hoach”	Central planning economy
“kinh te thi truong theo dinh huong xa hoi chu nghia”	Market economy with socialist orientation
“phep vua thua le lang”	The King’s laws bow before village regulations
“thoi bao kinh te Viet Nam”	Vietnam Economic Times

ABSTRACT

Growth inequality is a pressing issue for Vietnam, one of the fastest-growing economies in Southeast Asia. This dissertation examines potential factors contributing to the regional economic growth disparities of Vietnam and their effects on the development process. The Extreme Bound Analysis approach was used for estimating growth equations to identify the robust determinants of the model. Using the data from 42 provinces in Vietnam from 1998 to 2003, the analysis confirms the importance of good economic governance, initial GDP level, human capital, and population. The analysis suggests that provincial governance such as State Sector Bias and Proactivity of Provincial Leadership are robust and economically important factors related to regional economic growth.

CHAPTER 1

INTRODUCTION

Over the past few centuries, the world has seen unimaginable improvements in people's standard of living. Average incomes today in the United States and Western Europe are between 10 and 30 times larger than a century ago, and between 50 and 300 times larger than 2 centuries ago (Romer, 2005).

At the same time, there are enormous differences in living standards across different parts of the world. The gap between industrialized and developing countries is getting wider reflecting large differences in human welfare, nutrition, literacy, infant mortality, life expectancy, and other measurements of human well-being. Average real income in such countries as the United States, Germany, and Japan appear to exceed those in such countries as Bangladesh and Kenya by a factor of about 20 (Penn World Tables, 2007). While the Gross Domestic Product (GDP) per capita in the United States is \$121 a day (World Fact Book, 2006), more than 314 million Africans live on less than \$1 a day—nearly twice as many as in 1981 (World Bank, 2006).

There are also vast differences among regions within nations. This phenomenon is common in both developed and developing countries. Conflicts arise between national growth and regional income equality, especially in rapidly growing economies like Korea (Renaud, 1973) and China (Jian, Sachs, & Warner, 1996; Ying, 1999). Vietnam is not an exception. With a GDP growth rate of 8.2% in 2006, Vietnam is ranked among one of the fastest-growing economies in Southeast Asia and in the world. However, one of Vietnam's current priorities is to address the growing

disparity in economic development between regions, and provinces within a single region.

Per capita income, \$220 in 1994, rose to \$726 in 2006 with a related reduction in the share of the population living in acute poverty. In the meantime, regional differences in average annual income are wide: compared with \$726 national average, it is \$1,800 in Ho Chi Minh City and much lower than average in the poorer provinces of the central and northern highlands. Growth rates varied between regions and urban and rural areas. Nevertheless, positive per capita growth rates were recorded in most areas throughout the country. GDP growth was highest in the southeast, about 16%, and lowest in the Mekong Delta at 4%. Annual growth rates among the other regions ranged from 7% to 9% (Dollar & Litvack, 1998). Roughly 20% of the provinces (11 out of 64) account for more than 60% growth in the private sector and more than 70% of both private-sector investment and revenue (Vietnam Competitiveness Initiative [VNCI], 2006). While state spending—a significant portion of GDP—is spread more evenly across regions and mitigates some of the differences in living standards in the near term, the data reflect a pattern of highly concentrated growth in a few areas, with much of the country lagging behind and displaying far less of the dynamism that would allow them to catch up.

This dissertation's investigates the question: What factors contribute to the regional growth disparities in Vietnam? This question is of great concern for the development process in Vietnam because the lagging regions tend to resist economic reform while successful regions tend to embrace it. If only part of the country is successful, it will be difficult to achieve a national consensus about moving ahead

quickly to integrate into the global economy, reform public administration, finances and other important issues. If some provinces continue to lag behind, it is likely that the overall pace of economic reform will suffer. This is, therefore, an urgent economic problem to solve for the long-term stable development of the country, to help these promising provinces better reach their potential.

One hypothesis given for this striking difference is history. The northern area has long experience with old-style central planning, while the southern area has been exposed somewhat to the market economy. History does have some weight, but it is likely to diminish over time. Another reason suggested by Nguyen, Pham, Bui & Dapice (2004) is that better infrastructure in the south can be a primary reason for disparities. However, years of high investments have added important port facilities, highways, and better power and water supplies to the north. Industrial zones (IZs) are plentiful. Similarly, the cost of labor is higher in the south than in the north, so that should be a northern advantage. What elements in particular make some regions grow faster than the others? How much do they contribute to the overall rate of development? This research builds an economic model for the analysis of regional growth and assesses the effects of different factors on the economic-development process of provinces in Vietnam, ranging from infrastructure, to human capital, geographic location, business environment, and provincial governance.

This regional-development research on Vietnam is interesting for several reasons. First, Vietnam has been subject to several distinctive policy regimes since the establishment of the Democratic Republic of Vietnam in 1945. The country was divided into two parts: northern Vietnam and southern Vietnam after the Geneva

Peace Agreement was signed in 1954. The North was pursuing socialism with a central-planning economy under the support of the Soviet Union and the Eastern European Block. The South was pursuing capitalism under the influence and support of the United States. Although the country was reunified in 1975, the historical imprints are likely to have had considerable impact on the economic development of each region.

Vietnam continued its “closed door” policy until 1986. With the collapse of the Soviet Union, the country transformed from a central planning economy to a market economy “with a socialist orientation.” In this special case of transitional economic development, socialist and capitalistic elements of the economy coexist. A large proportion of businesses are state owned, and simultaneously there is booming private enterprise following the enactment of the Enterprise Law in 1999. This new law boldly changed the paradigm of creating a private business in Vietnam by making enterprise registration a legal right, rather than a privilege awarded at the discretion of local officials (Vu & Mazur, 2005). The Communist Party is still the ruling party with political power, but at the same time, market forces, entrepreneurs, and local officials have begun to have their voice in the policy-making process.

A second historical artifact is that Vietnam displays vast geographical disparities in the sectoral distribution of economic activity, living standard, resource base, and other determinants of income level and income growth. These disparities increase the impact of regional inequality because the gaps between the richest and poorest regions, the urban and rural areas, are getting wider and wider. In 2002, monthly consumption was 460 thousand Vietnam Dong (VND) per capita in urban

and 211 thousand VND in rural areas, the northwest and north central coast were poorest (179/193 thousand VND) and the HCMC area the highest (448 thousand VND; General Statistics Office of Vietnam [GSO], 2005).

Thirdly, the case of Vietnam regional development provides some important hints for economies with widening inequalities among its regions. Regional-development equality has been a common concern for many policy makers in the world, especially in developing economies.

This research analyzes 42 provinces of Vietnam from 1998 to 2003. It overviews the variation in the pace of economic development in the national economy. The data are collected from the General Statistics Office of Vietnam (GSO; 1996–2006), the Vietnam Competitiveness Initiative (VNCI, 2005), the World Bank (1996–2006), and the United Nations Development Programme (UNDP, 1990, 2005, 2007).

The Extreme Bound Analysis approach following Leamer (1983), Levine and Renelt (1992), Granger and Uhlig (1990), Poskitt and Tremayne (1987), and Reed (2006) is used to discover the robust variables among the various potential determinants in the growth equation. After purging the effects of nonrobust variables, the results confirm the effects of Initial GDP levels, Population, Human Capital, State Sector Bias, and Proactivity of Provincial Leadership to provincial growth.

The main contribution of this dissertation is to model economic and noneconomic effects on regional growth, as well as to guide policy makers seeking to promote more balanced economic development in the country. The data collection and analysis will also contribute to regional economic literature in Vietnam, and can be useful in further research on growth and development.

The dissertation is organized as follows: Chapter 2 will review different economic growth models from neoclassical to new-growth theory: the empirical studies on geography and economic growth. Chapter 3 provides unique historical features on regional-development paths in Vietnam, and analyzes historical background that affected the development in Vietnam's provinces. Chapter 4 includes data descriptions and analysis. Chapter 5 develops the model and introduces the methodology. The empirical results will be discussed in chapter 6. Chapter 7 summarizes the most important conclusions, and gives suggestions for further research possibilities in the future.

CHAPTER 2

LITERATURE REVIEW

Different regions in one country or different countries in the world follow a variety of growth patterns. Fundamental questions are why some are growing faster than others; what economic models can explain this variation? Since there is no single model of economic growth, there is no single theory for regional economic development. This chapter reviews neoclassical theories, new-growth theories, and the geographic economic-growth theories, and discusses how they relate to the research of regional growth in Vietnam.

2.1. Neo-classical growth models

2.1.1. The Solow-Swan growth model

In a closed-economy Solow–Swan growth model (Solow, 1956; Swan, 1956), economies differ in per capita income as a result of differences in the capital–labor (K/L) ratio. The Solow model allows for substitution between capital and labor. In the process, it assumes that there are diminishing returns to the use of these inputs. At any time, the economy has some amount of capital (K), labor (L), and knowledge or “the effect of labor” (A), and these are combined to produce output. Assume the aggregate production function takes the form of a Cobb–Douglas function:

$$Y(t) = K(t)^\alpha [A(t)L(t)]^{1-\alpha}, 0 < \alpha < 1, \text{ where } t \text{ denotes time.}$$

$$\dot{K} = s(t)Y(t) - \delta K(t)$$

where s is the savings rate and $\delta = 0.01$ the depreciation rate.

This model is considered to be the basic reference point for almost all analyses of growth. For a given saving rate, a lower initial K/L is associated with faster proportionate increase in K/L on the path to equilibrium (Barro & Sala-I-Martin, 1995).

The Solow model implies that, regardless of their starting point, countries converge to their balanced growth paths—a situation where each variable in the growth model is growing at a constant rate. On the balanced growth path, the growth rate of output per worker is determined solely by the rate of technological progress. The model indicates that the accumulation of physical capital cannot account for either the vast growth over time in output per person or the vast geographic differences in output per person. The differences in real incomes are far too large to be accounted for by differences in capital inputs.

There are different definitions of convergence. The first type is absolute convergence, which means every country will converge to a common Y/AL (output per unit of effective labor) and grow at rate g at the steady state (all countries have the same levels of income). This means that poorer countries will grow faster. The second type is conditional convergence, which means every country converges to its own steady state and grows at the rate g (all countries attain some steady state growth rate). They have different Y/AL . The further a country is from its steady state, the faster it grows.

2.1.1.1. Baumol (1986)

Several empirical studies have tested income convergence between countries. Baumol (1986) examines absolute convergence of per capita income from 1870 to

1979 among 16 industrialized countries for which Maddison (1982) provides data. Baumol regresses output growth over this period on a constant and initial income. He estimates:

$$\ln \left[\left(\frac{Y}{N} \right)_{i,1979} \right] - \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right] = 8.457 - 0.995 \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right]$$

$\ln(Y/N)$ is log income per person, ε is an error term, and i indexes countries. If there is convergence, b (the slope coefficient for the explanatory variable $\ln(Y/N)$) will be negative; countries with higher initial incomes have lower growth. A value for b of -1 corresponds to perfect convergence: higher initial income on average lowers subsequent growth one for one, and thus output per person in 1979 is uncorrelated with its value in 1870. A value for b of 0, on the other hand, implies that growth is uncorrelated with initial income and thus there is no convergence. The results are:

$$\ln \left[\left(\frac{Y}{N} \right)_{i,1979} \right] - \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right] = 8.457 - 0.995 \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right]$$

$$(0.094)$$

$$R^2 = 0.87, \text{ s.e.e.} = 0.15$$

where the standard error of the regression coefficient is 0.094. The regression suggests almost perfect convergence among these countries: the national productivity levels tend to get closer, productivity growth rate and output per worker shows inverse relationship. The estimate of b is almost exactly equal to -1 , and the two standard error confidence interval is (0.81, 1.18). The high correlation efficient ($R^2 = 0.87$) indicates that the higher a country's productivity level in 1870, the more slowly it

grows in the following century. In this sample, per capita income today is essentially unrelated to per capita income 100 years ago (Romer, 2005).

2.1.1.2. DeLong (1988)

DeLong (1988) criticizes Baumol's (1986) that the sample suffers from selection bias, and the independent variable is unavoidably measured with error. Sample selection arises because Baumol's regression uses an *ex-post* sample of countries that are now rich and have successfully developed. Those nations relatively rich in 1870 that have not converged are excluded in Maddison (1982)'s sixteen because of their resulting present relative poverty. Convergence is thus guaranteed in Baumol's regression, which tells little about the strength of forces making for convergence among nations that in 1870 belonged to what Baumol calls the "convergence club."

DeLong argues that a fair test of convergence requires not an *ex-post* sample of countries that have converged but an *ex-ante* sample of countries that in 1870 looked likely to converge. He therefore considers the richest countries as of 1870; specifically, his sample consists of all countries at least as rich as the second poorest country in Baumol's sample in 1870, Finland. This causes him to add seven countries to Baumol's list (Argentina, Chile, East Germany, Ireland, New Zealand, Portugal, and Spain) and drop one (Japan). The inclusion of the new countries weakens the case for convergence considerably. The regression of DeLong (1988) produces an estimate of b of -0.566 , with a standard error of 0.144 , and eliminates about half of the convergence that Baumol (1986) finds.

Moreover, according to DeLong (1988), least squares is not a satisfactory estimation technique because of errors in measuring 1870 incomes, creating bias toward finding convergence. Such errors include opposite errors in 1870-1979 growth and bias the regression slope toward -1. Such errors can produce the illusion of an inverse relationship between income in 1870 and growth since.

DeLong (1988) therefore considers the following model:

$$\ln \left[\left(\frac{Y}{N} \right)_{i,1979} \right] - \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right]^* = a + b \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right]^* + \varepsilon_i$$

$$\ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right] = \ln \left[\left(\frac{Y}{N} \right)_{i,1870} \right]^* + u_i$$

Here $\ln[(Y/N)_{i,1870}]^*$ is the true value of log income per capita in 1870 and $\ln[(Y/N)_{i,1870}]$ is the measured value. ε and u are assumed to be uncorrelated with each other and with $\ln[(Y/N)_{i,1870}]^*$. Unfortunately, it is not possible to estimate this model using only data on $\ln[(Y/N)_{i,1870}]$ and $\ln[(Y/N)_{i,1870}]^*$. The problem is that there are different hypotheses that make identical predictions about the data. For example, suppose that measured growth is negatively related to measured initial income, this is exactly what one would expect either if measurement error is unimportant and there is true convergence, or if measurement error is important and there is no true convergence. Technically, Romer (2005) thus states that the model is not identified.

2.1.2. Infinite-Horizon, Overlapping-Generations, And Extended Solow Models

2.1.2.1. The Ramsey–Cass–Koopmans Model, and the Diamond Model

The Solow (1956) model treats other potential sources of differences in real incomes as either exogenous and, thus not explained by the model (in the case of

technological progress, for example), or absent altogether (in the case of positive externalities from capital, for example). Consequently to address the central question of growth theory (what constitutes worldwide growth and income differences across countries), we must move beyond the Solow model.

Both the Ramsey (1928)–Cass (1965)–Koopmans (1965) model and the Diamond (1997) model resemble the Solow (1956) model. However, the dynamics of economic aggregates in their models are determined by decisions at the microeconomic level. Both models continue to take growth rates of labor and knowledge as given, but derive the evolution of the capital stock from the interaction of maximizing households and firms in competitive markets. The saving rate is no longer exogenous and constant.

Ramsay (1928), Cass (1965), and Koopmans (1965) construct models where competitive firms rent capital and hire labor to produce and sell output, and a fixed number of infinitely lived households supply labor, hold capital, consume, and save. The model avoids all market imperfections and all issues raised by heterogeneous households and links among generations. Diamond (1965) developed the overlapping-generations model and assumed that there is continual entry of new households into the economy. The model shows that it is possible for a decentralized economy to accumulate capital beyond the golden-rule level, and thus to produce an allocation that is Pareto-inefficient.

According to Romer (2005), relaxing Solow's model's assumption of a constant saving rate has advantages. First and most important for studying growth, it demonstrates that the Solow model conclusions about the central questions of growth

theory do not hinge on its assumption of a fixed saving rate. Second, it allows researchers to consider welfare issues. A model that directly specifies relations among aggregate variables provides no way of judging whether some outcomes are better or worse than others. The infinite horizon and overlapping generations are built up from the behavior of individuals, and therefore can be used to discuss welfare issues.

2.1.2.2. The Mankiw–Romer–Weil model

Mankiw, Romer, and Weil (1992) augment the standard Solow (1956) model with human capital accumulation and examine income convergence. They find support for the Solow model and evidence supporting conditional convergence if population growth, savings rates, and education are included in the estimation.

Their model is as follows:

$$Y(t) = K(t)^\alpha H(t)^\beta [A(t)L(t)]^{1-\alpha-\beta} \text{ where } H \text{ is the stock of human capital}$$

$$\dot{K} = 0.5s(t)Y(t) - \delta K(t)$$

$$\dot{H} = 0.5s(t)Y(t) - \delta H(t)$$

The steady state income per capita is:

$$\ln\left(\frac{Y(t)}{L(t)}\right) = \ln A(0) + gt + \frac{\alpha}{1-\alpha} \ln(s) - \frac{\alpha}{1-\alpha} \ln(n + g + \delta)$$

where n is the average growth rate of working-age population (including those from 15 to 64 years old), s is the average share of real investment in real GDP, and Y/L is the real GDP in 1985 divided by the working-age population in that year.

Mankiw, Romer, and Weil (1992) use annual data covering the years from 1960 to 1985. The sample of countries studied includes 98 non-oil-producing, 75

intermediate, and 22 member countries of the Organization for Economic Cooperation and Development. Including human capital in their research lowers the estimated effects of saving and population growth to roughly the values predicted by the Augmented Solow model. The results provide coefficients on saving and population growth that have the predicted sign. Coefficients on $\ln(s)$ and $\ln(n + g + \delta)$ are equal in magnitude and opposite in sign and insignificant in tests in any of the samples. Differences in saving and population growth account for a large fraction of the cross-country variation in income per capita. However, the data strongly contradict the prediction that $\alpha = 1/3$. The authors conclude that the convergence time is slower than in Solow model (35 years instead of 17 years).

Islam (1995) uses a time panel-data approach to study growth convergence. The main usefulness of the panel approach is that it allows for the differences in aggregate-production function across economies. The time period is from 1960 to 1985, and Islam takes every 5 years for each country in consideration (1960–1965, 1966–1970, 1971–1975, 1976–1980, 1981–1985). His result is different from those obtained from single-country cross regressions like Mankiw et al. (1992) with a much higher conditional convergence rate, and lower α .

2.2. New growth theory

Neoclassical models show that capital's earnings reflect its contribution to output if its share in total income is modest. Then capital accumulation cannot account for a large part of either long-run growth or cross-country income differences. The only determinant of income in the models other than capital is the “effectiveness of labor” (A), which represents knowledge or technology. Departing from the Solow

(1956) model treatment of technological progress as exogenous, the modern growth literature assumes endogenous technological progress. They consider human capital accumulation and research and development (R&D) activity as two important engines of economic growth.

2.2.1. Research and development model

The model involves labor (L), capital (K), technology (A), and output (Y), which are set in continuous time. There are two sectors, a goods-producing sector where output is produced and an R&D sector where additions to the stock of knowledge are made. The fraction a_L of the labor force is used in the R&D sector and the fraction $1-a_L$ in the goods-producing sector. Similarly, the fraction a_K of the capital stock is used in R&D and the rest in goods production. Both a_L and a_K are exogenous and constant. Because the use of an idea or a piece of knowledge in one place does not prevent it from being used elsewhere, both sectors use the full stock of knowledge A . The quantity of output produced at time t is thus

$$\dot{L}(t) = nL(t), n \geq 0$$

The production of new ideas depends on the quantities of capital and labor engaged in research and on the level of technology; therefore the production function for knowledge can be written as

$$\dot{A}(t) = B[a_K K(t)]^\beta [a_L L(t)]^\gamma A(t)^\theta, B > 0, \beta \geq 0, \gamma \geq 0$$

where B is a shift parameter. The production function of knowledge is not assumed to have constant returns to scale to capital and labor. As for constant returns to scale, doubling the inputs doubles the amount that can be produced. But in the case of

knowledge production, exactly replicating what the existing inputs were doing would cause the same set of discoveries to be made twice, thereby leaving $\dot{A}$ unchanged. That means it is possible to have diminishing returns in R&D. At the same time, interactions among researchers, fixed set up costs, and so on may be important enough in R&D that doubling capital and labor more than doubles output. Thus there is the possibility of increasing returns as well.

As in the Solow model (1956), the saving rate is exogenous and constant, and depreciation is set to zero for simplicity. Thus,

$$\dot{K}(t) = sY(t)$$

population is also considered as exogenous and nonnegative for simplicity. Thus,

$$\dot{L}(t) = nL(t), n \geq 0$$

Lucas (1988) shows how accumulation of skills may explain long-term economic growth. The important R&D-based growth-model studies include Romer (1990), Grossman and Helpman (1991), and Aghion and Howitt (1992), who point out the importance of knowledge or accumulation of ideas in the development of the economy. Their models provide examples that illustrate the private incentives for R&D and innovation.

The consumer-surplus effect is that the individuals or firms licensing ideas from innovators obtain some surplus, since innovators cannot engage in perfect price discrimination. This creates a very positive externality from R&D. The business stealing effect is that the introduction of a superior technology typically makes existing technologies less attractive, and therefore harms the owners of those

technologies. This causes a negative externality. Thirdly, the R&D effect is that innovators are generally assumed not to control the use of their knowledge in the production of additional knowledge. Thus the development of new knowledge has positive externalities on others engaged in R&D.

The net effect of these three externalities is ambiguous. It is possible to construct examples where the business-stealing externality outweighs both the consumer-surplus and R&D externalities. In this case, the incentives to capture the profits being earned by other innovators cause too many resources to be devoted to R&D. The result is that the economy's equilibrium growth rate may be inefficiently high (Aghion & Howitt, 1992). It is generally believed, however, that the normal situation is for the overall externality from R&D to be positive. In the model developed by Romer (1990), the consumer-surplus and business-stealing effects just balance, so on net only the positive R&D effect remains. In this case, the equilibrium level of R&D is inefficiently low, and R&D subsidies can increase welfare. Their main conclusion is that endogenous technological progress is almost surely central to worldwide growth but probably has little to do with cross-country income differences.

Baumol (1990) and Murphy, Shleifer, and Vishny (1991) observe that major innovations and advances in knowledge are often the result of the work of extremely talented individuals. They also observe that highly talented individuals typically have choices rather than just pursuing innovations and producing goods. These observations suggest that the economic incentives and social forces influencing the activities of highly talented individuals may be important to the accumulation of knowledge.

Baumol takes a historical view of the issue. He argues that, in various places and times, military conquest, political and religious leadership, tax collection, criminal activity, philosophical contemplation, financial dealings, and manipulation of the legal system have been attractive to the most talented people in the society. He also argues that these activities often have negligible (or even negative) social returns. These activities are often forms of rent-seeking—attempts to capture existing wealth rather than to create new wealth. Finally, he argues that there has been a strong link between how societies direct the energies of their most able members and whether the societies flourish over the long term (Romer, 2005).

Murphy et al. (1991) provide a general discussion of the forces that influence talented individuals' decision about whether to pursue activities that are socially productive. They emphasize three factors in particular. The first is the size of the relevant market: the larger the market from which a talented individual can reap returns, the greater are the incentives to enter a given activity. The second factor is the degree of diminishing returns. Activities whose scale is limited by the entrepreneur's time (performing surgeries, for example) do not offer the same potential returns as activities whose returns are limited only by the scale of the market (creating inventions, for instance). Thus, for example, well-functioning capital markets that permit firms to expand rapidly tend to promote entrepreneurship over rent-seeking. The final factor is the ability to keep the returns from one's activities. Thus, clear property rights tend to encourage entrepreneurship, whereas legally sanctioned rent-seeking (through government or religion, for example) tends to encourage socially

unproductive activities. Therefore, the allocation of talents is important for growth (Romer, 2005).

To understand further income differences among countries and to determine the extent they are due to differences in physical-capital accumulation, differences in human-capital accumulation, and other factors, Hall and Jones (1999) and Klenow and Rodriguez-Clare (1997) extended the Solow (1956) model by including human capital (H) in the model. The Cobb-Douglas production function makes the model tractable and leads easily to quantitative analysis:

$$Y(t) = K(t)^\alpha [A(t) H(t)]^{1-\alpha}$$

Y output, K capital, and A the effectiveness of labor are the same as in the Solow model. H is the total amount of productive services supplied by workers. It includes the contributions of both raw labor (skills that individuals are endowed with) and human capital (that is, acquired skills).

The dynamics of K and A are the same as in the Solow model (1956). An exogenous fraction s of output is saved, and capital depreciates at an exogenous rate δ . Thus,

$$\dot{K}(t) = sY(t) - \delta K(t)$$

The effectiveness of labor grows at an exogenous rate g :

$$\dot{A}(t) = gA(t)$$

The model assumes that each worker's human capital depends on his or her years of education, denoted E. Thus,

$$H(t) = L(t) G(E)$$

where L is the number of workers and $G(\cdot)$ is a function giving human capital per worker as a function of years of education per worker. The number of workers grows at an exogenous rate n :

$$\dot{L}(t) = nL(t)$$

The more education a worker has, the more human capital they have. As individuals acquire human capital, their ability to acquire additional human capital may improve. Also, according to Romer (2005), the microeconomic evidence suggests that each additional year of education increases an individual's predicted wage by approximately the same percentage. If wages reflect the labor services that individuals supply, this implies that $G(\cdot)$ is indeed increasing. Specifically,

$$G(E) = e^{\phi E}, \phi > 0$$

By dividing both sides of the output function by the number of workers, L_i , Romer used the growth accounting across countries for his analysis to measure directly all ingredients of the equation other than A_i and then compute A_i as a residual. Thus,

$$\ln \frac{Y_i}{L_i} = \alpha \ln \frac{K_i}{L_i} + (1 - \alpha) \ln \frac{H_i}{L_i} + (1 - \alpha) \ln A_i$$

Subtracting $\alpha \ln(Y_i/L_i)$ from both sides of the above equation, then dividing both sides by $1 - \alpha$, this yields

$$\ln \frac{Y_i}{L_i} = \frac{\alpha}{1 - \alpha} \ln \frac{K_i}{Y_i} + \ln \frac{H_i}{L_i} + \ln A_i$$

This expresses output per worker in terms of physical-capital intensity (that is, the capital-output ratio, K/Y), labor services per worker (H/L) and a residual. It assigns

long-term effects of changes in labor services per worker and the residual entirely to those variables.

Data on output and the number of workers are available from the Penn World Tables. Hall and Jones (1999) and Klenow and Rodriguez-Clare (1997) estimate physical-capital stock using data on investment, and reasonable assumptions about the initial stocks and depreciation. Data on income shares suggest that α , physical capital's share in the production function, is around one-third for almost all countries.

Hall and Jones (1999) estimate the stock of labor services by considering years of schooling. They assume that H_i takes the form $e^{\Phi(E_i)}L_i$, where E_i is the average number of years of education of workers in country i and $\Phi(.)$ function: $\Phi(E) = \Phi E$. They argue that microeconomic evidence suggests that the percentage increase in earnings from an additional year of schoolings falls as the amount of schooling rises. On the basis of this evidence, they assume that $\Phi(E)$ is a piecewise linear function with a slope of 0.134 for E below 4 years, 0.101 for E between 4 and 8 years, and 0.068 for E above 8 years.

They estimate the contributions of physical-capital intensity, schooling, and the residual to output per worker in each country, and compare the five richest countries in their sample with the five poorest. The average output per worker in the rich group exceeds the average in the poor group by a surprising factor of 31.7. On a log scale, this is a difference of 3.5. The differences in the average $[\alpha/(1-\alpha)]\ln(K/Y)$ between the two groups is 0.6; in $\ln(H/L)$, 0.8; and in $\ln A$, 2.1. They find that only a sixth of the gap between the richest and poorest countries is due to differences in physical-capital intensity, and less than a quarter is due to differences in schooling.

Klenow and Rodriguez-Clare (1997), using slightly different assumptions, reach similar conclusions. That means differences in physical capital and educational attainment explain only a small amount of the differences in output per worker. An additional finding from Hall and Jones' (1999) and Klenow and Rodriguez-Clare's (1997) decompositions is that the contributions of physical capital, schooling, and the residual are not independent. Hall and Jones (1999) find a substantial correlation across countries between their estimates of $\ln(H_i/L_i)$ and $\ln A_i$ ($\rho = 0.52$), and a modest one between their estimates of $[\alpha/(1-\alpha)]\ln(K_i/Y_i)$ and $\ln A_i$ ($\rho = 0.52$). They also find a substantial correlation between the two capital terms ($\rho = 0.60$).

Hendricks (2002) criticized Hall and Jones' (1999) paper in that their calculations did not take into account differences in human capital other than differences in years of education. Many sources of variation in human capital such as school quality, on-the-job training, informal human-capital acquisition, child-rearing, and even prenatal care diverge significantly across countries. A natural approach to comparing the overall human capital of workers in different countries is to compare the wages they earn in the same labor market. Since the United States has immigrants from many countries, this can be done by examining the wages of immigrants from different countries in the United States. Looking at immigrants' wages provides important information about whether there are large differences in human-capital quality. This idea was implemented by Klenow and Rodriguez-Clare (1997) and by Hendricks (2002). These authors find that immigrants to the United States with a given amount of education typically earn less when they come from lower-income countries. This suggests that cross-country differences in human capital are larger than

suggested solely by differences in years of schooling, and that the role of a residual is therefore smaller.

Secondly, instead of imposing the piecewise linear form assumed by Hall and Jones (1999), Hendricks estimates the returns to different amounts of education. His results suggest somewhat smaller differences in human capital across countries, and hence somewhat larger differences in a residual. Thirdly, Hendricks examines the possibility that low-skill and high-skill workers are complements in production. In this case, the typical worker in a low-income country (who has low skills) may have low wages in part not because output for a given set of inputs is low, but because he or she has few high-skill workers to work with. And indeed, the premium to having high skills is larger in poor countries. Hendricks finds that when he chooses an elasticity of substitution between low-skill and high-skill workers to fit the cross-country pattern of skill premia, he is able to explain a moderate additional part of cross-country income differences. The combined effects of these extensions to Hall and Jones's (1999) simple approach are not large. Hendricks found an overall role for human-capital differences in income differences that is slightly smaller than what Hall and Jones estimated.

2.2.2. Social infrastructure

Hall and Jones (1999) also mentioned another hypothesis—that differences in cross-country income may be due to social infrastructure. By infrastructure, Hall and Jones mean institutions and policies that align private and social returns to activities, and provide incentives for individuals and firms in an economy. There are certainly many different aspects of social infrastructure. Romer (2005) divides them into three

groups. The first group consists of features of the government's fiscal policies. For example, the tax treatment of investment and marginal tax rates on labor income directly affect relationships between private and social returns. Only slightly more subtly, high tax rates induce such forms of rent-seeking as devoting resources to tax evasion and working in the underground economy despite its relative inefficiency.

The second group of institutions and policies that make up social infrastructure consists of factors that determine the environment in which private decisions are made. If crime is unchecked or there is a civil war or a foreign invasion, private rewards to investment and to activities that raise overall output are low. At a more mundane level, if contracts are not enforced or the court's interpretation of them is unpredictable, long-term investment projects are less attractive. Similarly, competition, with its rewards for activities that increase overall output, is more likely when the government allows free trade and limits monopoly power. The final group of institutions and policies that constitute social infrastructure are ones that affect the extent of rent-seeking activities by the government itself.

As Hall and Jones (1999) stress, although well-designed government policies can be an important source of beneficial social infrastructure, the government can be a major rent-seeker. Government expropriation, the solicitation of bribes, and the doling out of benefits in response to lobbying or to actions that benefit government officials can be important forms of rent-seeking. Because social infrastructure has many dimensions, poor social infrastructure takes many forms. Corrupt government officials, severe impediments to trade, poor contract enforcement, and government

interference in production are some examples they offer of bad “social infrastructures” that could lead to low levels of output growth.

The most prominent studies about the relationship between social infrastructure and economic performance are by Sachs and Warner (1995), Knack and Keefer (1995), Mauro (1995), and Acemoglu, Johnson, and Robinson (2001, 2002, 2004). These papers provide measures of social infrastructure and examine how these measures are related to the level of growth rate of average incomes. They all show much lower levels of social infrastructure in the tropics. A country’s poor infrastructure is almost surely not a consequence of its poverty. For example, social infrastructure in much of Europe a century ago was much more favorable than social infrastructure in most of Africa today. And it is hard to see how the poor social infrastructure could be a direct result of geography. Thus, there seems to be more to the tropics’ poverty than the disadvantages of geography.

Hall and Jones in their (1999) paper argue the data suggest that social infrastructure has a quantitatively large and statistically significant relationship to output per worker, and that variations in social infrastructure account for a large part of cross-country income differences. Unfortunately, the problems created by measurement errors and especially potential correlation of social infrastructure with omitted variables are very difficult to address persuasively. As a result, Hall and Jones’ (1999) evidence is far from decisive. Moreover, the hypothesis that the tropics’ poverty is a direct consequence of geography might not take into consideration other variables in the development process.

Olson (1996) provides a different type of evidence from divided countries including China, Germany, and Korea. For most of the post-World War II period, both Germany and Korea were divided into two countries. Similarly, Hong Kong and Taiwan are separated from China. Many factors that might affect income, such as climate, natural resources, initial levels of physical and human capital, and cultural attitude toward work, thrift, and entrepreneurship, were similar in the different parts of these divided areas. Their social infrastructures, however, were very different: East Germany, North Korea, and China were communist while West Germany, South Korea, Hong Kong, and Taiwan had relatively free market economies.

In effect, these cases provide natural experiments for determining the effects of social infrastructure. If economies were laboratories, economists could take relatively homogeneous countries and divide them in half; they could then randomly assign one type of social infrastructure to one half and another type to the other, and examine the halves' subsequent economic performances. Unfortunately, economies are not laboratories. The cases of the divided regions are perfect for the comparison. These regions were fairly homogeneous initially, and the enormous differences in social infrastructure between the different parts were the result of minor details of geography.

The results of these natural experiments clearly show that social infrastructure does matter. In every case, the market-oriented regimes were dramatically more successful economically than the communist ones. In 1990, when Germany was united, output per worker was about 2.5 times larger in the West than in the East. When China reacquired Hong Kong in 1997, output per worker was about 10 times

larger in Hong Kong than in the mainland. Similarly, output per worker is between 5 and 10 times higher in Taiwan than in mainland China. There is no reliable data on output per worker in North Korea, but South Korea's output per worker is only slightly lower than Taiwan's, while all Olson's (1996) evidence suggests that North Korea's is much lower than China's. Thus in the cases of these very large cross-country income differences, differences in social infrastructure appear to have been crucial.

While social infrastructure might have a large effect on income, there are potentially many other factors besides social infrastructure that contribute to the output gap and economic-growth differences. Social infrastructure is also the result of national public policies, administrative system, resource allocation, investment planning, savings ratio, among other causes. There is a two-way effect interaction between political mechanism and infrastructure development, infrastructure and economic growth. Therefore, it is necessary to move beyond infrastructure and look at deeper and wider causes to explain these differences.

2.3. Geography and economic development

Hall and Jones (1997) include one physical measure of infrastructure: the distance of the country from the equator. It turns out that the relationship is powerful and robust. Distance from the equator is the single strongest predictor of long-term economic success in their specification even when the other measures of infrastructure are included. Being located at the equator, as Zaire and Uganda are, associated with a reduction in output per worker by a factor of 4.5 relative to the Scandinavian countries.

Bloom and Sachs (1998) also find a striking fact about cross-country income differences: average incomes are much lower in countries closer to the equator. Average incomes in countries within 20 degrees of the equator are less than a sixth of those in countries at more than 40 degrees latitude. Productivity growth in the tropics lagged far behind productivity growth in the midlatitudes since the middle of the nineteenth century, and all evidence suggests that the temperate zones continue to be the dynamic center of innovation in the world economy. Well over 90% of global R&D expenditure and at least that percentage of patents worldwide originate in the northern midlatitude economies.

Bloom and Sachs (1998) mention Africa's extraordinarily disadvantageous geography as the root of poverty and slow economic growth. Comparing the world's major regions, tropical regions in general lag far behind temperate regions in economic development. As a consequence of its climate, soils, topography, and disease ecology, Africa suffers from chronically low agricultural productivity (especially food production), high disease burdens, and very low levels of international trade, which is concentrated in a few primary commodities. Poor geographic and economic conditions closely related to demographic circumstances lead to slow economic performance. Africa has the highest youth-dependency ratios, as a result of the combination of world's highest fertility rates and falling levels of infant and child mortality. Productive capacity per capita is low, as well as the rates of savings and investment.

Bloom and Sachs' (1998) paper stresses the need for intensified research on the complex issues at the intersection of ecology and human society. They give three

reasons for focusing on geography: (a) There is little to be gained from yet another recitation of the damage caused by statism, protectionism, and corruption to African economic performance; (b) Most economists neglect the role of the forces of nature in shaping economic performance and treat economies as blank slates onto which another region's technologies and economic history may be grafted, whereas geography plays an extremely prominent role as a determinant of long-term performance; (c) Good policies must be tailored to geographic realities.

This idea has also been advocated by Sachs and Warner (1995, 1997), Diamond (1997), Sachs (2001), and others. Bloom and Sachs (1998), Sachs (2001), Easterly and Levine (2002) argue that tropical location leads to underdevelopment through mechanism such as (a) the fragility and low fertility of soils, (b) high prevalence of crop pests and parasites, (c) excessive plant respiration and lower rate of net photosynthesis, (d) high evaporation and unstable supply of water, (e) lack of dry season, (f) ecological conditions favoring infectious diseases for humans, (g) lack of coal deposits, and (h) high transport costs.

Diamond (1997) supports the idea that weather and latitude conditions are important for development. For example, societies that live in the Fertile Crescent developed faster because of the weather condition, axis orientation, and endowment of wild animals and many animal candidates for domestication. Domestication of crops and animals allowed societies to increase food production, have stored food and therefore develop larger populations, enabling specialization (political elites, religious groups, and an army). He suggested that germs and crops directly affected the technological development of societies in the long run. By specializing, these societies

were able to develop more technologies, so they have the first-mover advantage over other less-developed societies. These peoples also developed some resistance to germs like smallpox and measles that they got from their farm animals, while other peoples lack farm animals and did not develop this resistance. Gun and germs have been used as weapons in order to conquer other less-developed societies. Geography does play a vital role.

Other studies trace the effects of tropics, germs, and crops through institutions. Hall and Jones (1999) used institutional quality as one component of their “social infrastructure” (which explains productivity) with distance from the equator (along with European language) as instruments. They reason that Western Europeans have historically been associated with high-quality institutions, and Western Europeans settled in climates similar to Western Europe. Hall and Jones’ (1999) other component of social infrastructure reflects government policy—”openness” as measured by Sachs and Warner (1995), which also relates to Western European influence.

According to Sachs and Warner (1995), an open economy is defined as one with none of the following five conditions:

1. nontariff barriers covering on average more than 40% of imports
2. average tariff rates of 40% or more
3. a black-market exchange that is depreciated by 20% or more relative to the official exchange rate.
4. A socialist economic system
5. A state monopoly of major exports

They found a positive relationship between openness and growth. Very few developing countries have been continuously open after World War II. In 12 out of 15 cases, average growth in the open period exceeds the growth in the closed period. They also find evidence that slow growth was not the cause for closing the economy.

From 1970 to 1989, open economies outperformed closed economies in economic growth: in developing countries, open economies grew at 4.49% per year; closed economies at 0.69% per year. In developed countries, open economies grew at 2.29%, closed at 0.74%. These results suggest that within the group of open economies, we tend to see convergence. Differences in income in the long run depend on policies regarding economic integration. Evidence shows that being open to international trade has been sufficient to achieve economic growth in excess of 2% for developing countries. Only four countries that grew had closed economies: Hungary, Tunisia, Botswana, and China.

In another paper in 1997, Sachs and Warner offer some econometric evidence on the sources of slow growth in Sub-Saharan Africa. The evidence suggests that the continent's slow growth can be explained in an international cross-country framework, without the need to invoke a special explanation unique to Sub-Saharan Africa. They find that poor economic policies have played an especially important role in the slow growth, most importantly Africa's lack of openness to international markets. In addition, geographic factors such as lack of access to the sea and tropical climate have also contributed to Africa's slow growth.

Acemoglu et al. (2001, 2002) and Engerman and Sokoloff (2002) also consider institutional quality a fundamental determinant of economic development. However,

they argue that colonialism is the missing link. Acemoglu et al. (2001, 2002) and Engerman and Sokoloff (2002) present evidence that there were large differences in colonization strategies. And these differences are almost surely an important source of differences in social infrastructure today. For example, the fact that countries like Canada, the United States, and New Zealand were settled by large number of Europeans who largely displaced the native population makes it unsurprising that those countries adopted European institutions. The exact channels through which colonization strategies affected institutional development are not clear however. For example, Acemoglu et al. (2001) stress the distinction between extractive states and settler colonies and the resulting effects on the strength of property rights. Engerman and Sokoloff (2002), in contrast, stress the impact of colonization strategies on political and economic inequality and the resulting effects on the development of democracy, public schooling, and other institutions. Another possibility is that there was greater penetration of European ideas, and hence European institutions, in regions more heavily settled by Europeans.

Acemoglu et al. (2001) emphasize the disease environment. They note that Europeans adopted different types of colonization strategies. These different strategies of colonization affected institutional development, which is a main source of the income differences today. In tropical areas with extremely high mortality risks, particularly from malaria and yellow fever, European settlers established “extractive” institutions designed to exploit the areas’ population and resources with little settlement, and without supporting private property rights (e.g., Congo, Burundi, Ivory Coast, Ghana, Bolivia, Mexico, and Peru). On the other hand, in low-disease

environments including the United States, Australia, and New Zealand, they established “settler colonies” with institutions supporting private property and putting checks on the power of the State, similar to those in Europe. Therefore, they argue that geographic factors are central to the tropics’ poverty, not via their direct effect on output for given inputs and institutions, but through their past impact on institutional development. Acemoglu et al. (2001) use the empirical evidence from 64 countries’ settler mortality, protection versus expropriation and GDP data, to show that institutions have an impact on income. Based on their theory, they use settler mortality expected by the first European settlers in the colonies as an instrumental variable for the current institutions in these countries. Conditional on the variables they have controlled for, settler mortality more than 100 years ago should have no effect on output today, other than through its effect on institutions. Their results show that distance from the equator does not have an independent effect on economic performance. It is institutions that matter.

However, their argument is not convincing because of the following reasons. First, there are two different waves of colonization: Mercantilist in the Americas and imperialist in Africa (Olson, 1996), thus all colonies should not be put together. Second, the data for Africa occurred before colonization, therefore this breaks the link between extractive institutions and high mortality rates. Also, settler mortality rates turn out to be a poor predictor of institutional quality. Disease factors were not only present but also brought to the native inhabitants by the colonizers. Thirdly, property-rights institutions did not really exist when property-rights colonies were established,

and this breaks the link between the choice of property rights and extractive institutions.

According to Acemoglu et al. (2002), setting up institutions that enforce property rights is costly. As a result, a transformation of extraction of property-rights institutions is expensive. The gain to the small group of ruling elites is large in an extractive-institution strategy. These gains depend on the size of the ruling elite: the smaller it is, the more incentives for an extractive institution. If agents make irreversible investments that are complementary, they will be willing to support the persistence of institutions—agents that spend in human capital and physical capital will spend on enforcing property rights. In other words, if agents make sunk-costs investments, they may be less willing to switch, causing the institutions to persist.

Acemoglu et al. (2002) focus on the existence level of development in the colonized areas. Though Europeans introduced good policies in regions that were poor and introduced bad policies in regions that were rich, there is a great reversal in relative incomes today: those that were the most developed when being colonized are the least developed today. There is a negative association between economic prosperity in 1500 and today's relative income. They argue that it was the introduction of extractive institutions in high urbanization places, contrasted with the introduction of "settler institutions" in low urbanization places that explains the reversal in incomes. In regions that were more densely populated and had more developed institutions, establishing extractive states was more attractive (because there was a larger population to exploit and an existing institutional structure that could be used in that effort), and establishing settler colonies was more difficult. The result, Acemoglu

et al. (2002) argue, was a “great reversal”: among the areas that were colonized, those that were the most developed on the eve of colonization are the least developed today.

Engerman and Sokoloff (2002) emphasize the factor endowments and development paths among new-world economies. Factor endowments include soil, climate, and the size or density of the native population. Differences in native population, soil, and crops led to differences in inequality, and inequality affects institutions. Great equality or homogeneity led to more democratic institutions, to investing in public goods and infrastructure, and to institutions that offered broad access to economic opportunities. Institutions are not exogenous.

Engerman and Sokoloff (2002) argue that another geographic characteristic had a large effect on colonization strategies: conduciveness to slavery. A majority of the people who came to the Americas between 1650 and 1800 came as slaves, and the extent of slavery varied greatly across different regions. They argue that geography was the key: although all the colonizing powers accepted slavery, slavery flourished mainly in areas suitable to crops that could be grown effectively on large plantations with heavy use of manual labor. These initial differences in colonization strategy, Engerman and Sokoloff argue, had long-lasting effects on the areas’ political and institutional development.

The question of what these analyses imply about the sources of income differences among countries today is still a puzzle. The evidence about social infrastructure strongly suggests that the enormous income differences between tropical and temperate areas are not solely the result of direct effects of geography. One may argue that it is only through their impact on institutional development that the

geographic factors are affecting income today, and so the large income differences among regions subjected to different colonization strategies are strong evidence of the importance of institutions. Yellow fever, for example, has been largely eradicated throughout the world, and so cannot be a direct source of income differences today. The other view is that although the specific geographic characteristics that led to different colonization strategies are largely irrelevant to modern income differences, there are still geographic differences between temperate and tropical regions that directly affect income. In this view, the income differences between temperate and tropical regions are the result of both geography and institutions, and the differences cannot be used to clearly separate the effects of the two set of factors. These issues are active and hotly debated areas of research.

The literature has considered a lot of factors contributing to economic growth: from capital–labor ratio, to population, saving rate, education, capital accumulation, R&D, allocation of talents, the size of market, and infrastructure to geographical location. However, each study focuses on only one or few of those factors, and not all of them at the same time. Researchers have not combined those effects into a comprehensive picture, and evaluated the size of influences of each factor in the scenario.

Most of the empirical studies about growth examined the case of cross-country convergence, but little has been done with cross-sectional convergence in one country. In the case of Vietnam, it will be beneficial for policy-makers to see the effects of the difference factors in the growth equation, and whether there is a convergence in income or growth of provinces.

CHAPTER 3

REGIONAL DEVELOPMENT IN VIETNAM

Vietnam, as a developing country in transition from a centrally planned to a market economy, has recorded impressive socioeconomic growth achievements since the launching of the successful “*doi moi*” reform process at the sixth National Party Congress in 1986. Over this period, real GDP per capita has more than doubled, poverty has been substantially reduced from well over 70% in the mid-1980s to 18.1% in 2004 (GSO, 2005). Real GDP growth has averaged 7% per annum since 1986, agricultural production and farmer incomes have risen significantly, the country’s international trade has flourished in both quantity and diversity, and foreign investment has been substantial as a share of GDP.

Vietnam has seen great progress in economic and social development, but still enormous disparities are emerging. Growth has also been associated with an increase in inequality, particularly a widening rural–urban income gap, as well as growing disparities from various forms of isolation, such as geographic, social, ethnic, and linguistic. In an interview by *The Vietnam Economic Times* on April 9, 2007, John Hendra, United Nations Resident Coordinator for Vietnam, also mentioned several dimensions of inequality including the geographical dimension, both in terms of differences in life chances of people between provinces or between districts, and between urban and rural areas.

Three regions account for more than two-thirds of Vietnam’s poor: the Northern Uplands, the Mekong Delta, and the North Central Coast (United Nations

Development Programme [UNDP], 2007). Why is there such a big gap among provinces? This chapter will provide brief history information and the dueling hypotheses on the regional growth of Vietnam.

3.1. Economic Development History

The division of Vietnam into north and south was rooted in the civil war between the Nguyen and the Trinh princes from the 17th to the 19th centuries, and was aggravated further by the French colonial regime, which divided Vietnam into three parts that had different administrative systems. Moreover, the division of the country in 1954 into two parts, each following a different political and economic system, added to the disparities between north and south that persist more than 30 years after the reunification of the country (Le, 2005).

In 1858, the French began their conquest of Vietnam starting in the south. By 1893 France occupied all of Vietnam, as well as Cambodia and Laos, which they consolidated into a single territory known as Indochina. The French presence did not spur economic development. Indochina was considered a source of raw materials for French factories and a captive market for French goods. Vietnam saw little of the output generated during French occupation from the 1850s and prior to the Vietnam War. Although replete with rubber, coffee, and sugar resources, these sectors were exclusively controlled by French traders, and vast land requisition, crushing taxation, and preference for imports over indigenous industries led to devastating exploitation and little organic growth.

Japan occupied Vietnam during World War II, and there was a serious famine in 1945 that killed over 2 million people and devastated the economy. After Japan

stripped the French of all power in March 1945, Ho Chi Minh announced the independence of the Democratic Republic of Vietnam on September 2, 1945.

3.1.1. North-South Partition

France's post-World War II unwillingness to leave Vietnam led to failed talks and an 8-year guerrilla war between the communist-led Viet Minh on one side and the French and their anticommunist nationalist allies on the other. A Viet Minh victory at Dien Bien Phu in May 1954 forced the dispirited French to sign a cease-fire agreement in Geneva that split Vietnam into two parts along the 17th parallel: North Vietnam, a Communist state, and South Vietnam, a French-backed republic.

3.1.2. North Vietnam (1954–1975)

At the time of the 1954 partition, Vietnam was overwhelmingly a rural society; peasants accounted for nearly 90% of the total population. During the ensuing 20 years of political separation, however, the North and the South developed into two very different societies. In the North, the communists had embarked on a “socialist transformation” program intended to revolutionize the socioeconomic structure in which workers and peasants emerged as the nominal new masters of a socialist and ultimately classless state. Propertied classes were eliminated, and by 1960 all but a small number of peasants, artisans, handicraft workers, industrialists, traders, and merchants had been forced to join cooperatives of various kinds.

The socialist transformation of the private sector into cooperative and state-run operations did not result in the kind of economic improvement the government needed to win over the peasants and merchants. The regime managed to provide better

educational and health-care services than had existed in the pre1954 years, but poverty was still endemic. The party attributed the “numerous difficulties” it faced to “natural calamities, enemy actions, and the utterly poor and backward state of the economy,” but also acknowledged its own failings. These included cadre incompetence in ideological and organizational matters as well as in financial, technical, and managerial affairs (Federal Research Division, 1987).

The communist-controlled Vietnamese government relied on central planning to mobilize human and material resources during the battle for national independence and reunification. However, the central planning system, modeled on those of the Soviet Union and Eastern Europe countries, created enormous obstacles to economic growth and severe economic adversities. Like their counterparts in the Soviet Union and Eastern Europe, the primary objective of the Vietnamese managers of state enterprises and agricultural cooperatives was to meet government-established production targets. They paid little or no attention to the quality of their goods or to the cost of production. State enterprises were vertically integrated, retained large surplus labor forces, and accumulated huge inventories in the face of chronic shortages of supplies. There was virtually no incentive to develop management skills in marketing, quality control, product development, and finance (Litvack & Rodinelli, 1999).

3.1.3. South Vietnam (1954–1975)

The South had a more prosperous economy without the Stalinist economic structure that stifled the North (Watkins, 2007). South of the demarcation line after partition in 1954, the social system remained unchanged except that power reverted to

the Vietnamese elite. The South's urban–rural network of roles, heavily dependent on the peasant economy, remained intact despite the influx of nearly a million refugees from the North; and land reform, initiated unenthusiastically in 1956, had little socioeconomic impact in the face of obstructions by the landowning class. In contrast to the North, there was no doctrinaire, organized attempt to reorganize the society fundamentally or to implant new cultural values and social sanctions.

As the war in the South intensified, social disruption in both urban and rural life was created by countless numbers of civilians being forced to abandon their ancestral lands and severing their network of family and communal ties to flee areas controlled by the Viet Cong or exposing themselves to government operations against the communists. Traditional social structures broke down, leaving the society listless and bereft of a cohesive force other than the common instinct for survival.

3.1.4. Reunification

In early 1975, North Vietnamese regular military forces began a major offensive in the south, inflicting great damage to the south's forces. The communists took Saigon on April 30, 1975, and announced their intention of reunifying the country. The war ended in Vietnam in 1975. Also ended was nearly a century of foreign colonization and economic oppression.

The war-torn country faced a destroyed infrastructure and crippled economy, and joined the Soviet and Eastern Bloc countries that practiced centrally controlled economic policies. The government played the dominant role in national economic activities. The state controlled all land and natural resources and virtually all productive activities. It allocated equipment and raw materials for production and

organized agriculture under a collective system. It managed the distribution of agricultural products and consumer goods for personal consumption through a process of egalitarian rationing, making Vietnam for all practical purposes a grants economy. Central planning set production targets, ignoring requirements for profit-making and eliminating competition among state-owned enterprises. Prices were set by the state planning agency at subsidized levels much lower than those of the “free” and “black” market, thereby creating a two-tiered price system. Jobs were guaranteed for everyone willing to work, but severe restrictions were placed on size, number of employees, and capitalization of nonstate enterprises (Litvack & Rondinelli, 1999).

Economic stagnation marked the period after reunification from 1975 to 1985. Industrial production grew at an average of 0.6% per year, with agricultural output gaining only 1.9% yearly from 1976 to 1980. At the same time, the population was growing by nearly 1 million per year, twice the rate of GDP (Murray, 1997). Vietnam had an agrarian economy of peasants, with nearly 80% of the population working in agriculture. Despite this, food production was insufficient to feed the population, requiring extensive imports which eventually led to consumption outpacing income, and debts that equaled the national income by the early 1980s. Inflation was out of control and excessive state spending approached 45% of GDP (Bui, 2000). Vietnam’s economy was diverging compared to the rest of the world and it ranked among the worst, sharing an unfortunate position with Sub-Saharan Africa as one of the places on earth in the 1980s where masses of people were at risk of starvation (Murray, 1997). The country suffered further setbacks until finally embracing market reform.

In the early 1980s, Vietnam began its transformation into a multisector, market-based economy. The economy rose with impressive growth resulting in sweeping social and economic changes. From 1989 to 1995, Vietnam enjoyed a rapid influx of foreign investment, with real GDP growth greater than 8% in 1992 and 9.5% in 1993, contributing to a reduction in the poverty rate and an improvement in living standards (Ashwill & Thai, 2005). By the onset of the Asian economic crisis in July 1997, the rate of growth had already begun to decelerate. In 1999, Vietnam's GDP was only 4.8%, contributing to a rise in unemployment and poverty. Since 2000, an economic recovery has been underway with growth rate of over 7% per year. Vietnam is now committed to economic integration through its participation in global and trade organizations such as the Asia-Pacific Economic Cooperation, the Association of South-East Asian Nations, and the World Trade Organization. The government has made great strides in creating a more efficient and open business environment by improving its legal framework and deregulating access to the market. The Enterprise Law promulgated in 1999 laid the groundwork for a healthy business environment.

3.2. Current Situation of Regional Development in Vietnam

The shift away from a centrally planned economy to a more market-oriented economic model brought new vitality to the economy and improved the quality of life for many Vietnamese. However, the north-south divergence is the most critical of disparities and is reflected in every aspect of the Vietnamese economy. As of 1989, the population in the south had an annual per capita income estimated at dong (VND) 683,000, which was twice the income of the population in the north, estimated at VND 345,000 (Le, 2005). Even in the Hanoi-Hai Phong area, where the population had an

income equivalent to the national average (around VND 500,000 in 1989), it was nevertheless only 40% of the average per capita income of the population in the Ho Chi Minh City area. The north-central coast, traditionally the poorest area of the country, had the lowest income level, about half the national average, and only 17% that in the Ho Chi Minh City metropolitan area. In the Red River Delta agricultural area of the north, where population density is the highest, the per capita income was only 77.5% of the national average and only two-thirds of the average per capita income of the Mekong River delta population in the south.

Notwithstanding 3 decades of heavy emphasis on industrial development in the north, even government statistics indicate that a larger share of total industrial output in 1989 came from the south. The south's contribution totaled 53% of heavy industry and 65% of light industry compared with 47% of heavy industry and 44% of light industry from the north. Ho Chi Minh City (HCMC) accounts for 41% of total light-industry output in 1989. Even state enterprises were more efficient in the south, accounting for about 65% of the total financial contribution of all state enterprises to the government budget.

In the south, output per worker averaged 3.6 times that of the north in heavy industry and 2.5 times that in light industry. Mining, food processing, tourism, and financial services also are concentrated in the south, further accentuating the economic disparities of the two regions.

A recent study by the United Nations Development Programme in Vietnam in June 2004 looked into the difference in development between 7 northern provinces (Quang Ninh, Hai Duong, Hung Yen, Ha Tay, Bac Ninh, Bac Giang and Vinh Phuc)

and 4 southern provinces (Dong Nai, Binh Duong, Long An and Ba Ria) in Vietnam. The gap between them is marked (See Table 1; Nguyen et al., 2004).

Table 1
Northern Seven and Southern Four Provinces: Economic Comparisons

	Northern 7	Southern 4
Population (million)	10	5
Exports per capita	\$50	\$785
Implemented FDI per capita	\$60	\$570
Enterprise Law Investment pc	\$84	\$103
New jobs per 1000 (2000–2002)	7	41
(2003)	3	12

Source: Nguyen, D. C., Tuan, P. A., Van, B., & Dapice, D. (2004). *History or policy: Why don't northern provinces grow faster?* New York: United Nations Development Program.

The fast growth of southern provinces around Ho Chi Minh City is often explained by their superior location and/or their more recent experience with a free market system before Doi Moi (the economic-renovation process). However, another region of Vietnam has good infrastructure, is close to major ports and markets, and has access to well-trained workers: the northern provinces near Hanoi and Hai Phong. Yet their recent population growth is among the slowest in the country, while provinces near Ho Chi Minh City are among the fastest. Considering job growth from 2000 to 2002 as a measure, the four southern provinces with only half of the northern provinces' population created 209,000 jobs, nearly triple the northern group, which created only 70,000. Da Nang province alone created 30,000 jobs with only 7% of the northern provinces' population. As to exports, the four southern provinces in 2003 exported nearly \$4 billion (excluding oil and gas), while the northern seven had under

\$0.5 billion, including coal. The Mekong Delta, excluding Long An, exported \$1.7 billion.

Foreign direct investment (FDI) followed the pattern: from 2001 to 2003, the four southern provinces had \$2.9 billion of implemented FDI while northern provinces had only \$0.6 billion. Per capita Enterprise-Law investment from 2000 to 2003 was 20% lower in the north. By these measures, the northern provinces are not doing as well as might be expected: it is not just that they lag the fast growing south, but in important respects, they lag other regions with fewer advantages of location, infrastructure, and access to skills and markets.

3.2.1. Dueling Hypotheses

One reason given for this striking underperformance of northern provinces is history. This northern area has a long experience with old-style central planning. It lacks relatively recent memory of a market economy and so had to learn to deal with foreign and even domestic private investors. There is open debate about whether southern provinces benefited from a southern legacy and affinity with a market mechanism. Because southern provinces were only under a centrally planned system for 11 years (between 1975 and 1986), many of the entrepreneurs under the old regime reemerged after the beginning of economic reforms. In this view, the lack of bureaucratic understanding, social structures, and habits of thought limit the upside growth in the north. There is no recent tradition of entrepreneurship in the north, but this does not explain why many from the region come down to the south to do business, or why there have been similar numbers of Enterprise-Law startups over 1000 population in Bac Ninh and Dong Nai.

Nguyen et al. (2004) suggest looking at growth patterns and strategies in provincial differences. In practice, the ability to set up and successfully run a business can be likened to a race with many hurdles. There is hurdle for getting land, for access to capital, for permission and freedom from instructive inspections, for knowledge of markets, for technical know-how, and so on. Also, different provinces have unique elements that are impossible to replicate. The growth problem of Vietnam is the puzzle addressed in this research.

CHAPTER 4

DATA ANALYSIS

The main sources of data used in this research were from the GSO (1996–2006), the Vietnam Competitiveness Initiative (VNCI, 2005), the World Bank (1996–2006), and the United Nations Development Program (UNDP, 1990, 2005, 2007). These are nationally and internationally recognized think-tanks, policy-making institutes, and nongovernmental organizations that have long been known for their high reputation for research and contribution to the economic-development process.

4.1. Data sources and collection

4.1.1. Vietnam Living Standard Surveys

In the past 10 years, the GSO has carried out four national living-standard surveys in 1992–1993, 1997–1998, 2002 and 2004. Their main content reflects living standard of households and basic socioeconomic conditions in communes/wards that affect the living standard of people in the region.

The first survey was implemented between October 1992 and October 1993. It included a household survey, a community survey, and a market-price survey. The household survey included household size and composition, health, anthropometric measures of nutrition, education, housing characteristics, migration, employment, nonfarm enterprises, agriculture, other income, expenditures, food consumption, ownership of consumer durables, and savings and credit. The household questionnaire was approximately 110 pages long and included about 1,000 questions. The sample was selected in three stages using data from the 1989 population census. First, 120

villages and 30 urban precincts were selected at random, with probabilities proportional to the population. Then two rural hamlets or urban blocks were selected in each selected village/precinct. Finally, 16 households were selected in each selected hamlet/block, making a total sample of 4,800 households. The sample was designed to be representative at the level of the seven geographic regions of Vietnam.

The second Vietnam Living Standards Survey was conducted from December 1997 to December 1998. Like the 1992–1993 Vietnam Living Standards Survey, the survey included a household survey, a community survey, and a market-price survey, though a survey of health centers was added. The household questionnaire covered the same topics as the 1993 survey, with only slight changes in the questions and format. The household sample included most of the households from the 1993 survey, as well as additional households to provide better coverage of urban areas and the Central Highlands. The sample contained 6,000 households and was representative for each of ten strata, the rural areas of the seven geographic regions and three urban strata (Hanoi and Ho Chi Minh City, other cities, and towns).

The Vietnam Household Living Standards Survey was carried out in 2002 and 2004 (see Appendix E). The survey has two versions: a small questionnaire (36 pages) administered to about 60,000 households and a larger questionnaire (43 pages) administered to a smaller sample of about 15,000 in 2002. The larger questionnaire had an expenditure module, allowing calculation of more reliable expenditure-based estimates of living standards. The household questionnaire in the Vietnam Household Living Standards Survey 2002 is simplified as compared with previous ones, but still compatible with previous surveys. The survey in 2004 was simplified even further

than the 2002 version, with a sample size of 45,000 households, of which 9,000 included all topics (core and rotated modules including topics on agriculture and household business), and 36,000 did not include the expenditure topic (income sample/households).

Information from these surveys provides data on income classified by region that was used for this research, measuring regional economic growth. The household questionnaires concentrated on income and expenditure of households to assess living standards on national, regional, and provincial levels. The survey scope was households and communes/wards which were selected in 61 provinces and cities.

4.1.2. Vietnam Provincial Competitiveness Index

Under the United States Agency for International Development (USAID)-funded VNCI Project, the Provincial Competitiveness Index (PCI) on the business environment was collected. It served the purpose of this research on regional growth of Vietnam well: an effort to explain why some parts of the country perform better than others in terms of private sector dynamism and growth.

In 2002, The Asia Foundation and the Vietnam Chamber of Commerce and Industry undertook an initial research effort in 14 provinces to study the interplay of economic and governance factors in generating provincial growth. This became the foundation for a broader study of regional differences undertaken by the VNCI (2006) to identify the most critical economic-governance determinants of growth in Vietnam. The PCI assesses and ranks provinces by their regulatory environments for private sector development, controlling for differences in initial endowments. In 2005 the PCI covered 42 provinces, accounting in total for 90% of the national GDP. Using survey

data from businesses that describe their perceptions of the local business environment, as well as credible and comparable data from official and other sources regarding local conditions, the PCI rates provinces on a 100-point scale. The overall index is comprised of nine subindices that explain much of the variation in performance across provinces in Vietnam.

In 2006, the PCI was constructed with two new subindices: Labor Training—assessing efforts to help overcome skills shortages at the provincial level, and Legal Institutions—measuring the degree of confidence that businesses have in provincial legal institutions. A larger data set in 2006 allows for the inclusion of all 64 provinces. The PCI subindices will be used to evaluate governance factors in a regional-growth equation.

4.1.3. Vietnam Development Reports

Every year, the World Bank (1996-2006), UNDP (1990, 2005, 2007), and other nongovernmental organizations sponsor annual reports and in-depth analysis about Vietnam, including those on economic, social, and environmental development. The data from these reports and from researchers, professors currently working on Vietnam development issues, are also used as sources of reference in this dissertation.

4.2. Data Coverage

The data in this research consists of observations on 42 provinces in Vietnam from 1998 to 2003. This time period was chosen because it was 12 years after the “doi moi” policy, when economic reform started having effects on the economy and overall economic performance of each province. The data continue until 2003, because after

that many provinces in the data set were split into two parts or rebordered under Government Decree Number 310/TCTK-PPCD in effect beginning July 1, 2004.¹ The number of observations is 42 provinces instead of all 61 provinces because of the availability of data. These 42 provinces encompass 90% of national GDP.

The provincial GDP (dependent variable) data are collected from the GSO (2005). Indices on entry costs, access to land, transparency and access to information, time costs of regulatory compliance, informal charges, implementation and consistency of policies, state-sector bias, proactivity of provincial leadership, private-sector development policies, level of development (human capital), quality of infrastructure/urbanization, proximity to the market, population, FDI, and initial GDP are used as explanatory variables to analyze the current situation of provincial development in Vietnam. A detailed explanation of each potential determinant of growth is discussed in chapter 6.

¹ The number of Vietnamese provinces was 44 in 1991, 53 in 1992, 61 in 1997, and 64 in 2004.

CHAPTER 5

METHODOLOGY AND DEVELOPING THE THEORETICAL MODEL

Economic growth models reach different conclusions depending on model specifications. In many cross-country and cross-sector growth studies, when there are several possible explanatory variables, the results vary depending on the particular set of variables used. Therefore, attempts have been made to examine the “robustness” of coefficient estimates, to find the *best* model specification, or ways of combining alternative model specifications.

Many candidate regressions have equal theoretical status, but the estimated coefficients on the variables of interest in these regressions may depend importantly on the conditioning set of information. Levine and Renelt (1992) examine whether conclusions from existing studies are robust or fragile to small changes in the conditioning-information set. They use a variant of Edward E. Leamer’s (1983) extreme bound analysis (EBA) to test the robustness of coefficient estimates to alterations in the conditioning set of information. A large number of variables in a broad collection of growth studies are considered in the context of statistical significance and theoretically predicted sign when the conditioning set of variables in the regression changes. They find that almost all the identified relationships are very sensitive to small alterations in the conditioning set of variables, and many publicized coefficients change sign with small changes in the conditioning set of variables.

So what is the EBA method? According to Leamer (1983), in Bayesian terms, the “extreme bounds” are applicable when the prior distribution for a subset of coefficients is located at the origin but is otherwise unspecified, and the prior

distribution for the other coefficients is “diffuse.” He performed a sensitivity analysis to determine if features of the posterior depend importantly on the way this partially defined prior distribution is fully specified. EBA uses equations of the form

$$Y = \beta_I I + \beta_M M + \beta_Z Z + u$$

where Y is either per capita GDP growth or the share of investment in GDP, I is a set of variables always included in the regression, M is the variable of interest, and Z is a subset of variables chosen from a pool of variables identified by past studies as potentially important explanatory variables of growth. The analysis involves varying the subset of Z -variables included in the regression to find the widest range of coefficient estimates on the variable of interest, M , that standard hypothesis tests do not reject.

Levine and Renelt (1992) first chose a variable that had been the focus of past empirical studies, M , and ran a “base” regression that included only the I -variables and the variable of interest. Then they computed the regression results for all possible linear combinations up to three Z -variables and identified the highest and lowest values for the coefficient on the variable of interest, β_M , that cannot be rejected at the 0.05 significance level. Thus, the extreme bound is defined by the group of Z -variables that produces a maximum value of β_M plus two standard deviations. The degree of confidence that one can have in the partial correlation between Y and M variables can be inferred from the extreme bounds on the coefficient β_M . If β_M remains significant and of the same sign at the extreme bounds, then one can maintain a fair amount of confidence in that partial correlation. In such a case, the result is referred to as “robust.” If the coefficient does not remain significant or if the coefficient changes

sign, then one might feel less confident in the relationship between the M and Y variables, because alterations in the conditioning-information set change the statistical inferences that one draws regarding the M–Y relationship. In this case, the result is referred to as “fragile.”

Growth economists are interested in the “true model” that includes significant variables to determine what elements are really correlated with growth. The theoretical model and the procedure for determining robust variables will be presented in this chapter.

5.1. Theoretical model of economic growth:

Assume that provincial growth (Y_t) is determined by the following generalized Cobb-Douglas production function,

$$(1) Y_t = A_t K_t^\alpha (L_t Q_t)^\beta = A_t Q_t^\beta K_t^\alpha L_t^\beta$$

where Q_t is the efficiency of Labor and A_t is a time-varying, scaling variable that includes factor-neutral technology shocks.

Dividing both sides by population N_t gives

$$(2) \frac{Y_t}{N_t} = A_t Q_t^\beta \left(\frac{K_t}{N_t} \right)^\alpha \left(\frac{L_t}{N_t} \right)^\beta N_t^{(\alpha+\beta-1)}$$

This can be expressed in log form as

$$(3) \ln(y_t) = \alpha \ln(k_t) + \beta \ln(l_t) + (\alpha + \beta - 1) \ln(N_t) + \ln(A_t) + \beta \ln(Q_t)$$

$$\text{where } y_t = \frac{Y_t}{N_t}, k_t = \frac{K_t}{N_t}, l_t = \frac{L_t}{N_t}$$

Differentiating equation (3) with respect to time yields

$$(4) \frac{\dot{y}_t}{y_t} = \alpha \frac{\dot{k}_t}{k_t} + \beta \frac{\dot{l}_t}{l_t} + (\alpha + \beta - 1) \frac{\dot{N}_t}{N_t} + \left(\frac{\dot{A}_t}{A_t} + \beta \frac{\dot{Q}_t}{Q_t} \right)$$

It follows that

$$(5) \ln(y_1) - \ln(y_0) \cong (\alpha + \beta - 1)[\ln(N_1) - \ln(N_0)] + C_t, \text{ where}$$

$$C_t = \alpha[\ln(k_1) - \ln(k_0)] + \beta[\ln(l_1) - \ln(l_0)] + [\ln(A_1) - \ln(A_0)] + \beta[\ln(Q_1) - \ln(Q_0)]$$

This theoretical structure specifically identifies population as an important determinant of economic growth. However, the last term, C_t , is sufficiently general that any number of variables could be argued for inclusion.

5.2. A procedure for determining *robust* variables

5.2.1. The Schwarz Information Criterion (SIC) and the corrected version of Akaike Information Criterion (AICc)

The first step consists of identifying the *best* specification. There are a number of powerful modern tools to assist with model selection. Two model-selection criteria were used for this purpose: the (SIC); and the corrected version of the AIC (AICc). The SIC and AICc respectively represent the two main, competing schools of thought regarding how to conceptualize the task of selecting the best model.

The first key property to consider when evaluating model selection is called “consistency.” A model selection criterion is consistent if (a) when the true model is among the models considered, the probability of selecting the true model approaches 1 as the sample size gets large, or (b) when the true model is not among those considered, so that it is impossible to select the true model, the probability of selecting

the best approximation to the true model approaches 1 as the sample size gets large. The SIC is by far the most commonly used of the several model-selection criteria that possess this property.

On the other hand, in case either the true model or the best approximation to the true model is not in the set of candidate models considered, there is a different optimality property, called “asymptotic efficiency.” An asymptotically efficient model-selection criterion selects the model closest to the true model with probability convergence to 1 as the sample size becomes infinitely large. AIC, though inconsistent, is asymptotically efficient, whereas SIC is not.

Because of different properties of SIC and AIC, Diebold (2001) suggested reporting and examining both SIC and AIC in practice. Most often, researchers select the same model. When they do not, he recommends using the more parsimonious model selected by SIC, other things being equal. This accords with what he calls “keep it sophisticatedly simple.” Other things being equal, simple models are preferred to complex ones.

However, AIC suffers from overfitting in finite samples, incorporating too many variables in its best models. When the sample size gets large, AIC selects models that are too large (overparameterized). As a result, a number of finite sample corrections have been developed for the AIC. Of these, the most preferred is a version known as the corrected version of the Akaike Information Criterion, the AICc. The correction is of particular use when the sample size is small, or when the number of fitted parameters is a moderate to large fraction of the sample size. AICc is asymptotically efficient if the true model is infinitely dimensional. Furthermore, when

the true model is of finite dimension, AICc is found to provide better model order choices than any other asymptotically efficient method (Hurvich & Tsai, 1989).

Monte Carlo studies of finite sample performance have demonstrated that both the SIC and AICc perform well relative to alternative procedures (McQuarrie & Tsai, 1998). While there are a number of equivalent formulations, this research uses the following formulae:

$$(6) \text{ SIC} = T \cdot \ln\left(\frac{\text{SSE}}{n}\right) + k \cdot \ln(T), \text{ and}$$

$$(7) \text{ AICc} = T \cdot \ln\left(\frac{\text{SSE}}{n}\right) + T \cdot \left(\frac{T+k-1}{T-k-1}\right)$$

where T is the number of observations, k is the number of coefficients in the model, including the intercept, and SSE is the sum of squared residuals from the estimated model. Note that SSE and k are the only parameters that vary across models, since sample size and the dependent variables do not change. The SIC and AICc make different tradeoffs between these parameters. Generally, the SIC penalizes additional explanatory variables more severely than the AICc, producing best models with fewer variables.

Once the portfolios of models with best SIC and AICc are selected, the procedure continues with the second step using Extreme Bounds Analysis and Bayesian Model Averaging (BMA) to find the robust variables in the growth model.

5.2.2. Extreme Bounds Analysis (EBA) and Bayesian Model Averaging (BMA)

EBA, mentioned at the beginning of this chapter, is designed to study the sensitivity of coefficient estimates across different regression specifications. The

lower extreme bound is defined to be the lowest value of the coefficient estimate β_m minus two standard deviations, and the upper extreme bound is defined to be the largest value of β_m plus two standard deviations. The extreme bound test for variable M says that if the lower extreme bound for M is negative, and the upper extreme bound is positive, then variable M is not robust. That means if one finds a single regression for which the sign of the coefficient β_m changes or becomes insignificant, then the variable is not robust.

Levine and Renelt (1992) employed a version of this test to cross-country data and found that very few (or no) variables were robust. One possible reason is that very few variables can be identified to be correlated systematically with growth. Another explanation is that the test is too strong for any variable to pass it: if the distribution of the estimator of β_m has some positive and negative support, then one is bound to find one regression for which the estimated coefficient changes sign if enough regressions are run.

EBA weighs all model specifications equally, so a divergent coefficient estimate from a poorly specified equation can be sufficient to disqualify a variable as robust. Also, some of these specifications will have low R^2 specifications and can lead to wide bounds. To solve this problem, Granger and Uhlig (1990) propose “reasonable extreme bounds analysis,” where bounds are derived for all specifications with R^2 values a given percentage of the maximum R^2 value. The range of coefficient values is restricted to the set of specifications that produce R^2 values within a given δ -value of the maximum achieved R^2 across all specifications. However, they do not provide guidance of the choice of δ and acknowledge that the use of R^2 has problems.

BMA directly addresses the “all specifications weighted equally” criticism by developing a system for weighting model specifications. BMA starts by positing a prior distribution for the population value for some parameter of the model specification (usually a regression coefficient). This prior distribution is updated with the results from regression estimates across (theoretically) all possible model specifications to form a posterior distribution of parametric values. The updating procedure weights the corresponding specifications by model probabilities that can be thought of as the conditional probability that a given specification is the “true model.”

While the BMA approach is useful to weight specifications for forecasting purposes, it is problematic when used to weight coefficient estimates. Suppose the true model to study the relationship between dependent variable y and explanatory variable X_1 is given by $y_t = \beta_0 + \sum_{k=1}^K \beta_k X_{k,t} + \varepsilon_t$, $t = 1, \dots, T$, where some β_k may equal zero (but not β_1); and $\text{Cov}(X_j, X_k) = 0$ for all $j \neq k$. There are 2^k possible linear combinations of these variables, and suppose the researcher considers each combination a potentially true model. Define $P(M_j)$ as the prior probability that model j is the true model and let $P(M_j) > 0$ for all j .

The BMA approach calculates the posterior probability of each model as

$$(8) \ P(M_j | y) = \frac{P(M_j) T^{-k_j/2} SSE_j^{-T/2}}{\sum_{i=1}^{2^k} P(M_i) T^{-k_i/2} SSE_i^{-T/2}},$$

where k_j and SSE_j are the number of included regressors and the sum of squared residuals in model j . The corresponding (posterior) expected value of β_1 is given by

$$(9) E(\beta_1 | y) = \sum_{j=1}^{2^K} P(M_j | y) \cdot \hat{\beta}_{1,j}$$

where $\hat{\beta}_{1,j}$ is the estimate of β_1 in model j . Any variable excluded from a particular model has a slope coefficient with a degenerate posterior distribution at zero (Sala-i-Martin, Doppelhofer, & Miller, 2004). The posterior variance of β_1 is given by

$$(10) Var(\beta_1 | y) = \sum_{j=1}^{2^K} P(M_j | y) Var(\beta_1 | y, M_j) + \sum_{j=1}^{2^K} P(M_j | y) (\hat{\beta}_{1,j} - E(\beta_1 | y))^2$$

In each specification in which X_1 appears, the preceding assumptions ensure that the least squares estimate is unbiased, so that $E(\hat{\beta}_{1,j}) = \beta_1$. However, X_1 appears in only half of all possible specifications. In the other 2^{K-1} models, X_1 is excluded, and the BMA approach sets $\hat{\beta}_{1,j} = 0$. It follows that $E(\beta_1 | y) < \beta_1$ even if $\hat{\beta}_{1,j} = \beta_1$ in every specification in which it appears. In other words, the BMA-based expectation is biased toward zero. This follows directly from the fact that BMA “estimates” the value of β_1 to be zero in all specifications in which X_1 is not included.

Using the Bayesian arguments, a procedure developed by Poskitt and Tremayne (1987) can be used to estimate a set of specifications and reports the corresponding ranges of coefficient estimates and t -ratio for those specifications including the respective variables. Without giving all specifications equal weight, they identify two categories of models: (a) “reasonable” models, and (b) others. Only “reasonable” models are considered for extreme-bound analysis.

Poskitt and Tremayne (1987) take as their point of departure that informational criteria such as the SIC and the AICc are themselves sample statistics, so that the

model with the lowest SIC or AICc value may not be the best model. They argue that all “close competitors” be included in a “portfolio” of “reasonable” models.

Let I^* be the value of the information criterion for the best model, and let I^A be the corresponding value for an alternative model. The posterior odds ratio is defined as

$$(11) \mathfrak{R} = \exp \left[-\frac{T}{2} (I^* - I^A) \right]$$

Poskitt and Tremayne (1987) characterize any model with $\mathfrak{R} < \sqrt{10}$ as a “close competitor” to the best model. They argue that it may be advantageous to extend the usual model-building process, suggesting not only that the model minimizing the criterion should be selected, but also that any additional specifications closely competing should not be discarded, thereby advancing the general notion of a portfolio of models. They present Monte Carlo evidence that model portfolios constructed in this manner behave well in finite samples.

To summarize, the procedure of determining *robust* variables first constructs separate model portfolios using SIC and AICc selection methods. Then for each portfolio, EBA (Leamer, 1983) and BMA (Hoeting, Madigan, Raftery, & Volinsky, 1999) methods are used. In this respect, the procedure is similar to Granger and Uhlig’s (1990) “reasonable extreme bound analysis,” except that the set of evaluated models is determined by Poskitt and Tremayne’s (1987) $\mathfrak{R} < \sqrt{10}$ standard, rather than an arbitrary δ value. This procedure was also used by Reed (2006) in his model of U.S. state economic growth.

CHAPTER 6

RESEARCH FINDINGS

This chapter provides empirical results from the economic growth model constructed in chapter 5. There are many different factors, ranging from population, to labor force, infrastructure, investment, geographic location, and provincial leadership that can affect regional economic development. The question is which of these factors should be included in the model, therefore affecting the provincial growth disparities in Vietnam, and how influential are those robust determinants of growth.

6.1. Potential determinants of regional economic growth in Vietnam

Considering the number of observations of 42 provinces, in order to avoid the problem of multicollinearity, and based on the availability of statistical data on Vietnam, this research takes into account the effects of the following variables as potential determinants of regional growth:

1. *Entry Costs* measure the time it takes firms to register, acquire land, and receive all the necessary licenses to start a business.

The entry-costs index was designed to assess the differences in entry costs for new firms across provinces. According to the Enterprise Law in 2000 and its subsequent implementing documents, these procedures should have become uniform across all provinces, but researchers on the Task Force to Implement Enterprise Law argue that they have not (VNCI, 2005). The index is built on a 10-point scale combining soft data (perceptions indicators from mail-out surveys to firms) and hard data (registration records from the Ministry of Planning and Investment). Perception indicators include

the percentage of firms waiting over a month to complete all steps necessary to start their business, percentage of firms waiting over 3 months to complete all steps necessary to start their business, effective waiting time for land to begin business activities. Hard indicators including firms per 1,000 citizens registered at the Provincial Department of Planning and Investment after the Enterprise Law, and registered capital between 2000 and 2003 as a percentage of provincial GDP in 2003. Among 42 provinces, Ninh Thuan has the lowest entry costs of 3.64 over a 10-point scale, while Da Nang has the highest entry costs of 8.77.

2. *Access to Land* measure whether firms possess their official Land Use Rights Certificate, whether they have enough land for their business expansion requirements and the effective price of land in the province, taking into consideration demand and supply in the provinces, and the quality of industrial zone (IZ) policies.

This is also a very practical issue, since limited access to useful land not only reduces opportunities for new business development, but also discourages investors from expanding businesses or using land-use rights as collateral for bank loans. On average, Southern provinces seem to outperform their Northern peers in access to land according to VNCI (2005) studies. Six indicators comprise the land policy index, including the percentage of firms with Land Use Rights Certificates or are in the process of receiving them; the percentage of firms without those certificates that rent land from family, friends, state-owned enterprises, or local agencies; the percentage of firms that feel land availability constrains their business expansion; provincial land conversion policies (from agricultural to manufacturing usage); effective land prices

(to avoid overland pricing)², and quality IZ policy ³. HCMC has the best IZ score at 2.83, followed by Binh Duong at 1.76, and Binh Dinh, Ninh Binh, Tay Ninh and Tien Giang all had scores of less than 0.10.

3. *Transparency and Access to Information* measure whether firms have access to the proper planning and legal documents necessary to run their business, whether those documents are equitably available, whether new policies and laws are communicated to firms and predictably implemented, and the business use of the provincial web page.

How to construct transparency and access to the information index is always of interest to economists. VNCI (2005) used Vishwanath and Kaufman of World Bank's definition of transparency as "the increased flow of timely and reliable economic, social, and political information about government service provision, monetary and fiscal policy." Their transparency index therefore encompasses five attributes: access (timely dissemination of information on provincial planning, laws, and regulations), equity (equitable access to information), consistency (fair implementation of provincial laws and regulations), predictability (knowledge of the direction of long-term strategies to make informed business decisions), and openness (availability of business information on the provincial web-page). Among these attributes, openness is weighted to be 40% of the final index. Da Nang received the highest openness score, and ranks second after Quang Ninh on overall transparency and access to information index.

² Effective Price = (Land Prices/Enterprises per 1,000)*(Percentage of Business Land/100)

³ Quality of IZ policy = (IZs+Planned IZs)*(Occupancy Rate/100)*(Firm IZ Evaluation/100)

4. *Time Costs of Regulatory Compliance* measure how much time firms waste on bureaucratic compliance as well as how often and for how long firms must shut down their operations for inspections by local regulatory agencies.

Many firms are interrupted from their business operations to deal with bureaucratic problems. This index evaluates the percentage of management's time spent dealing with bureaucratic procedures and paperwork, and the improvement on reducing time taxes since the Enterprise Law, the frequency and length of tax inspection every year, and firms' attitude toward inspection policy. Tax inspections were shortest in Tra Vinh, where it also has the lowest time costs of regulatory compliance.

5. *Informal Charges* measure how much firms pay in informal charges and how much of an obstacle those extra fees pose for their business operations.

This characterizes the amount that firms pay in informal fees, fines, and other extraordinary payments as they attempt to engage in the normal course of business. This group includes five indicators measuring the extent of the problem by gauging the frequency, type, and amount of extra payment: the percentage of firms that believe that extra payments are an obstacle; the percentage of firms that felt that enterprises in their line of business were subject to bribes from provincial authorities; the percentage of firms paying over 10% of their revenue in extra payment; macrocorruption (are commissions paid to provincial officials as a normal activity in bidding for government contracts); and extra fees to tax inspectors as a percentage of annual revenue. Binh Duong has the highest score on informal charges of 8.85, and HCMC has the lowest overall score of 3.38.

6. *Implementation and Consistency of Policies* measure the coordination between central and provincial governments, as well as the consistent application of central policies across provincial subagencies.

In the wake of the Enterprise Law, a great deal of thought has gone into assessing whether provinces are adequately implementing economic reforms devised at the central level in Hanoi. Many provinces have been chastised by the Enterprise-Law Implementation Committee for either ignoring central regulations, or actively thwarting central laws with subtle barriers or contradictory provincial regulations. The Implementation index measures the coordination between central and provincial governments, as well as the consistent application of central policies across provincial subagencies, with three measures: the percentage of firms that agreed that coordination between provincial and central government was good; implementation of provincial initiatives; and implementation of good plans (for social welfare, infrastructure, and private-sector planning). For the first indicator of coordination, An Giang, Bac Ninh, and Phu Yen all scored above 90%, while in Ha Tay, Binh Thuan, and Nam Dinh, only about half of the firms evaluated coordination highly. An Giang is also one of the most united provinces, with only 39% of firms believing that departments impeded provincial projects. Eight provinces, predominantly in the Red River Delta, had perfect scores of 100% on implementation of good plans.

7. *The State-Sector Bias* measures the bias of the provincial government toward the state sector in terms of incentives, policy, and access to capital.

In essence, do private firms feel that they face a fair and balanced environment or must they overcome a subtle bias toward the state in the form of special advantages or

soft budget constraints? Just as for the Entry-Costs Index, State-Sector Bias indicators are divided into a firms' perceptions dimension that include five indicators and a dimension that include three hard indicators. The firms' perceptions indicators include the percentage of firms that agree there is a bias in the decision-making on the part of provincial officials; a positive attitude toward the private sector, an improved attitude since the Enterprise Law; an attitude affected by the firms' revenue or employment contribution; equitization policy; and bias toward equitized firms. Hard indicators are composed of the average proportion of bank loans to the State-Sector Bias; the change in the number of local state-owned enterprises; and State-Sector Bias industrial output as a percentage of total provincial industrial output in 2003.

8. *Proactivity of Provincial Leadership* measures the creativity and cleverness of provinces in implementing central policies and designing their own initiatives for private-sector development.

Provincial officers may cost businesses considerable time and money, or they can save a lot of time and effort for firms with a proactive attitude. Four indicators determined the extent of provincial dynamism, and these are measured by the percentage of firms that agree or strongly agree with the following statements: (a) provincial officials are knowledgeable enough about present national law to find opportunities within existing law to solve firm problems; (b) provincial officials are creative and clever about working within the national law to solve the problems of private sector firms; (c) all good initiatives come from the provincial government, but the central government frustrates them; and (d) there are no good initiatives at the provincial level—all important policy comes from the central government. Binh

Duong scored the highest, and the first highest score Proactivity-Index provinces are all from the south. The lowest proactivity index score province is Ha Tay from the North.

9. *Private Sector Development Policies* measure provincial policies for the private-sector trade promotion provision of regulatory information to firms, business partners' matchmaking and capacity training to improve the quality of labor in the province.

The Proactivity index is comprised of four questions that attempt to measure how well provincial officials are performing in resolving problems on behalf of firms. Firms were asked to rank their provinces on a 5-point scale to gauge how effective they thought their province's policies were in the following four areas: provision of market information; matchmaking for business partners; business consulting; and labor training. The highest scoring provinces were the Southern provinces of Can Tho, Vinh Long and Tay Ninh. The six lowest scoring provinces were all in the Red River Delta area in the North.

10. *The Level of Development (Human Capital)* index is composed primarily of labor quality and primary-achievement test scores, but also includes measures of road quality and the percentage of paved roads in rural areas. Red River Delta provinces have a slight advantage over the South in human scores. Mekong Delta River scores especially low on human capital and quality of infrastructure.

11. *Quality of Infrastructure/Urbanization* index is associated with the percentage of the population living in urban areas; the number of telephones per capita; the quality of transport measured by the millions of tons shipped per kilometer;

the percentage of the economy devoted to agriculture; and whether a province is or shares a border with one of the five national-level cities (Hanoi, HCMC, Hai Phong, Da Nang, and Can Tho). This final measurement picks up not only urbanization but also the benefits of the special infrastructure allotments that go along with the national-level city designation.

12. *Proximity to the Market* captures the distance that must be traversed for a private firm to sell its product. Average retail sales as a measure of GDP grant a view of the size of the intraprovincial market.⁴ Distance from Ha Noi to HCMC is a simple measure of how long it would take for a firm to tap into the lucrative markets in the two metropolises. Finally, the cost of shipping a 40-cubic foot container from Tokyo captures the cost of access to export markets. Ha Noi and HCMC top the list followed by a number of Red River and Northern Southeast provinces that benefit from their close proximity to those two cities.

13. *Population*, average of population over the years of research interest, is a determinant of growth, and closely relates to labor force and economic development. The question of whether population growth has a positive or negative influence on development depends on different countries' situations. For many Eastern European countries, governments worry about population reduction that might affect the country's long-term growth. Population increase is desirable in these countries because it is considered favorable for short-term and long-term development. In Vietnam, more than half of the population was born after the end of the war in 1975.

⁴ This measure was created by taking the best estimates of Viet Port and Evergreen shipping companies, firms that engage in this activity regularly. Mountainous regions and the Mekong River Delta were particularly expensive because containers needed to be unpacked and then restuffed.

The baby-boom placed more pressures on the devastated economy after the war. Too high a population-growth rate means slower economic development. The government decided to impose a two-child-policy per family, encouraging young couples to have a maximum of two children. In recent years, the population growth rate has been reduced and become more stable, but how much effect does it have on regional growth?

14. *Foreign Direct Investment* (FDI) impacts Vietnam economic growth in general national economy and in provinces in particular. Stocks of FDI flow into some provinces with better initial conditions such as infrastructure or close proximity to major markets, changing the pace of local economic growth.

15. *Initial GDP* measures the provincial GDP level in the year 1998. Some provinces have lower starting points, some have higher starting points. The coefficient estimate of the Initial GDP variable can provide some insight into growth convergence of provinces in Vietnam.

These preceding variables attempt to capture the economic influences represented by

$$C_t = \alpha[\ln(k_1) - \ln(k_0)] + \beta[\ln(l_1) - \ln(l_0)] + [\ln(A_1) - \ln(A_0)] + \beta[\ln(Q_1) - \ln(Q_0)] \quad \text{in}$$

equation (5) of chapter 5. There are approximately 32,767 ways of combining 15 variables. Each of these permutations, appending a core set of “free” variables, can be thought of as a single model. Thus, the empirical problem consists of choosing the best model or set of models from these 32,767 possibilities. The data consists of 42 observations from 1998–2003. The general specification for the empirical model equation (5) is

$$DLNY = \beta_0 + \beta_1 DNNN + \beta_2 y_0 + \beta_3 FDI + \beta_4 pop + \beta_5 human + \beta_6 infra + \beta_7 prox + \beta_8 entry + \beta_9 access + \beta_{10} trans + \beta_{11} time + \beta_{12} charge + \beta_{13} imple + \beta_{14} soebias + \beta_{15} proact + \beta_{16} private + \varepsilon_t$$

where Y is the change in Provincial GDP from 1998 to 2003 and the rest are potential determinants of growth discussed earlier. DNNN is the change in population from 1998–2003.

Table 2
List of Variables and Explanation

Variable Name	Explanation
y ₀	<i>Initial GDP:</i> provincial GDP level in the year 1998
FDI	<i>Foreign Direct Investment</i>
Pop	<i>Average population</i> from 1998 to 2003
Human	<i>The Level of Development (Human Capital):</i> a measure of labor quality and primary-achievement test scores, and road quality and the percentage of paved roads in rural areas
Infra	<i>Quality of Infrastructure/Urbanization:</i> a measure of infrastructure and transportation quality
Proxi	<i>Proximity to the Market:</i> a measure of the travel distance for a private firm to sell its product
Entry	<i>Entry Cost:</i> a measure of the firm's time to register, acquire land, and receive all the necessary licenses to start business.
Access	<i>Access to land:</i> A measure of firms access to land use rights certificate, business expansion, and the quality of industrial zone policies.
Trans	<i>Transparency and Access to information:</i> a measure of firms' access to planning and legal documents.
Time	<i>Time Costs and Regulatory Compliance:</i> A measure of firms' wasting time on bureaucratic compliance and inspections by local regulatory agencies.
Charge	<i>Informal Charges:</i> A measure of firms' payment in informal charges extra fees pose in their business operations.
Imple	<i>Implementation of Policies and Consistent Application across Provincial Sub-Agencies:</i> a measure of the coordination between central and provincial governments, and the consistent application of central policies across provincial sub-agencies.
Soebias	<i>State Sector Bias:</i> a measure of the bias of provincial governments toward state owned enterprises (SOES) in terms of incentives, policy, and access to capital.
Proact	<i>Proactivity of Provincial Leadership:</i> a measure of the creativity and cleverness of provinces in both implementing central policy and designing their own initiatives for private sector development.
Private	<i>Private Sector Development Policies:</i> a measure of provincial policies for private sector trade promotion, provision of regulatory information to firms, business partner matchmaking, and capacity training to improve the quality of labor in the province.

6.2. Empirical Analysis and Results

The empirical analysis proceeds in three steps. In the first step, a regression that uses the full set of regressors is estimated. In the second step, model-selection

criteria to identify the best SIC and best AICc specifications were used among the 32,767 total possible models. These best models were then compared to the model with all variables. Finally, EBA was used in separate SIC and AICc portfolios of “reasonable” models to identify which determinants of regional development growth are robust.

6.2.1. Specification With All Variables

Table 3 reports the results of estimating Equation (5) using the full set of explanatory variables. In this table, DLNN coefficient on the change in provincial population, is positive in sign but not highly significant (p -value > 0.0001), while the coefficient on average national population growth over these years has a negative sign showing an inverse relationship between population boom and economic growth, but is not highly significant. Variables such as entry cost, access to land, time costs of regulatory compliance, and state-owned-enterprise bias bear negative signs, among which access to land and state-owned-enterprise bias have t -statistics greater than 2. The last variable of the growth equation, private-sector development policies is negative in sign with t -statistic less than 2. Other variables including human capital, infrastructure, proximity to market, transparency and access to information, informal charges, implementation and consistency of policies, and proactivity of provincial leadership all bear a positive sign and are healthy factors in the growth process. Among them, only the proactivity variable has a t -statistic greater than 2. Next, the SIC and AICc selection criteria were used to select the *best* models.

Table 3
Regression Results Using All Variables

Variable	Coefficient	<i>t</i> -stat
dl _{nn}	0.09281	0.16
Initial GDP	0.40505	3.10
FDI	0.06138	0.67
Population	-0.00006417	-2.58
Human Capital	0.01536	1.69
Infrastructure/Urbanization	0.02234	1.02
Proximity to the Market	0.00433	0.43
Entry Costs	-0.02320	-1.14
Access to Land	-0.06659	-2.19
Transparency and Access to Information	0.02350	1.08
Time Costs of Regulatory Compliance	-0.00582	-0.32
Informal Charges	0.03073	1.83
Implementation and Consistency of Policies	0.01693	0.77
State Sector Bias	-0.09974	-3.14
Proactivity of Provincial Leadership	0.04024	2.02
Private Sector Development Policies	-0.01005	-0.68
Observations: 42, $R^2 = 0.7826$, SIC = 213.6780, AICc = 245.7441		

6.2.2. Best SIC and AICc Specifications

Table 4 reports results from the best specifications chosen by the SIC and AICc model-selection criteria. The best specification means the lowest SIC and AICc values out of 32,767 possible specifications. The best SIC model includes Initial GDP, Population, Human Index, Informal Charges, State-Sector Bias, and Proactivity with *t*-statistics greater than 2.0. The best AICc model includes Initial GDP, Population, Human Index, State-Sector Bias and Proactivity with *t*-statistics greater than 2.0. In both best SIC and AICc models, the regression specifications produce similar variables, except for the Access to Land variable that appears only in the best AICc model. These suggest the role of State-Sector Bias and Proactivity of Provincial Leadership factors of regional growth differences in addition to Initial GDP, Population, and Human Capital.

Table 4
Regression Results from Best SIC and Best AICc Specifications

Variable Name	Best SIC		Best AICc	
	Specification	t-stat	Specification	t-stat
dlmn	0.46996	1.11	0.50164	1.22
Initial GDP	0.45173	5.94	0.50051	6.33
Population	−0.00005158	−2.54	−0.00005376	−2.72
Human Capital	0.02550	3.79	0.01974	2.69
Infrastructure/Urbanization	---	---	---	---
Proximity to the Market	---	---	---	---
Entry Costs	---	---	---	---
Access to Land	---	---	−0.04118	−1.73
Transparency and Access to Information	---	---	---	---
Time Costs of Regulatory Compliance	---	---	---	---
Informal Charges	0.03200	2.11	0.02940	1.99
Implementation and Consistency of Policies	---	---	---	---
State Sector Bias	−0.11491	−4.28	−0.10918	−4.15
Proactivity of Provincial Leadership	0.03082	2.65	0.04014	3.21
Private Sector Development Policies	---	---	---	---
Number of observations	42		42	
R ²	0.7213		0.7446	
SIC	213.6780		213.7581	
AICc	246.1403		245.7441	

6.2.3. Extreme Bound Analysis

Following the EBA convention, robust variables are those whose coefficient estimates are all same-signed and lie more than two standard deviations away from zero. Two portfolios of models (one for SIC, one for AICc) were analyzed; not every variable appears in every specification within a given portfolio. According to current, robust variables are required to appear in at least 50% of the specifications in either portfolio.

The SIC portfolio consists of 10 different models as defined by the $\mathfrak{R} < \sqrt{10}$ criterion. The results from analyzing this portfolio of models are reported in Table 4A. Robust variables (identified with an “R”) are Initial GDP, Population, Human Capital, State-Sector Bias, and Provincial Proactivity. The AICc portfolio consists of 10 different models, and the same variables including Initial GDP, Population, Human

Index, State-Sector Bias, and Proactivity of Provincial Leadership are robust variables reported in Table 5B.

Table 5A
Extreme Bounds Analysis for Portfolio of Top SIC Models

Number (percent)	Robust	Variable	Range of coefficient estimates			Range of t-ratios		
			Low	Mean	High	Low	Mean	High
5 (100%)	R	y ₀	0.3608	0.45624	0.511	3.22	5.49	6.33
2 (25%)	--	FDI	0.08756	0.08756	0.08756	1.1	1.1	1.1
5 (100%)	R	Pop	-0.0000683	-0.0000593	-0.0000516	-3.57	-2.984	-2.54
5 (100%)	R	Human	0.0185	0.02204	0.0255	2.42	3.058	3.79
0 (0%)	--	Infra	---	---	---	---	---	---
0 (0%)	--	Proxi	---	---	---	---	---	---
0 (0%)	--	Entry	---	---	---	---	---	---
3 (60%)	--	Access	-0.046	-0.04358	-0.041	-1.86	-1.795	-1.73
0 (0%)	--	Trans	---	---	---	---	---	---
0 (0%)	--	Time	---	---	---	---	---	---
4 (80%)	--	Charge	0.02903	0.03014	0.032	1.89	1.9967	2.11
0 (0%)	--	Imple	---	---	---	---	---	---
5 (100%)	R	Soebias	-0.11799	-0.10321	-0.08496	-4.38	-3.972	-3.5
5 (100%)	R	Proact	0.02556	0.03239	0.04014	2.15	2.662	3.21
0 (0%)	--	Private	---	---	---	---	---	---

Table 6 collects the robust variables from these EBAs and reports them, along with a mean estimated effect calculated as the simple average of the respective mean in Tables 5A and 5B. Table 6 identifies five variables as robust determinants of regional economic growth: Initial GDP level, Population, Human Capital, State-Sector Bias, and Provincial Proactivity. All have the expected signs. The small value for the mean estimated effect of Population level signifies a very small effect of initial GDP on regional growth. A 1% increase in initial GDP gives an estimate of 4.5% increase in regional growth rate. The estimated effect of Human Capital and Provincial Proactivity are also relatively small. The estimated effect of State-Sector Bias indicates that a 1% increase in State-Sector Bias lowers the growth rate by 0.105%,

and a 1% increase in Proactivity of Provincial Leadership increases the overall growth rate by 0.03%.

Table 5B
Extreme Bounds Analysis for Portfolio of Top AIC Models

Number (percent)	Robust	Variable	Range of coefficient estimates			Range of <i>t</i> -ratios		
			Low	Mean	High	Low	Mean	High
5 (100%)	R	y ₀	0.3608	0.44804	0.511	3.22	5.07	6.33
2 (40%)	--	FDI	0.08359	0.08359	0.08359	1.02	1.06	1.1
5 (100%)	R	Pop	-0.00006832	-0.00005722	-0.00005158	-3.57	-2.874	-2.54
5 (100%)	R	Human	0.0165	0.02037	0.0255	2.06	2.766	3.79
0 (0%)	--	Infra	—	—	—	—	—	—
0 (0%)	--	Proxi	—	—	—	—	—	—
0 (0%)	--	Entry	—	—	—	—	—	—
3 (60%)	--	Access	-0.046	-0.04228	-0.04	-1.86	-1.75333	-1.67
0 (0%)	--	Trans	—	—	—	—	—	—
0 (0%)	--	Time	—	—	—	—	—	—
4 (80%)	--	Charge	0.02679	0.02931	0.032	1.79	1.945	2.11
0 (0%)	--	Imple	—	—	—	—	—	—
5 (100%)	R	Soebias	-0.11799	-0.107846	-0.08496	-4.38	-4.11	-3.5
5 (100%)	R	Proact	0.02898	0.03491	0.04014	2.48	2.834	3.21
0 (0%)	--	Private	—	—	—	—	—	—

Table 6
Robust Variables and Mean Estimated Effects

Variable Name	Estimated Effect
Initial GDP level	0.45214
Population	-0.000058241
Human Capital	0.021205
State Sector Bias (AIC model)	-0.105528
Proactivity (SIC model)	0.03365

“Mean” estimated effects: simple average of the “mean” coefficient estimates in Table 5A and 5B

6.3. Remarks from empirical analysis

Among the robust determinants from the regression results, besides population, initial GDP and human capital that commonly have their weights in every growth equation, the determinants of State-Sector Bias and Proactivity of Provincial Leadership raised concern about provincial governance in the development process. The development picture of Vietnam becomes more interesting because under one

government, one legal system, one economic policy, the provincial leadership does play a vital role in promoting their provincial economic performance.

State-Sector Bias here does not necessarily include competition in the same product or service. It may also include competition for skilled labor, land, or credit. Some provinces have stated explicitly that their primary goal is to promote large state-owned champions as the primary engine of growth, allowing the private sector to serve only as a supplier of intermediate goods and services to the state sector (Malesky, 2004). Others may not have such explicit bias, but instead have an institutional incentive to promote State-Sector Bias, because of the high employment and revenue they generate for the province. In other cases, it is the rents they can generate and the resources they control that incentivize local officials to maintain state-control of State-Sector Bias. In any case, promoting State-Sector Bias is not a long-term strategy for provincial economic success because these privileged companies will need to eventually compete in the international market or in an expanded Vietnamese market. Without the special privileges to which State-Sector Bias have grown accustomed, they will find it very difficult to succeed against more efficient privately owned domestic and international firms.

Proactivity of Provincial Leadership toward the private sector therefore plays a vital role in development. As indicated by the VNCI (2005) project, ambiguity is a standard part of doing business in Vietnam. This is often the result of unclear wording in legal documents, long delays in implementing documents being promulgated for central laws or decrees, contradictions between implementing documents (circulars, directives, official letters, and People's Committee's decisions), and even central laws

themselves. For many industry segments new to Vietnam, there is a lack of any clear legal regime. A few provinces even use these uncertainties as barriers to firms that might offer competition to their local champions. In these cases, provinces which are creatively clever about working within the confines of central law can be of major assistance to these businesses, therefore can have a major impact on provincial development.

CHAPTER 7

CONCLUSION

This dissertation analyzes factors associated with regional growth disparities in Vietnam. The striking difference among regions in Vietnam is a pressing issue faced by the country with a high growth rate only second to China in today's Asia. After reviewing the history as well as current situation of regional growth in Vietnam, the research examines the determinants of regional economic growth of 42 provinces in Vietnam from 1998 to 2003.

Using a generalized Cobb-Douglas production-function framework, this research considers a number of potential explanatory variables yielding 32,767 possible linear combinations of variables, each representing a potentially true model. The EBA method is used to sort out these different model specifications to identify robust determinants of regional economic growth. It analyzes the current situation by using data from 42 provinces from 1998 to 2001. EBA was used to find the robust variables. The SAS program sorted out 32,767 possible linear combinations of the 15 variables. After purging out the effects of nonrobust variables, the results confirm the effects of Initial GDP levels, Population, Human Capital, State-Sector Bias, and Proactivity of Provincial Leadership as important determinants of growth.

This highlights the role of provincial management in creating a favorable business environment, especially for the private sector. It also raises an interesting issue in Vietnam - even under the same national law, the interpretation and implementation of law can vary among different provinces. Also, providing incentives

for the private sector, lowering trade barriers, inducing technology exchange, and enhancing education are all important factors contributing to the equation of growth.

The empirical results identify five robust determinants of Vietnam regional economic growth over the years from 1998 to 2003. Among these are Initial GDP levels, Population, Human Capital, State-Sector Bias, and Proactivity of Provincial Leadership. This finding highlights the importance of public policy as a determinant of economic growth. A saying in Vietnam is, “The King's Laws Bow Before Village Regulations” (Phep vua thua le lang): provincial authorities should take this into account in creating a more favorable environment to promote their local development.

The approach is related to the “reasonable extreme bound analysis” of Granger and Uhlig (1990). However, the SIC and the AICc are first used to choose “portfolios of reasonable models,” as suggested by Poskitt and Tremayne (1987), before conventional EBA within these portfolios are tested. An advantage of this approach is that it uses standard SAS procedures and can be easily implemented by other researchers.

The analytical framework presented here can be applied to other economic growth models at both the micro and macro levels. The model can also be used to analyze economic-growth differences among regions in developing as well as developed countries, especially in the case of newly emerging economies like China, Korea, and Russia.

In Vietnam, using the same approach and methodology, with availability of data and systematic collection and analysis, this research can be extended to 64 provinces in Vietnam over a longer period of time. But reformed macroeconomic

policies are needed to correct short-term imbalances now, together with guidelines for provincial authorities to realize and create a favorable supportive local economic environment. If Vietnam is to fulfill its potential for providing a healthy and prosperous life for its people, these reforms must be drastic and part of a consistent long-term strategy aimed at rapid, sustainable, balanced regional economic growth and equality for its people. With so much of its history dominated by conflict, Vietnam is vulnerable to social and regional disparities that can lead to widespread violence—even at a foreseeable future date when economic development is at last proceeding apace.

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APPENDIX A

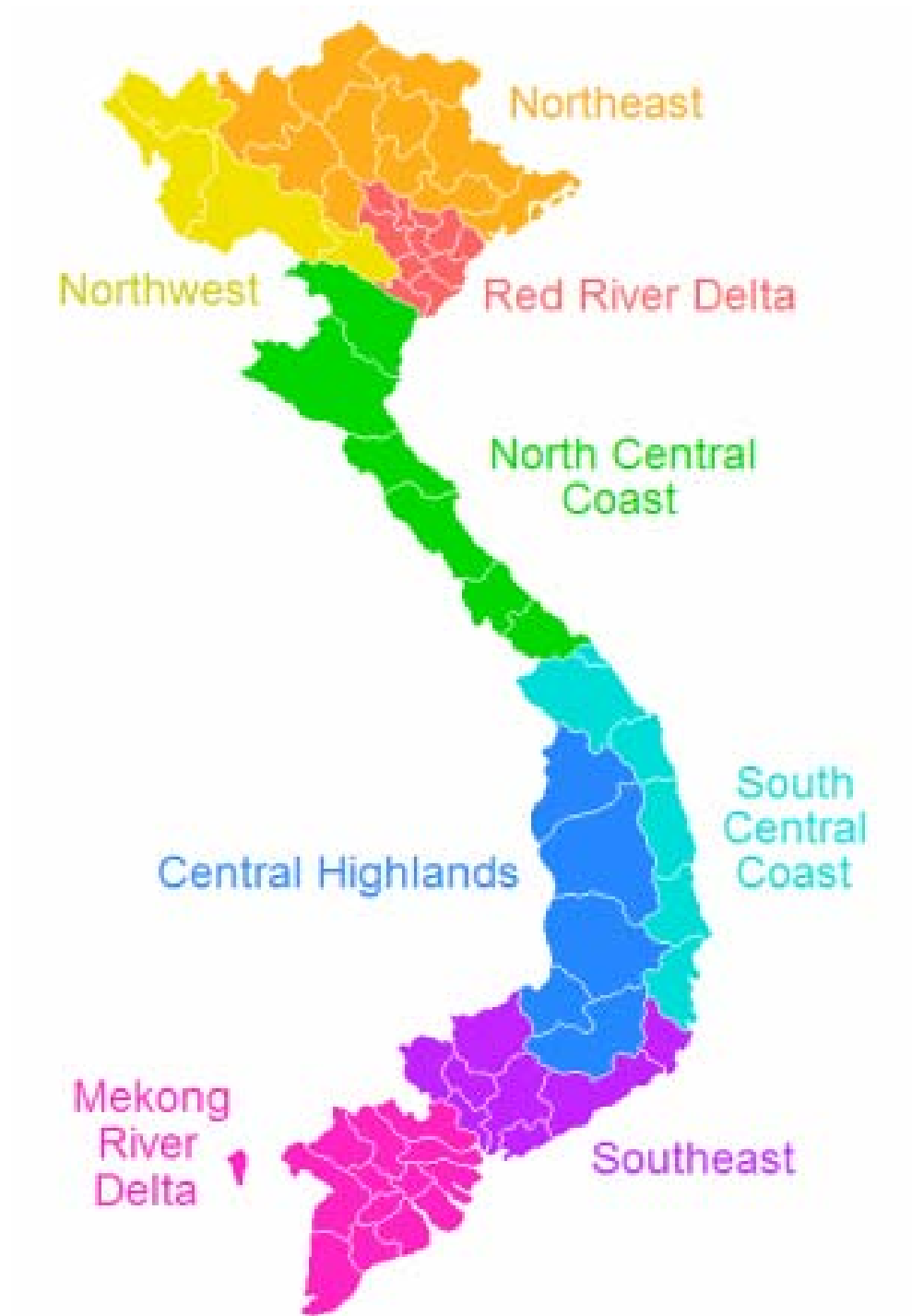
ADMINISTRATIVE MAP OF VIETNAM



Source: University of Texas Libraries (2001).

APPENDIX B

REGIONAL MAP OF VIETNAM



Source: Wikipedia. (2007). Retrieved from, <http://simple.wikipedia.org/wiki/Vietnam>.

APPENDIX C

GEOGRAPHICAL REGIONS OF VIETNAM

REGION I: **Red River Delta** includes the following provinces: Ha Noi, Hai Phong, Ha Tay, Hai Duong, Hung Yen, Ha Nam, Nam Dinh, Thai Binh, and Ninh Binh.

REGION II: **North East** includes the following provinces: Ha Giang, Cao Bang, Lao Cai, Bac Kan, Lang Son, Tuyen Quang, Yen Bai, Thai Nguyen, Phu Tho, Vinh Phuc, Bac Giang, Bac Ninh, and Quang Ninh.

REGION III: **North West** includes the following provinces: Lai Chau, Son La, and Hoa Binh.

REGION IV: **North Central Coast** includes the following provinces: Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, and Thua Thien Hue.

REGION V: **South Central Coast** includes the following provinces: Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, and Khanh Hoa.

REGION VI: **Central Highlands** includes the following provinces: Kon Tum, Gia Lai, and Dac Lac.

REGION VII: **North East South** includes the following provinces: Ho Chi Minh, Lam Dong, Ninh Thuan, Binh Phuoc, Tay Ninh, Binh Duong, Dong Nai, Binh Thuan, Ba Ria – Vung Tau.

REGION VIII: **Mekong River Delta** includes the following provinces: Long An, Dong Thap, An Giang, Tien Giang, Vinh Long, Ben Tre, Kien Giang, Can Tho, Tra Vinh, Soc Trang, Bac Lieu, and Ca Mau.

Source: Nguyen, V. C., Vu, Q. V., Tran, V., & Le, H. (2002).

APPENDIX D

STATISTICAL SUMMARY OF DATA

Table B1
Statistical Summary of Data

Variable	Mean	Std. Deviation	Minimum	Maximum
Initial GDP	0.3086200	0.2428385	0.1590508	1.5354938
FDI	0.2458038	0.4212480	0.0012963	1.6374732
Population	1467.1300	886.43168	523.38000	5278.0700
Human Capital	6.0640476	2.3998964	1.0000000	10.0000000
Infrastructure/Urbanization	3.9161905	1.6760493	0.9900000	10.0000000
Proximity to Market	6.3404762	2.3019366	1.0100000	10.0000000
Entry Costs	6.1071429	1.1107332	3.6400000	8.7700000
Access to Land	6.1559524	0.9829995	3.6700000	8.3200000
Transparency and Access to Information	4.6459524	1.0612971	2.7800000	7.1200000
Time Costs of Regulatory Compliance	6.3359524	1.0801311	4.0100000	8.3500000
Informal Charges	6.2528571	1.2606411	3.3800000	8.8500000
Implementation and Consistency of Policies	6.2235714	1.1629689	2.7700000	8.2700000
State Sector Bias	5.8721429	0.8024005	4.1700000	8.5300000
Proactivity of Provincial Leadership	5.6309524	1.7515370	1.2000000	9.3000000
Private Sector Development Policies	5.1873810	1.5870437	1.0500000	8.1400000
DLNY	3.0816567	0.1709354	2.8124502	3.8309811
DLNN	0.0678088	0.0434239	0.0153046	0.2290135

APPENDIX E

VIETNAM HOUSEHOLD LIVING STANDARD SURVEY QUESTIONNAIRE

YEAR 2001-2002

Province/ City.....
District/commune.....
Commune/Ward/Town.....
Location.....
Household head (capitalized)..... Household number
Ethnic group
Address.....
Is the interpretation service required? (Yes:1, No:2)

Date
Team head
(sign & name)

Date
interviewer
(sign & name)

Section 1: List of household members

1. Please you tell the full name of each person, who has been having meals, sleep, and sharing income and expenditure in your household, start with household head.
2. Sex: male...1, female....2
3. Relationship to head of household: head...1, wife/husband....2, child...3, child in law...4, parents....5, sister/brother...6, grandfather/grandmother...7, grandchild...8, other relationship...9
4. What month and year (Solar calendar) was [NAME] born?
5. How old is [NAME]?
6. What is the current marital status of [NAME]? : never married...1, married...2, widowed...3, divorced...4, separated...5

Section 2: Education

1. Which grade has [NAME] finished?
2. Can [NAME] read and write?: Yes...1, No....2
3. What was the highest degree [NAME] obtained?: No degree...0, Primary...1, Lower Secondary School...2, Upper Secondary School...3, Technical

- worker...4, Professional secondary school...5, Junior college diploma...6, Bachelor's...7, Master's ...8, Candidate/Doctor...9
4. In the past 12 months, has [NAME] attended school? : Yes....1, No....2
 5. In the past 12 months, what is the expenses for [NAME] to go to school?
 - A. Tuition and registration fees to study outside of school district
 - B. Contribution to school, class (building, parents' association,...)
 - C. Uniforms and other clothing required by the school
 - D. Textbook, reference book
 - E. Other school tools (paper, pens, bag, pencil...)
 - F. Extra classes (include language, computer)
 - G. Other expenditures (transportation, lodging)
 - H. Total (A+B+...+G)
 6. Is [NAME] exempted from tuition and other contributions?
 7. What is the reason for [NAME]'s school fee exemption?: Poor...1, Ethnic Minority...2, Martyr...3, Disabled, sick veteran policy households...4, remote area...5, have difficult situation...6, primary pupils...7, other (specify.....)....8
 8. Exemption percentage
 9. Over the last 12 months, has [NAME] received scholarship or subsidy thanks to educational records?: No....1, Yes...2
 10. What is the value of the scholarship or subsidy received during the past 12 months?
 11. Expenses for other courses (housework, tutorial, typewriting, foreign language, computer skills)?

Section 3: Employment

1. In the last 12 months:
 - a) have you worked for pay for a unit or someone who is not a member of your household? Yes....1, No...2
 - b) have you worked in a field, garden or forest plot belonging to your household, or have you raised livestock or aquatic products? Yes...1, No...2
 - c) have you worked in a business enterprise or profession organized and managed by your household? Yes...1, No...2
2. Have work? Yes...1, No...2
3. How many hours did you work in the past 7 days?
4. Have you looked for or wanted to work during the past 7 days?
5. What is the reason for you not having looked for a work or wanted to work in the last 7 days? Be studying...1, do housework...2, Not be able to work...3, have a job...4, can't find a job/don't know where to find a job...5, other (specify...)...6
6. What is the most time consuming work among the ones you were doing in the last 12 months?
7. Organization, function/product of this work?
8. For whom did you work? Self-employed...0, work for other households...1, government agencies, police, military/communist party, social organization...3, state-owned enterprises...4, other state economic sector...5,

- collective economic sector...6, private capitalist economic sector...7, state capitalist economic sector...8, foreign shared enterprises...9
9. For how many months in the past 12 months did you do this work?
 10. During these months, how many days did you usually work per week?
 11. During these days, how many hours did usually work per day?
 12. Did you do 2 upwards works at the same time? Yes...1, No...2
 13. How many months did you do all kinds of paid work in the last 12 months?
 14. What is the average quantity of working days per month?
 15. What is the average quantity of working hours per day?
 16. Do you have to work in your house? (such as cleaning, shopping, cooking, clothes washing, fetch water and wood, repairing tools in the house,...)
Yes...1, No...2
 17. How many hours a day in the last 12 months you did this kind of work?
 18. Have you contributed any public working days? Yes...1, No...2
 19. In the past 12 months, how many public working days without pay did you contribute?

Section 4: Health

1. In the last 12 months, has any member of your household gone to the health care centers? (including doctor's visit and cases whereas he/she is not sick or ill but taking health check, prenatal check-up, abortion, setting a coil, paid vaccination,...)
2. Name of the person used health facility
3. Which health facility has [NAME] used? (including invited a health care provider to home): hamlet health center ...1, commune health center...2, polyclinic...3, government hospital...4, private health facility...5, traditional medical practitioner...6, other health facility...7
4. Did [NAME] be hospitalized then? Yes...1, No, just be an outpatient...2
5. What is the total out-patient treatment cost of [NAME]? (including consultation and other expenses (feeding-up allowance, other service fees as requested, medicine, health tools...) related to treatment that time)
6. What is the total in-patient treatment cost of [NAME]? (including hospital fee and other expenses (feeding-up allowance, other service fees as requested, medicine, health tools, ...) related to treatment that time.
7. In the last 12 months, how much did your household spend on buying medicine for self treatment or stand-by without consultation (including medicine and other expenses such as transportation, vehicle keeping fee,...)?
8. In the past 12 months, how much have you spent on health tools? Example: stethoscope, hearing aid apparatus, sputum taking medicine, sphygmomanometer, medicine cabinet...
9. In the past 12 months, how much have you contributed to health (health fund, construction of health centers, preventive campaigns,...)?
10. How much have you paid for health insurance in the past 12 months?

Section 5: Income and other inflows of money

Part 5A. Income from salary, wage

1. Have paid job? Yes...1, No...2
2. What is the most time consuming among the works you do to receive salary/wage?
3. Has this work been mentioned in question 6 section 3? Yes...1, No...2
4. Organization, function/product of this work?
5. Which organization are you working for? Other household...1, government administration, police, military...2, communist party, social organization...3, state enterprise...4, other economic state sector...5, collective economic sector...6, private capitalist economic sector...7, private capitalist economic sector...7, state capitalist economic sector...8, foreign shared economic sector...9
6. In the past 12 months, how much did you receive from this work in money and in kind?
7. Apart from salary/wage, how much did you receive from the following items in cash and in kind?
 - a) New Year and holidays
 - b) Social subsidy (including subsidy for sickness, maternity or working accident)
 - c) Domestic and overseas business trip allowance
 - d) Others
 - e) Total (a+b+c+d)
8. Apart from those two works, did you do any other works for salary and wage in the last 12 months? Yes...1, No...2
9. How much did you receive from these works in cash and in kind in the last 12 months?
10. Income from salaries and wages of other members

Part 5B. Agricultural, forestry and fishery activities

1. Are your household a co-operative member? Yes...1, No...2, Do not know...3

Part 5B1. Agricultural, syvilcultural land and aquacultural water

2. Do your household manage and use agricultural, sylvilcultural, and aquacultural land? Yes...1, No...2
3. Which kind of the following land are your household manage and use?
 - a. Agricultural land: of which land for annual crop..., land for perennial crop...
 - b. Sylvilcultural land: of which natural forestry ..., planted forestry....
 - c. Aquacultural water
 - d. Unused land
4. Area: Total....., of which used for long time....
5. Do you have a land use certificate? Yes....1, No...2
6. Whose name is written? Husband....1, Wife....2, Both...3, Single...4

7. In the last 12 months, did your household lend and/or use your land for rent?
Yes...1, No...2
8. Cash and in-kind from lending and/or using your land for rent?
9. In the last 12 months, did your household borrow and/or rent land from others?
Yes...1, No...2
10. Cash and in-kind paid for borrowing and renting land of others in the last 12 months?

Part 5B2. Agriculture Production

1. In the last 12 months, has your household harvested any agricultural products?
Yes...1, No...2

Part 5B2.1. Income from rice and other food crops

2. Which product has your household harvested? Ordinary rice1, glutinous rice...2, specialty rice...3, Indian corn...4, sweet potatoes...5, cassava/manioc...6, other stable crops...7, potatoes...8, kohlrabi, cabbage, cauliflower...9, other leafy greens...10, tomatoes...11, water morning glory...12, fresh legumes (beans)...13, soybeans...14, sesame seeds...15, other vegetables, tubers, fruits...16
3. What is the total cultivated area in the last 12 months?
4. What was the harvested production in the last 12 months?
5. Of which, how much was sold, bartered?
6. Who did you mainly sell to and bartered with? State...1, Non-state...2
7. What was the value of the harvested production in the last 12 months?

Part 5B2.2. Income from annual and perennial industrial crops

2. Which product has your household harvested? Soybeans...17, peanuts...18, sesame seeds...19, sugar cane...20, tobacco...21, cotton...22, rute, ramie...23, rush...24, other annual industrial crops...25, other annual crops...26, tea...27, coffee...28, rubber...29, black pepper...30, coconut...31, mulberry...32, cashew...33, other perennial industrial crops...34
3. What is the total cultivated area in the last 12 months?
4. What was the harvested production in the last 12 months?
5. Of which, how much was sold, bartered?
6. Who did you mainly sell to and barter with? State...1, Non-state...2
7. What was the value of the harvested production in the last 12 months?

Part 5B2.3. Income from fruit crops

2. Which product has your household harvested? Oranges, limes, mandarins...35, pineapple...36, bananas...37, mango...38, apples...39, grapes...40, plums...41, papaya...42, litchi, logan, rambutan...43, sapodilla...44, custard apple...45, jackfruit, durian...46, mangosteen...47, other fruit trees...48, perennial crops...49, breeding...50, ornamental plot plant...51
3. What is the total cultivated area in the last 12 months?
4. What was the harvested production in the last 12 months?
5. Of which, how much was sold, bartered?

6. Who did you mainly sell to and barter with?
7. What was the value of the harvested production in the last 12 months?

Part 5B2.4. Income from crop by-production

Please tell us about products by which you used and sold in the last 12 months

8. Straw, thatch
9. Sweet potato leaves and stems
10. Stems of cassava plant and maize
11. Stems and leaves of peanuts and various types of legumes
12. Top and leaves of sugar cane
13. Stems of jute, ramie mulberry plants
14. Various types of firewood (not including agro-forestry trees)
15. Others

Part 5B2.5. Agricultural production expenditure

9. Which of the following did your household spend on to make the already harvested production? Seeds, tree for breeding...1, organic fertilizer...2, chemical fertilizer...3, pesticide...4, non-durable items...5, energy, fuel (petrol, rude oil, lubricant, firing,...)...6, repair, maintenance...7, depreciation of fixed assets...8, rent and bid for land use...9, rent asset, machinery equipment, other means of machines...10, plough rent...11, outside labor cost...12, irrigational cost...13, payment of loan interest...14, agricultural taxes...15, other costs (fee, postage, advertisement, marketing, production insurance contribution of funds for vegetation protection, soil renovation administrative management...)...16
10. Expenditure
17. How much has your household spent on the following crop: a) foodgrain crop; b) foodstuffs crop; c) industrial crop; d) fruits and others rather than forestry crop; e) total (a+b+c+d)
18. Remained valued of crop for use or sales?

Part 5B3. Income from livestock

1. Has anyone in your household raised or owned cattles, poultries in the last 12 months? Yes...1, No...2

Part B3.1. Income from livestock

2. Did you household make any production of the following? Water pigs...1, water buffalo...2, various of poultries...3, breed of cattles, poultries...4, other cattles, poultries (goat, sheep, bear, stag, rabbit, dog, dove,...)...5, eggs of poultries (chicken, duck,...)...6, fresh milk...7, silk worm cocoon....8, bee's honey...9, other livestock (not be killed or slaughter)...10, livestock by-products...11
3. How much [...] has your household sold, exchanged given as present in the last 12 months?
4. How much [...] has your household consumed for your household in the last 12 months?
5. How much [...] did you use for other purpose in the last 12 months? (including for preliminary processing, used as materials, for production,...)

6. Total income from livestock in the last 12 months.

Part 5B3.2. Expenditure on livestock

7. Breed of cattles, poultries
8. Food
9. Non-durable items
10. Energy, fuel (electricity petrol, rude oil,...)
11. Small repair, maintenance
12. Depreciation of fixed assets
13. Rent and bid for land use
14. Rent of asset, machinery equipment, other means of production
15. Payments for laborers
16. Payment for medicine for cattles, poultries
17. Payment of loan interest
18. Turn-over tax
19. Other expenses (fees, postage,...)
20. Remained amount for use or sales?

Part 5B4. Farm services

1. Did any member of your household use any machines, equipment, tools for agricultural services in the last 12 months? (such as ploughing, farming, irrigation, prevention from insects, pluck rice off, preliminary treatment, other services such as protection, fertilization, castrate cattles, cage washing,...) Yes...1, No....2

B4.1. Income from farm services

2. Did your household make any income from the following activities? Farm work...1, irrigation...2, prevent from insect...3, pluck rice off, preliminary treatment...4, other services (protection, fertilization, castrate cattles, washing,...)....5

3. How many months did you have income from the activities mentioned in question 2 in the last 12 months?

4. What was the average monthly income?

5. Total income

Part 5B4.2. Expenses for farm services

6. Did your household make any income from the following activities? Farm work...1, irrigation...2, prevent from insect...3, pluck rice off, preliminary treatment...4, other services (protection, fertilization, castrate cattles, washing,...)

Expenditure on agricultural service activities in the last 12 months?

7. Materials
8. Non-durable items
9. Energy, fuel (electricity petrol, rude oil,...)
10. Small repair, maintenance
11. Fixed assets depreciation
12. Rent of house, workshop machineries, means of production
13. Outside labor cost
14. Loan interest

15. Turnover tax
16. Other expenditure (fees, postage, advertisement, marketing, production, insurance,...)
17. Total (7+...+16)

Part 5B5. Sylviculture

1. Did any member of your household do sylviculture activities in the last 12 months? (including forest plantation, management, protection, growing, making tree for breeding)

Part 5B5.1. Income from sylviculture

2. Which of the following products did your household harvested? Mu oil tree...52, cinnamon...53, anise...54, pine...55, varnish tree...56, tree for wood...57, bamboo...58, fan palm tree...59, water coconut...60, other sylviculture trees...61, wood...62
3. Value of production harvested in the last 12 months?
4. Of which, value of production used for sales, barter
5. In the last 12 months, how much did you earn from forest plantation, protection, maintaining and improving?
6. In the last 12 months, how much did you earn from trees for breeding and other products collected in the forest?
7. In the last 12 months, how much did you earn from sylviculture services

Part 5B5.2. Sylviculture expenditure

8. Which of the following expenses did your household spend? Seeds, tree for breeding...1, all kinds of fertilizers...2, non-durable items...3, energy, fuel (petrol, rude oil, lubricant, firing,...)4, repair, maintenance...5, depreciation of fixed assets...6, rent and bid for land use...7, rent asset, machinery equipment, other means of machines...8, plough rent...9, outside labor cost...10, payment of loan interest...11, agricultural taxes...12, other cost (fees, post, advertisement)...13
9. Value
10. Remained amount of forestry production for use and sales
11. Did your household make any income from hunting down, trapping, domesticating forestry animals in the last 12 months? Yes...1, No...2
12. How much money did your household make from hunting down, trapping, domesticating forestry animals?
13. How much money did your household spend on hunting down, trapping, domesticating forestry animals?

Part 5B6. Aquaculture

1. Has anyone in your household raised or caught aquaculture products in the last 12 months? (including growing shrimp, breeding fish and other products, catching aquacultural products in ponds, lakes, rivers, streams and sea) Yes...1, No...2

Part 5B6.1. Income from aquaculture

2. Which product has your household harvested? Aquaculture raising (fish, shrimp, shrimp and fish breedings, other water products)...1, aquaculture catching (fish, shrimp, other water products, receiving from other water product service)...2
3. How much [...] has your household sold, used for payment, exchanged, given as present in the last 12 months?
4. How much [...] has your household consumed for your household in the last 12 months?
5. How much [...] did you use for other purpose in the last 12 months? (including for preliminary processing, used as materials, for production,...)
6. Total income from livestock in the last 12 months

Part 5B6.2. Expenditure on planting and growing aquacultural products

Please provide us with information on your expenditure on livestock that your household has raised in the last 12 months? (including all kinds of expenses on purchase, barter, receive,...)

7. Breed of raising, catching, service
8. Foods
9. Non-durable items
10. Energy, fuel (electricity, petrol, rude oil,...)
11. Small repair, maintenance
12. Depreciation of fixed assets
13. Rent and bid for land use
14. Rent of asset, machinery equipment, other means of production
15. Payment for laborers
16. Payment for medicine for aquacultural products
17. Payment of loan interest
18. Turn-over tax
19. Other expenses (fees, postage,...)
20. Total expenditure (7+...+19)
21. Remained amount of aquacultural production for use and sales?

Part 5C. Non-farm, non-forestry and non-aquaculture businesses; farm, forestry and aquaculture product processing

1. In the last 12 months, did your household do any non-farm, non-forestry and non-aquaculture businesses? Yes...1, No...2

Part 5C.1. Income from non-farm, non-forestry and non-aquaculture businesses; farm, forestry and aquaculture product processing

2. Please provide us with detailed information on these activities
3. Person who knows most information
4. How many months did this activity in operation?
5. What is the average monthly turnover of selling goods and services?
6. Turnover
7. Was there any product which you consumed in the last 12 months?

8. What was the value of the consumed product?
9. Total
10. Did you have business license for this kind of activity?

Part 5C.2. Expenditure for non-farm, non-forestry and non-aquaculture businesses; farm, forestry and aquaculture product processing

Could you please provide information on your expenditure for non-farm, non-forestry and non-aquaculture businesses in the last 12 months? (including for self, buying, bartering, being given,...)

11. Material sub-material?
12. Non-durable things?
13. Electricity, petrol, oil, fuel, water,...?
14. Small repair, maintenance
15. Fixed assets depreciation
16. Rent of factory, workshop, machine, or other tools?
17. Labor cost for outside?
18. Loan interest?
19. Turnover tax, fee for business registration
20. Other expenses? (postage, travel, advert, marketing, sample buying, surveying, products insurance)
21. Total expenditure (11+...+22)
22. Total value of remained products kept for use and sales

Part 5D. Other sources of income

Part 5D.1. Other incoming money which is considered as income

1. Has anyone in your household received money or inking from the following source? (Remittance and value of in-kind presents from overseas...101, domestic remittance and value of in-kind presents...102, pension, sickness and one-time job loss allowance...103, social insurance allowance...104, other income from social insurance...105, interest of savings, shares, coupon, loans...106, income from workshop, machinery, assets, tool....107, others (lottery, charity, and support from other organizations)...108) Yes...1, No...2. If yes, go to questions 2.
2. What was the value during the last 12 months?

Part 5D.2. Other incoming money which is not considered as income

1. Has anyone in your household received money or inking from the following source? (selling machine, equipment, workshop, house, tools, right of land ownership transfer...201; selling gold, silver, precious stone, jewelry...202; withdrawal from savings, stocks,...203; borrowing on interest, advance payment...204; others...205) Yes...1, No...2. If yes, go to question 2.
2. What was the value during the last 12 months?

Section 6: Expenditure

Section 6. Part A. Expenditure on food and drinks

Part 6A1. Expenditure on food and drinks during holidays

1. Which of the following things did you consume during the holidays in the last 12 months? Fragrant, special rice...101, glutinous rice...102, pork...110, beef...111, buff...112, buffalo's meat...113, duck and other cattle meat...114, other meat (goat, dog, lamb, game meat, bird...)...115, processed meat (pork pies, roasted meat, sausage,...)...116, fresh fish, shrimp...118, other seafoods (crab, snails,...)...120, chicken or duck eggs...121, beans...124, fruit...134, sugar, molasses...139, cakes, candy, candied fruits...141, alcohol, beer...145, beverages...146, canned or bottled refreshment...147, coffee...150, tea...151, cigarettes, tobacco with water pipe...155, outdoors eating...157, other things (processed foods, extra foods, spice,...)...158. If yes to question 1, go to question 2 and 3.
2. Value and Quantity bought or bartered
3. Value and Quantity self-made or received

Part 6A2. Daily expenditure on food and drink

1. In the last 12 months, apart from holidays' time, which of the following did you consume? Fragrant, special rice...101, glutinous rice...102, corn/maize (weight of kernels)...103, cassava (fresh equivalent)...104, sweet and ordinary potatoes (fresh equivalent)...105, bread, wheat or wheat flour...106, noodle, instant noodle, instant rice soup...107, wheat/egg noodle (dry)...108, fresh rice noodles...109, arrow root noodles...110, pork meat (inedible part removed)...111, beef and buffalo meat (inedible part removed)...112, chicken...113, duck and other poultry...114, other meats (goat, lamb, game meats, birds,...)...115, processed meat...116, grease, oil...117, fresh fish, shrimp...118, dried and processed fish and shrimp...119, other sea foods (crab, snails,...)...120, chicken and duck eggs...121, tofu...122, peanuts, sesame seeds...123, beans...124, various kinds of fresh pea...125, water morning glory...126, kohlrabi...127, cabbage...128, tomatoes...129, other vegetables (calabash, pumpkin, cucumber,...)...130, oranges...131, bananas...132, mangoes...133, other fruit (rambutan, papaya, melon,...)...134, fish sauce and dipping sauce...135, salt...136, spices, condensed soup...137, seasoning, spice...138, sugar, molasses...139, chewing gum...140, cakes, candy, candied fruits...141, condensed milk, powder milk...142, cream, yoghurt...143, fresh milk...144, alcohol, beer...145, beverages...146, bottled and canned refreshment...147, fruit juice, bottled, canned without gas fruit juice...148, bottled and canned purified water...149, bottled and canned tonic water...150, instant coffee...151, powder coffee...152, powder tea/instant tea...153, cigarettes, tobacco with a water pipe...154, betel leaf, areca nut, lime...155, betel and areca...156, outdoors meal (breakfast, lunch, dinner)...157, others...158. If yes to question 1, go to question 2 to 10.

2. In the last 12 months, apart from holidays' time, did your household buy or barter anything mentioned in question 1?
3. How many times each month (average) in the last 12 months?
4. What was the average amount you bought or bartered each time?
5. What was the value each time?
6. Value you did buy in the last 12 month.
7. In the last 12 months, did your household consume the self-made or given things?
8. How many months you did you consume?
9. Total quantity of self-made or given things did your household consume in these months?
10. What was the total value did your household consume?

Part 6B. Expenditure on non-food and non-drink and other expenditure

Part 6B1. Expenditure on daily consumption

1. In the last 12 months, apart from holidays' time, which of following did you consume? Pocket money for children...201, coal, wood, sawdust, chaff...202, gas...203, kerosene for cooking or light...204, gasoline, lubricant and grease for motor vehicles (car, motorcycle)...205, bicycle, motorcycle or car tending...206, matches, candles, flint...207, washing powder softening liquid...208, disk washing liquid, house cleaning liquid...209, shampoo, conditioning...210, bath soap, liquid...211, lotion, powder and lipsticks...212, toothpaste, tooth brush...213, toilet paper, razorblades...214, books, newspaper, magazines...215, flowers...216, entertainment (cinema, video, sports)...217, lottery tickets...218, regular worship...219, haircut, hairdressing...220, other daily expenses...221. If yes to question 1, go to question 2 to 5.
2. How many months did you buy in the last 12 months?
3. How much did you buy each month?
4. How much did you buy in the last 12 months?
5. How much did you self make in these months?

Part 6B2. Annual expenditure

1. In the last 12 month, which of the following did your household consume? Fabric...301, ready-made clothing (incl. underwear)...302, mosquito net and netting...303, face towel, scarves...304, rush mats, blankets, pillows...305, other sewing materials and garments (needles, thread, sock)...306, tailoring or laundry service...307, shoes, sandals, wooden clogs...308, nylon sheeting, hats, umbrellas...309, light bulbs, electric wire, plugs, fuse...310, porcelain and glass bowls, plates, teapots and cups...311, pans, pots, bins, buckets, basins...312, vacuum thermos and liner...313, bags and baskets...314, lighter, flashlight, battery...315, cradle, hammock, pram...316, other household items (exclude durable goods)...317, bike tires, tubes, bicycle spare parts...318, motorbike, car tires, tubes, motorcycle, car spare parts...319, maintenance and repair of living tools...320, boat, bus, train, taxi, transportation fees...321, pictures, photos, houseplants...322, sport instruments...323, toys...324, envelopes, stamps,

telephone, postage...325, internet...326, cosmetic surgery, body building...327, excursion, holidays...328, jewelry, watch, makeup...329, other cultural activities...330, hiring domestic services...331, other annual expenses...332. If yes to question 1, go to question 2 and 3.

2. Value of purchase in the last 12 months.

3. Value of self make in the last 12 months.

Part 6B3. Other expenses included in expenditure

1. In the last 12 month, which of the following did your household spend on? Contributions to various funds (fund for natural relief, cooperation fund, poverty fund, education enhancement fund...)...401, public labor contribution...402, all kinds of taxes (excl. production tax)...403, wedding...404, funeral and worship on special occasions of members of the household...405, arrange parties (to celebrate birthday, completion, reception...)...406, give, donate, support (cash and inkind)...407, other expenses...408. If yes to question 1, go to question 2.

2. Value of purchase, self make in the last 12 months.

Part 6B4. Other expenses not included in expenditure

1. In the last 12 month, which of the following did your household spend on? Lend money, pay debt, return advance (incl. payment for interest)...501, contribute to revolving credit group, buying shares, certificate and stock...502, purchase of gold, silver, precious stone, foreign currency for saving purpose...503, saving account...504, life, security insurance...505, other insurance (excl. life, security, health insurance)...506, outstanding investment (housing, incomplete production workshop...507, other expenditure (specify_____)...508. If yes to question 1, go to question 2.

2. Value of purchase, self make in the last 12 months.

Section 7: Fixed assets and durable things

1. Kindly let us know what kind of following things do you have? Perennial crops garden...1, aquaculture production area...2, other production land area...3, buffalo, cow, horse for production and breeding...4, breeding male and female pig...5, basic poultry, cattle...6, breeding facilities...7, feed grinding machine...8, rice milling machine...9, rice pulling off machine...10, pesticide spurring machine...11, rice cooling box...12, workshop...13, shop...14, other production base...15, car...16, pulling machine...17, trailer...18, a plough...19, motorbike...20, bicycle...21, wagon...22, motor boat, ferry...23, boat, ferry without motor...24, other means of transportation...25, lathe, welding, cutting machine...26, sewing, casting machine...27, wooden sewing machine...28, pumping machine...29, power generator...30, printer, photocopy machine...31, fax machine...32, telephone...33, sewing, weaving, embroider...34, other machine and equipment...35, fishing net...36, goods keeping things...37, other professional equipment...38, video...39, color T.V....40, black white T.V....41, sound system...42, radio/cassettes...43, recorder...44, computer...45, camera, video...46, refrigerator, freezer...47, air-conditioner...48, washing, drying

machine...49, electric fan...50, water heating machine in the bathroom...51, gas cook...52, electric cook, rice pan, airpressure pan...53, troller (various kinds)...54, wardrobe (various kinds)...55, bed...56, chair, table, sofa...57, vacuum cleaner, exsiscate...58, other valuable things (antique, piano, organ, dressing table)...59.

2. Name of assets, durable things

3. When did your household buy/receive?

4. What was the value when you bought/received?

5. What is the current value?

6. What is the using purpose?

7. What is the time proportion for production and living in the last 12 months?

Section 8: Housing

Pls. provide us with some information on your housing.

1. How many houses/flats are you living in?

2. What is the total living area?

Including bedrooms, dining room, sitting room, learning rooms, playing room

Excluding bathrooms, toilets, kitchens, stores, business rooms

3. What type of your household's main dwelling? A city house surrounded by a garden...1, permanent house or apartment with private bath/kitchen/toilet...2, permanent one-story house or apartment with separate bath/kitchen/toilet...3, semi-permanent house...4, temporary house...5.

4. How long have you been living in this house?

5. What type of house did you use to live before? A city house surrounded by a garden...1, permanent house or apartment with private bath/kitchen/toilet...2, permanent one-story house or apartment with separate bath/kitchen/toilet...3, semi-permanent house...4, temporary house...5.

6. Where did you live before? In this place...1, other place but in the same ward/commune...2, in other ward/commune, but in the same province/city...3, in other city/province...4.

7. Does this house/apartment belong to you? Yes, totally...1, yes, partly...2, no...3.

8. Do you have to pay for house rent? Yes...1, No...2.

9. Who do you pay rent mainly for? Government...1, relatives...2, private landlord...3, other (specify_____)...4.

10. How much did you pay rent for your dwelling in the last 12 months? (in cash and in kind)

11. What is the current price of your dwelling?

12. Apart from this dwelling, do you have any other landlot or house/flat? Yes...1, No...2.

13. Do you have any income from renting this landlot or house/flat? Yes...1, No...2. 14. How much did you earn for renting this landlot or house/flat in the last 12 months? (in kind and cash)

15. What is the current price of this landlot or house/flat?

16. Is there any land or house/flat did you buy? Yes...1, No...2.

17. When was the last time of purchase?
18. Do you have any newly built house/flat completed in the last 12 months?
Yes...1, No...2.
19. What were the expenses for construction from starting to completion?
20. Expenses in the last 12 months for that construction.
21. What were the expenses on big reparation, renovation, improvement of your house/land in the last 12 months? (write 0 if no expenses)
22. What were the expenses on small repair in the last 12 months (incl. painting...)?
(write 0 if no expenses)
23. What is the main source of your drinking water? Individual tap...1, public tap...2, bought water (in tank, bottled or in a jar)...3, deep drill well with pump...4, hand dug well, constructed well...5, filtered spring water...6, deep well...7, rain water...8, river, lake, pond...9, other (specify_____)...10.
24. Do your household use purifying tank or mechanical to purify this drinking water? Yes...1, No...2.
25. Do you have to pay for this water? Yes...1, No...2.
26. How much did you have to pay for this drinking water in the last 12 months?
27. What type of toilet does your household have? Flush toilet with septic tank/sewage pipes...1, suilabh...2, double vault compost latrine...3, toilet directly over the water...4, other...5, no toilet...6.
- 27a. What is the toilet cover made of? Clay, clay brick...1, covered with cement...2, paved with enameled tiles...3, other (specify_____)...4.
28. What is your main source of lighting? Electricity...1, battery lamp, resin torch...2, gas, oil, kerosene lamp...3, other (specify_____)...4.
29. Did you have to pay for living electricity in the last 12 months? Yes...1, No...2.
30. How much did you pay for electricity used for living purpose in the last 12 months?
31. How did your household dispose garbage in the last 12 months? Collected...1, dumped in river/lake...2, dumped in a side nearby...3, other (specify_____)...4.
32. Do you have to pay for garbage disposal? Yes...1, No...2.
33. How much did you pay for garbage disposal?
- 33a. Sum of expenses on housing, electricity, water .
34. Do you have a TV? Yes...1, No...2.
35. What channels can you receive? VTV1...1, VTV2...2, VTV3...3, Cable...4, home city...5, other city...6, others...7.
36. Which channel do you usually watch?
37. What time do your household usually watch TV? Before 8 a.m....1, 8-<11 p.m....2, 11-<14 p.m....3, 14-<17 p.m....4, 17-<19 p.m....5, 19-<21 p.m....6, after 21 p.m....7.
38. What are the most favorite 3 TV channels in your household? News...1, film...2, music...3, sport...4, quiz...5, wild life...6, teenagers...7, other (specify_____)...8.

39. Do you have a radio? Yes...1, No...2.
40. What channel can your radio receive? TNVN channel am...1, TNVN channel pm...2, home city...3, other city...4, others...5.
41. What channels does your household usually listen to?
42. What time does your household listen to radio? Before 8 a.m....1, 8-<11 p.m....2, 11-<14 p.m....3, 14-<17 p.m....4, 17-<19 p.m....5, 19-<21 p.m....6, after 21 p.m....7.
43. What are the most favorite 3 radio channels in your household? News...1, people's army...2, music...3, telling story...4, program for teenagers...5, arts...6, other (specify.....)...7.
44. Which newspapers, magazine can you buy or borrow in the commune/ward? People...1, labor...2, women...3, army...4, police...5, sports...6, legal...7, pioneer...8, youth...9, life and science...10, world security...11, teenagers...12, children...13, arts...14, union...15, communist...16, knowledge...17, fashion...18, funny youth...19, pupil's flower...20, family and society...21, life and health...22, market...23, buy and sell...24, home city...27, other cities...28, others...29.
45. What are the three newspapers which your household usually read (including ones you buy and borrow)?
46. Do your household have a computer? Yes...1, No...2.
47. Are you linked to Internet? Yes...1, No...2.

Section 9: Participation in poverty alleviation programs

1. Are you a family of invalids, sick war veterans, martyr, Vietnamese heroic mothers? Yes...1, No...2.
2. Are you a family of lonely elderly, disabled who receive regular social subsidy? Yes...1, No...2.
3. Are you classified as a poor or very poor household by the commune authorities? Yes, poor household...1, yes, very poor household...2, don't know...3, no...4.
4. In the last 12 months, has any household member been provided with free health insurance? Yes...1, No...2.
5. In the last 12 months, has your household been provided with poor household certificate by the commune authorities? Yes...1, No...2.
6. In the last 12 months, has any household member used the poor household Certificate for Health consultation, treatment and were exempted from or gotten any fee reduction? Yes, got fee exemption, reduction...1, yes, did not get any fee exemption, reduction...2, no...3.
7. In the last 12 months, did you receive any assistance from the State mass organization, associations to repair, construct dwelling? Yes...1, No...2.
8. What was the value of assistance?
9. Were you exempted from agricultural land use tax in the year 2001? Yes...1, No...2.
10. Were you exempted from agricultural land use tax in the year 2001? Commune authorities have not implemented...1, do not know...2.

11. Have you ever been provided with loan in the last 12 months? Yes...1, No...2.
12. What is the source of your loan? Bank for the poor...1, bank for agriculture and rural development...2, other banks...3, national employment funds...4, mass credit associations...5, socio-political organizations...6, private...7, relatives, friends...8.
13. What is the value of loan in the last 12 months?
14. What is the term of the loan?
15. What is the interest?

Source: General Statistics of Vietnam