Geography and Economic Growth in Vietnam

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Abstract

Using panel data from Vietnam, this paper estimates the determinants of consumption growth for the period 2002-04, using a microgrowth model. While controlling for individual heterogeneity, particular attention is devoted to the question of whether geography, broadly defined to include natural and man-made characteristics at the level of the commune, can be responsible for lower growth rates and, consequently, poverty persistence. We find very limited support for this hypothesis. Neither public nor private investment at commune levels seem to have, per se, a significant effect on growth. However, local poverty rate does have an important, nonlinear, relation with growth rate of consumption at individual level, suggesting the importance of local externalities in this process. The policy implications of this finding are discussed.

1 Introduction

The recognition that "growth is good for the poor" (Dollar and Kraay, 2001), has been accompanied by the parallel recognition that growth is an inherently unbalanced process (Ray, 2010) and that, as such, the benefits of growth will be heterogeneous across individuals, sectors and regions. At a global level, that discussion led to the recognition that modern economic growth been characterized by large divergences in income level (Pritchett, 1997). In a parallel way, and at a lower level of aggregation, it has driven the recognition that poor areas will persist even in the presence of rapid growth which, in turn, has driven the discussion about the extent, the significance and the effect of "pockets of poverty", summarized under the question of whether there are poor regions or only poor people (Ravallion and Wodon, 1999).

The answer to this question matters at two levels. The first concerns the adequacy of using geography as a targeting indicator for interventions directed at poverty alleviation (Elbers et al., 2007, Baker and Grosh, 1994). The second, perhaps more important, starts from the view that poverty is a dynamic concept (Baulch and Hoddinott, 2000). Policies that are targeted at the already poor can achieve temporal relief but would do little to prevent falling into poverty and eliminate poverty persistence if they do not address the deeper determinants of poverty (Krishna, 2007). This approach to poverty policy could potentially lead to effective measures that would reduce poverty but requires the credible identification of the causes for falling into or escaping poverty. Under this approach, pockets of poverty may matter most if they are a cause of poverty persistence or, in the words of Ravallion and Jalan (1996, p.227), if it is the case that "people are having a harder time escaping poverty just because they live in a poor areas and not because of their own characteristics".

There are two main explanations for why location, or geography, may explain poverty persistence. The first, and perhaps more obvious, is that geographical characteristics (natural characteristics such as topography, climate or natural soil fertility) alter the returns to privately owned assets and, as such, are actually responsible for differences in growth in household living standards. Although the clearest statement of the capacity of natural geography to create large divergences in growth comes from outside economics (Diamond, 1997), this hypothesis has been intensively discussed in the macroeconomic growth literature (Sachs et al., 2004). In Bloom, Canning, and Sevilla (2003), geography is shown to be a source of multi-

ple equilibria and poverty traps (as in Murphy, Schleifer, and Vishny, 1989, Azariadis and Drazen, 1990) by leading to thresholds at which returns to assets are locally increasing.[1] An important extension to this line of work seeks to understand the importance of local public goods, such as reliable access to roads or electricity, or the presence and regularity of markets, in determining the returns to private assets (Ravallion and Jalan, 1996, Escobal and Torero, 2000, Dercon, 2004).

The second explanation, is that geographic concentration of economic activity creates externalities that affect growth. It plays a central role in urban economics (Glaeser, 2010) and in the new economic geography literatures (Krugman, 1998, Anselin, 2003) but, until recently (WB, 2009), has been relatively less explored in the development economics literature.

The increased availability of panel data on microeconomic units, namely households, has allowed for these ideas to be tested at a micro level, with attention being paid to the importance of natural geography, community capital but also spillover effects. Escobal and Torero (2000), Ravallion and Jalan (1996), Jalan and Ravallion (2002), and Dercon (2004) are examples of such work.

Jalan and Ravallion (2002) use farm household panel data to test for geographic poverty traps in the context of growth in rural China, while controlling for latent heterogeneity through the estimation of a dynamic model. Dercon (2004) uses several rounds of the Ethiopian Rural Household Survey to construct a panel of growth rates and test for the effect of covariate

[1] The possibility that geography would create different convergence clubs (as in Baumol (1986) and Delong (1988)) is also discussed, but finds no empirical support in the data.

shocks (specifically, drought at regional level) on subsequent growth in rural Ethiopia. Conclusions from these studies confirm that geographic factors, both natural and man-made (community infrastructure such as roads), could account for differences in growth in living standard of households across regions.

Finally, Escobal and Torero (2000) test for the presence of persistent spatial concentrations of poverty caused by geography in Peru. Using panel data, with time invariant fixed effects at the household and province level, they again estimate a model of consumption growth that takes into account the possibility that not only private assets but also public assets (natural geographic characteristics and the presence of public goods) matter for the growth rate of consumption. Contrary to the studies mentioned previously, the authors conclude that public goods, not natural geography, are responsible for sharp differences in growth rates, with geography possibly playing an indirect role through an effect in the provision of public goods.

This paper addresses these different hypotheses empirically, in the context of Vietnam in the 2000s. In particular, it attempts to disentangle the separate contributions of natural characteristics, community public goods and initial poverty rate on the rate of growth of private consumption. Vietnam is an interesting case study because it has successfully achieved rapid economic growth since the 1990s (GSO, 2000) that was also accompanied by growing inequality (Glewwe and Nguyen, 2002) and the persistence of pockets of poverty, particularly in the remote northern and central highlands (Minot and Baulch, 2005).

The remaining of this paper proceeds as follows. The next section

presents the empirical framework. As the previous literature, our approach is to estimate an empirical growth model along the lines proposed by Mankiw, Romer, and Weil (1992) using microeconomic data. The criticisms of this approach in the growth literature are well known (Quah, 1996, Durlauf, Johnson, and Temple, 2004) and we focus on one of them, the possibility of nonlinearities in the growth equation. Following Liu and Stengos (1999), we use the the partially linear model proposed by Robinson (1988) to take that possibility into account, focusing in particular on the effect of local poverty rate.

The data used is briefly described in section 3, with particular attention being devoted to the interpretation of the geographic variables. The empirical results, presented in section 4, suggest that geographic variables effect in terms of public assets or private investment. However, local poverty rate influences growth at micro level: households living in poor areas do have a harder time because they live there, even after accounting for individual and community assets. We conclude with a discussion of the policy relevance of these results, in particular with respect to the implications on geographically targeted programs and migration of the poor.

2 Empirical Framework

As with previous studies (for example Jalan and Ravallion, 2002, Escobal and Torero, 2000, Dercon, 2004), we use the empirical framework proposed by Mankiw, Romer, and Weil (1992) and estimate a growth model of household consumption. The equation we are interested in estimating is:

$$lnC_{ic1} - lnC_{ic0} = \alpha + \beta\, lnC_{ic0} + \delta\, X_{ic0} + \gamma\, Z_{ic} + \varepsilon_{ic0} \qquad (1)$$

where C_{ic0} and C_{ic1} are per capita consumption of household i, in community c at time t $(1, 0)$ and $lnC_{ic1} - lnC_{ic0}$ is the rate of consumption growth over time. On the right hand side, X_{ic0} is a vector of time-variant household variables (for example, household composition) and Z_{c0} is a vector of time-invariant characteristics (for example, ethnicity) that may determine savings rate or investment. Finally, ε_{ic0} is the mean-zero error term. In interpreting the empirical estimates, β is the convergence rate towards the consumption steady state, with a negative estimate supporting the hypothesis of conditional convergence - that is, that consumption growth at an individual level would be negatively related to its starting level of per capita consumption.

Ravallion and Jalan (1996) argue that this formulation does not allow for the consideration of two mechanisms through which growth can occur: the effects of individual capital endowments on the individual growth process (which is the usual interpretation of β) and the possibility that the microgrowth process may be driven entirely by intra-community externalities. Under this alternative hypothesis, "individual growth prospects may be better in an initially better-off region through positive local spillover effects controlling for individual's initial conditions" (p.228-229). Dercon (2004) explore this idea by rewriting equation 1 as

$$lnC_{ic1} - lnC_{ic0} = \alpha + \beta\,(lnC_{ic0} - ln\overline{C}_{ic0}) + \beta_1 ln\overline{C}_{ic0} + \delta\, X_{ic0} + \gamma\, Z_{ic} + \varepsilon_{ic0} \qquad (2)$$

which, under the assumption of constant returns to scale to capital goods, and with a slight abuse of notation, is equivalent to

$$lnC_{ic1} - lnC_{ic0} = \alpha + \beta\, lnk_{ic0} + \beta_1\, lnk_{c0} + \delta\, X_{ic0} + \gamma\, Z_{ic} + \varepsilon_{ic0} \qquad (3)$$

where k_{ic0} is the initial per capita stock of household capital (land, livestock, human capital) and k_{c0} is the per capita stock of community capital (representing conditions such as area topography, public infrastructure, the presence of (non-farm) private investment). We are especially interested in estimating the effects of geographical variables and their (presumably indirect) influence on household consumption growth. In the next section we discuss in more detail the variables that we have available to capture each of the dimensions through which geography may matter to growth but it is worth emphasizing the analysis of the influence of the neighborhood living standards on household consumption growth.

As mentioned (for example, Ravallion and Jalan, 1996), the intuition for the inclusion of these variables is that households surrounded by poor neighbors will have less opportunities to grow and diversify because economic opportunities are limited. We capture the potential importance of such externalities is introduced through the inclusion of local poverty rate as an additional regressor in equation 3. Its estimate would reflect the impact of the proportion of the commune which is poor on individual consumption growth.

As with other empirical applications of growth regressions, the validity of

the above estimates is subjected to several criticisms (Quah, 1996, Durlauf, Johnson, and Temple, 2004). In this work, we are particularly interested in the possibility of relaxing the assumption of a linear effect of the economic environment on individual growth rates. Following Liu and Stengos (1999), equation 3 can then be rewritten as

$$lnC_{ic1} - lnC_{ic0} = \alpha + \beta\, lnk_{ic0} + \beta_1\, lnk_{c0} + \delta\, X_{ic0} + \gamma\, Z_{ic} + \phi(PR_{c0}) + \varepsilon_{ic0} \quad (4)$$

which formalizes the assumption that one variable (local poverty rate) has a general nonlinear effect on the growth rate, through the function $\phi(\bullet)$, while assuming that the effect of other variables is linear. Equation 4 can then be estimated using the semiparametric partially linear regression model introduced by Robinson (1988).

3 Data

We use the 2002 and 2004 rounds of the Vietnam Household Living Standard Surveys (VHLSS) to understand the determinants of growth at microlevel during this period. These surveys covered 29,530 and 9,188 households, respectively, and are representative at the national, rural and urban, and regional levels. A subsample of 4,800 households interviewed in 2002 were also re-interviewed in 2004, forming a short panel which is representative of the whole country and at the urban and rural levels. In the rest of the paper, we focus on growth in rural areas and limit the attention to the 3065

rural households interviewed in both rounds.

The surveys provide information on household characteristics, including demographic characteristics, employment and labour force participation, education, health, income, expenditures, housing, fixed assets and durable goods and participation of households in poverty alleviation programmes. In addition, the surveys have detailed data on commune characteristics, from demographic information and general situation of communes, general economic conditions and aid programmes, up to the importance of non-farm employment, agriculture production, local infrastructure and access to transport, education and health, as well as the participation in anti-poverty programs. Important in our analysis, the surveys also provide information regarding the number of poor people in each commune, which we can use to estimate the local poverty rate.

Consumption expenditure per capita, rather than income, is the preferred welfare indicator. This choice of consumption over income as welfare indicator is mostly determined by data availability and reliability, since in developing countries information on income is difficult to collect due to the small importance of formal sector wages and salaries (Deaton and Grosh, 1998).[2] Consumption expenditure is valued at 2002 real prices, with adjustments made to take into account the time and location of the interview, through the use of monthly deflators and regional price indices. Household expenditure was converted to per capita expenditure through the use

[2]Consumption expenditure includes expenditure in food and non-food items. Food expenditures include purchased food and foodstuffs and self-produced products of households. Non-food expenditures comprise expenditures on education, health care, houses and commodities, and expenditures on power, water supply and garbage.

of an adult equivalence scale, as well as economies of scale, specific to the Vietnamese context, provided by White, Masset, and Edoardo (2002).[3]

Table 1 presents descriptive statistics for the household variables that will be included in the estimation of equations 1 and 2. These include, growth rate of consumption, land, livestock [4] and education. Education is measured by years of education of the household head and, in those cases where s/he has not completed formal education, whether s/he can read.

Selected commune variables are listed in table 2 and can be grouped into different categories which are defined as region (whether the commune is on low or high mountains, and whether it is in a coastal area), ethnicity (as measured by the main ethnic group of the commune), public infrastructure (whether the commune has access to roads, to electricity, to transportation, whether markets are daily or at least periodic and whether malaria is the major health problem), and presence of (non-farm) private investment.

Data on household and commune variables can be further disaggregated with reference to communes being classified as poor in 2002[5] The differences between poor and non-poor communes are presented in table 3. As expected, one of the significant disparities between poor and non-poor communes is that the poverty rate is much higher (almost 16% increase in poverty rate) in poor communes.

[3] White, Masset, and Edoardo (2002) provide the values of Adult Equivalent Scale, combined with economies of scale, as follow: family with one adult = 1, incremental cost of one adult = 0.70 and incremental cost of one child =0.50.

[4] We use the general Tropical Livestock Unit (TLU) used for Asia to quantify different livestock types and sizes in one common unit. The conversion factors are 0.5 for water buffalo and cattle breed, 0.25 for pigs and pigs breed, and 0.01 for poultries.

[5] Poor communes are defined here as those targeted by the Programme 135 (P135), a programme established in 1998 and targeted at the most vulnerable communes.

These differences in poverty rate reflect other differences at the level of household endowments as well as community characteristics. Individuals living in poor communes have, on average, much lower consumption (36% lower, statistically different at the 10% level of significance), more agricultural land (but with lower quality, as measured by the percentage that is irrigated), much lower education and low basic literacy skills. The only exception seems to be livestock ownership.

There are also regional differences, as noted by other authors. Non poor communes are often found in the Delta areas, while the poor communes are often located in the mountainous areas especially in High Mountain and Remote Areas. A slightly higher fraction of the non poor communes are also found in the Coastal area however the difference should be noted with caution since it is at a low level of significance. Another distinctive feature that separates the poor and the non poor communes is ethnicity: most of the nonpoor communes are of Kinh ethnicity, while most of the poor communes are of Tay, Thai, Muong and other ethnic minorities.

Poor and non-poor communes are similar in terms of road access (as measured by the number of months in which road is impassable), but quite distinct in other measures, particularly with respect to the economic environment in which people live: poor communes have significantly less access to daily markets (although not to other periodic markets) and a much higher presence of non-farm businesses with more than 20 permanent employees (either receiving Foreign Direct Investment or not) as well as of other enterprises.

These differences are more or less expected. The question then is whether

they have consequences not only in terms of describing living standards in one period, but also in determining the dynamics of living standards. Analysing the level of economic mobility at micro level, using a transition matrix between the five quintiles of the distribution of real consumption, between the period 2002 and 2004, allows us a first approach to that question. Results, for the entire rural subsample, are presented in table 4.

From the probability matrix table 4, we can identify two distinctive features that characterize economic mobility for these households. Firstly, more than half (63%) of households with initial consumption in the lowest quintile remain in that position in 2004. Similarly, a similar pattern could be inferred for households with initial consumption in the highest quintile. Secondly, for all other quintiles, the image that is obtained is one of relatively higher levels of mobility, which may reflect both measurement error or simply the effect of shocks (and/or the process of recovering from such shocks).

From the comparison of the two transition matrices presented in table 5 and table 6, there is a distinctive pattern on economic mobility as a function of whether they live either in poor or non-poor communes. When comparing the probability of households remaining in the lowest quintile of consumption, it can be noted that mobility is much lower in the poor communes, where only 22% of households in poor communes are able to move into the succeeding consumption quintiles compare to 46% of those in non-poor communes. On another hand, those households that are in the high consumption quintile in poor communes also have a lower chance of maintaining their current living standards (57%, lower than the 61% for those living in non-poor communes). One conclusion of this comparison is that

poverty is more persistent in poor communes. Therefore the design of an effective policy directed to poverty alleviation seems to require the previous identification of the fundamental factors that lead to this lower mobility. In the next section, we present the empirical results of the effect of household and commune variables on household consumption growth.

4 Empirical Results

The empirical results are presented in table 7. We start by estimating a specification of equation 1 that is simply a function of initial consumption (column 1). We then augment this model with two sets of variables, that measure different types of community assets and effects. In column 2, we include those variables that are not easily manipulable by policy (region and ethnicity), while in column 3 we include those that are more frequently the object of discussion of policy interventions (infrastructure, market access, economic diversification in rural areas). In column 4 we merge these two sets of variables and in column 5 we include, as an additional regressor, the local poverty rate. In column 6 we address the possible suspicion of endogeneity, by replacing initial consumption per capita with asset ownership per capita. And finally, in column 7 we address the possible non-linear effects of poverty rate, by estimating equation 6 as a partial linear model.

The empirical estimates of the effect of initial consumption on consumption growth are consistent with the principle of diminishing returns underlying the Solow model (Durlauf, Johnson, and Temple, 2004), usually interpreted as a sign of convergence to a common steady state. Throughout

the different specifications, the effect of initial consumption is also relatively stable, varying from -0.23 (in the simplest model, presented in column 1) to -0.29 in the extended model (column 5). The same is true in the specifications presented in columns 6 and 7. The only asset that seems to have a statistically significant effect on the rate of growth is land, with estimates that are quite similar regardless of the way we estimate the model (as a linear model or as a partial linear model).

The estimates for models (2) to (5), which correspond to empirical growth models that include communes' variables as additional explanatory variables of the growth rate of consumption (region and ethnicity, and public infrastructure and non-farm/private investment), are a bit discouraging if the purpose of this paper was to identify growth correlates that are amenable to policy intervention. In column 3, only access to electricity, malaria and the presence in relatively large private firms that do not benefit from Foreign Direct Investment seem to have a significant effect on growth at micro-level, with the expected sign for the first two (we had no expectation regarding the effect of the last one). However, once we add controls for region and ethnicity, the significance of these variables disappears and only presence of non-FDI firms seems to matter, and even then, only at the 10% significance level. The variables measuring natural geography (being in a high mountain has a negative effect on growth) and ethnicity(being in a community that is mainly kinh, the principal ethnic group) clearly explain differences in growth rate, even after including poverty rate (column 5) or replacing initial consumption with initial levels of assets per capita (column 6). Interestingly, some of these conclusions change when we re-estimate this last specification

using a partial linear model: natural geography is no longer important, the effect of access to periodic transport becomes significant and the importance of ethnicity is greatly increased.

Poverty rate remains significant, but a more interesting finding is the shape of the (nonlinear) relation between poverty rate and the rate of consumption growth, presented in figure 5 and that we interpret as the effect of effect of the externalities associated with the different importance of surrounding poverty (changing proportion of poor people) on changes in living standards. This relation is characterized by a relatively flat region for poverty rates between 0 and 20% indicating that up to that level of poverty, changes in surrounding poverty will not affect individual's growth in consumption. In this interval, the marginal effect of poverty rate is quite high and positive. If poverty is above 20%, increases in poverty diminish individual's growth. It seems that in these cases, people do have a harder time escaping poverty because they are surrounded by poor people.

Overall, there are three main points to the discussion. Firstly, the important finding that growth rate of consumption at micro level in Vietnam is mostly affected by ethnicity (living in a community where the main ethnic group is Kihn) and the local poverty rate. We find no empirical evidence in favor of the hypothesis of poverty traps associated with geographical characteristics, particularly those associated with characteristics that can be easily addressed by policy. Secondly, and as a consequence, our results offer no support for the hypothesis that there are large returns from public infrastructure or non-farm/private investment for rural poor.

Although we have already included a large number of controls that ad-

dress many of the correlates of growth at micro-level identified in previous studies, it is of course possible that poverty rate in the community is proxying for something else.[6] If we take a causal interpretation of this result then our third result, of a non-linear relationship between poverty rate and consumption growth is potentially useful in providing insights into more adequate anti-poverty policies. We illustrate this claim taking migration as an example, but other policies can potentially be affected by similar intuition.

Given the shape of the relation between neighborhood poverty and individual's growth in living standards, an interesting conclusion that could be inferred relates to the possible overall positive effect of migration of poor people from poor to non-poor areas. In particular, if poor households from poor communes (which are located at the right end of the graph) relocate into a wealthier commune, that would benefit the remaining households (as the poverty rate in the sending region would decrease) and would have no significant (negative) externality imposed on those households living in the recipient areas (where poverty rate could be lower than 20%). As a result, such migration could increase the aggregate consumption growth.

5 Conclusion

For the past 20 years, the annual growth rate of the Vietnamese economy averaged to 7 percent. However this success was not enjoyed by everyone, as evidenced by disparities in poverty rate across ethnicity and regions. This paper empirically studies the determinants of growth of consumption, using

[6] Although we have left out, for the moment, two important determinants of growth at this level: migration of household members and shocks

a short panel of the Vietnam Household Living Standards Survey (VHLSS). We conclude that differences in growth rates do not seem to be due to geography, rather they may reflect history (as proxied by ethnicity) and externalities associated with the local poverty rate. Therefore poor people should be targeted in attempts to alleviate poverty effectively, potentially with large spillover effects if the nonlinear relation identified in this work is taken into account: in particular, it seems that poverty programs should be directed at locations with a high proportion of the poor, not just poor people.

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Table 1: Summary statistics: Household variables, 2002

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Growth rate (%)	0.132	0.521	-3.349	2.906
Consumption, 2002 (ln)	6.737	0.666	4.614	9.538
Land area (ln)	-2.153	2.724	-7.601	2.651
Livestock (ln)	0.631	4.21	-5.298	8.265
Household education	6.29	3.431	0.5	12
Literacy skill	0.904	0.294	0	1
N		3065		

Table 2: Summary statistics: Community variables, 2002

Variable	Mean	Std. Dev.	Min.	Max.	N
Growth rate (%)	0.132	0.521	-3.349	2.906	3065
Consumption, 2002 (ln)	6.737	0.666	4.614	9.538	3065
Poverty rate	16.144	12.542	0.176	94.375	3050
Road access	0.713	2.055	0	12	3065
Access to transport	0.4	0.49	0	1	3065
Daily market	0.418	0.493	0	1	3065
Periodic market	0.297	0.457	0	1	3065
Electricity	0.926	0.262	0	1	3065
Malaria	0.196	0.397	0	1	3065
Irrigated land (%)	75.569	31.791	0	100	3065
Extension visits	9.561	13.294	0	120	3065
Number of firms (nonFDI)	1.46	4.304	0	50	3065
Number of firms (FDI)	0.199	0.878	0	17	3065
Electricity	0.926	0.262	0	1	3065
Other enterprises in commune	0.647	0.478	0	1	3065
Kinh	0.852	0.356	0	1	3065
Tay	0.036	0.185	0	1	3065
Thai	0.023	0.148	0	1	3065
Muong	0.017	0.13	0	1	3065
Coastal	0.068	0.252	0	1	3065
Delta	0.553	0.497	0	1	3065
Mid-Lands	0.069	0.254	0	1	3065
Low Mountain	0.167	0.373	0	1	3065
High Mountain	0.142	0.349	0	1	3065
Remote Area	0.192	0.394	0	1	3065

Table 3: Summary statistics: Household and Community variables for non-poor and poor communes 2002

	Non-poor			Poor			
Variable	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**T-stat**
Land area (ln)	-2.342	2.716	2497	-1.321	2.603	568	8.15
Livestock (ln)	0.61	4.246	2497	0.724	4.05	568	0.58
Household education	6.552	3.39	2497	5.136	3.374	568	8.99
Literacy skill	0.922	0.268	2497	0.826	0.38	568	7.12
Poverty rate	13.237	8.734	2485	28.927	17.705	565	30.71
Road access	0.581	1.903	2497	1.292	2.545	568	1.44
Access to transport	0.412	0.492	2497	0.347	0.476	568	2.88
Daily market	0.448	0.497	2497	0.285	0.452	568	7.16
Periodic market	0.307	0.461	2497	0.254	0.435	568	2.51
Electricity	0.964	0.185	2497	0.755	0.43	568	18.02
Malaria	0.147	0.354	2497	0.414	0.493	568	14.99
Irrigated land (%)	77.863	29.97	2497	65.485	37.183	568	8.47
Extension visits	9.351	12.756	2497	10.486	15.418	568	1.75
Number of firms (nonFDI)	1.717	4.708	2497	0.329	0.961	568	5.31
Number of firms (FDI)	0.24	0.966	2497	0.016	0.125	568	4.35
Other enterprises in commune	0.705	0.456	2497	0.393	0.489	568	14.55
Kinh	0.935	0.246	2497	0.484	0.5	568	31.35
Tay	0.02	0.14	2497	0.104	0.305	568	9.89
Thai	0.013	0.114	2497	0.063	0.244	568	7.33
Muong	0.012	0.107	2497	0.042	0.201	568	5.07
Coastal	0.074	0.261	2497	0.042	0.201	568	2.69
Delta	0.618	0.486	2497	0.268	0.443	568	15.77
Mid-Lands	0.073	0.26	2497	0.053	0.224	568	1.70
Low Mountain	0.164	0.371	2497	0.181	0.386	568	0.98
High Mountain	0.071	0.257	2497	0.456	0.498	568	26.24
Remote Area	0.076	0.265	2497	0.704	0.457	568	43.72

Table 4: Transition matrix, 2002-2004, All communes

Consumption 2004 / **Consumption 2002**	**0-20**	**20-40**	**40-60**	**60-80**	**80-100**	
0-20	0.63	0.21	0.10	0.04	0.01	1.00
20-40	0.24	0.37	0.24	0.10	0.05	1.00
40-60	0.08	0.26	0.33	0.23	0.09	1.00
60-80	0.03	0.10	0.26	0.37	0.24	1.00
80-100	0.01	0.06	0.07	0.26	0.60	1.00

Table 5: Transition matrix, 2002-2004, poor communes

Consumption 2004 / **Consumption 2002**	**0-20**	**20-40**	**40-60**	**60-80**	**80-100**	
0-20	0.78	0.13	0.06	0.03	0.00	1.00
20-40	0.38	0.33	0.16	0.11	0.02	1.00
40-60	0.15	0.27	0.33	0.20	0.05	1.00
60-80	0.05	0.14	0.27	0.33	0.20	1.00
80-100	0.01	0.01	0.02	0.03	0.57	1.00

Table 6: Transition matrix, 2002-2004, non-poor communes

Consumption 2004 / **Consumption 2002**	**0-20**	**20-40**	**40-60**	**60-80**	**80-100**	
0-20	0.54	0.26	0.12	0.05	0.02	1.00
20-40	0.21	0.38	0.25	0.09	0.05	1.00
40-60	0.07	0.26	0.33	0.23	0.10	1.00
60-80	0.02	0.09	0.25	0.37	0.25	1.00
80-100	0.01	0.04	0.06	0.26	0.61	1.00

Table 7: Empirical estimates: growth rate in Vietnam, 2002-04

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
lnrlcons02	-0.225***	-0.277***	-0.259***	-0.281***	-0.287***		
	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)		
agland						0.023**	0.028**
						(0.011)	(0.011)
lnTLU						0.000	0.006
						(0.005)	(0.006)
gradehhh						0.000	-0.005
						(0.004)	(0.004)
read						0.038	0.023
						(0.042)	(0.046)
coastal		-0.054		-0.047	-0.030	-0.003	-0.004
		(0.037)		(0.038)	(0.036)	(0.040)	(0.080)
midlands		0.045		0.029	0.027	-0.004	-0.077
		(0.041)		(0.043)	(0.042)	(0.047)	(0.080)
highmountain		-0.128***		-0.135***	-0.121***	-0.083**	-0.100
		(0.038)		(0.040)	(0.040)	(0.042)	(0.081)
lowmountain		-0.058**		-0.067**	-0.064**	-0.055*	-0.075
		(0.028)		(0.030)	(0.030)	(0.030)	(0.060)
remotearea		-0.024		-0.002	0.015	0.039	0.033
		(0.028)		(0.030)	(0.030)	(0.032)	(0.058)
kinh		0.213***		0.202***	0.168***	0.137***	0.216**
		(0.044)		(0.043)	(0.045)	(0.046)	(0.093)
tay		0.103*		0.107*	0.063	0.056	0.131
		(0.061)		(0.063)	(0.064)	(0.063)	(0.133)
thai		0.032		0.051	0.014	0.041	0.050
		(0.057)		(0.059)	(0.060)	(0.067)	(0.147)
muong		-0.030		-0.020	-0.024	-0.011	0.046
		(0.086)		(0.084)	(0.086)	(0.095)	(0.170)
roadaccess			-0.005	-0.005	-0.005	-0.005	-0.014
			(0.005)	(0.005)	(0.005)	(0.005)	(0.010)
transportation			-0.010	-0.022	-0.028	-0.030	-0.073*
			(0.020)	(0.021)	(0.021)	(0.023)	(0.041)
dailymarket			0.014	-0.005	-0.007	0.000	0.015
			(0.021)	(0.020)	(0.020)	(0.021)	(0.041)
periodicmarket			-0.018	-0.026	-0.026	-0.020	-0.054
			(0.022)	(0.022)	(0.021)	(0.023)	(0.042)
electricity			0.153***	0.032	0.011	-0.019	-0.060
			(0.040)	(0.041)	(0.041)	(0.045)	(0.087)
irrigatedland			0.000	-0.000	-0.000	-0.000	-0.001
			(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
agentvisits			-0.001	-0.000	-0.000	0.000	-0.000
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
malaria			-0.079***	-0.027	-0.021	-0.007	0.011
			(0.028)	(0.026)	(0.026)	(0.028)	(0.051)
nonFDIemploy			0.004**	0.004*	0.003*	0.003	0.005
			(0.002)	(0.002)	(0.002)	(0.002)	(0.005)
FDIemploy			0.016	0.015	0.013	0.013	0.026
			(0.010)	(0.010)	(0.010)	(0.010)	(0.024)
otherenterprises			0.039*	0.012	0.003	-0.022	0.030
			(0.023)	(0.023)	(0.023)	(0.025)	(0.045)
povertyrate					-0.003***	-0.001	
					(0.001)	(0.001)	
Constant	1.646***	1.849***	1.701***	1.884***	2.028***	0.127	
	(0.107)	(0.118)	(0.112)	(0.128)	(0.137)	(0.088)	
Observations	3,065	3,065	3,065	3,065	3,050	3,050	3,049
R-squared	0.082	0.121	0.103	0.126	0.128	0.020	0.020

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

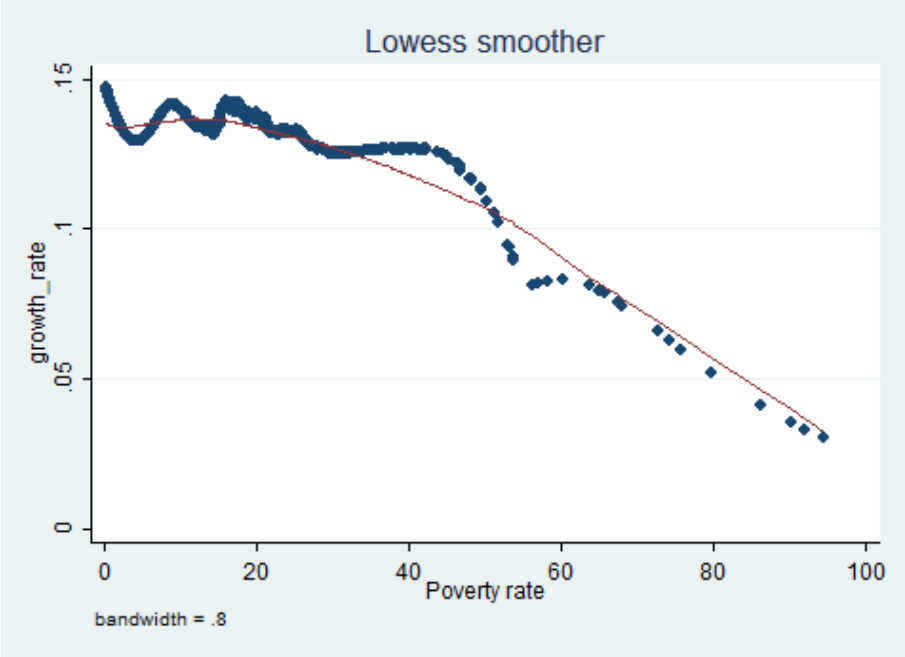

Figure 1: Nonlinear effects of poverty rate on growth rate