Determinants of the result of new rural development program in Vietnam

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Abstract

Purpose – The purpose of this paper is to identify the determinants of the proportion of communes that met all national new rural criteria (hereafter NRD communes).

Design/methodology/approach – First, the method of propensity score (PS) stratification is used to classify 63 provinces into the subgroups. Second, the ordinary least squares (OLS) model is used with the subgroups classified from the PS stratification method as one of explicative variables. The dependent variable in the OLS model is the proportion of NRD communes.

Findings – With the sample of 63 provinces of Vietnam, the author found that per capita income growth rate, high growth of gross regional domestic product (GRDP) and effort of the provincial authority have positive impact on the proportion of NRD communes.

Practical implications – This research suggests that the provincial authority should actively participate in the NRD program, and the economic development is key factor for success implementation of the NRD program.

Originality/value – This research contributes to understand the factors impacting the result of the NRD program and then help to identify the measures to support this program.

Keywords New rural development, Public budget, Effort, Propensity score stratification, OLS model

Paper type Research paper

1. Introduction

Vietnam has been implementing the national target program on new rural development (NTP–NRD) since 2010 on a whole country territory with 8,973 communes (GSO, 2017) of 63 provinces and first-tier cities. NTP–NRD in the period 2010–2020 has general objectives "To build a new countryside with gradually modem socioeconomic infrastructure, rational economic structure and forms of production organization; to associate agriculture with quick development of industries and services and rural with urban development under planning; to assure a democratic and stable rural community deeply imbued with national cultural identity; to protect the eco-environment and maintain security and order and to raise people's material and spiritual lives along the socialist orientation" (Prime Minister, 2010). The specific objective is to have 50 percent of communes acknowledged as new rural commune in the year 2020. The general objectives of NTP–NRD are similar as the definition of rural development in being universally used in literature (OECD, 1990; Kearney *et al.*, 1995; Kulkarni and Rajan, 1991; Moseley and Gaskell, 1994). The objective of NTP–NRD is very similar to the definition of rural development of Moseley and Gaskell as rural development is "a sustained and sustainable process of cultural, social and economic change, designed to enhance the long-term wellbeing of the whole community".

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To achieve the mentioned objectives, the NTP–NRD has 11 activities to implement, including: (1) planning to build a new countryside; (2) developing socioeconomic infrastructure; (3) restructuring and developing the economy and increasing income; (4) poverty reduction and social security; (5) renewing and developing forms of effective production organization in rural areas; (6) developing education and training in rural areas; (7) developing medical services and providing health care for rural inhabitants; (8) building a cultured life and developing information and communications in rural areas; (9) clean water supply and environmental sanitation in rural areas; (10) raising the quality of party organizations, administrations and sociopolitical organizations in localities and (11) maintaining social security and order in rural areas. (Prime Minister, 2010).

The whole political system from central to commune levels is mobilized to implement the NTP–NRD activities. The rural people and community are determined as the subject of the NRD program. The government increased public budget for the NRD program. The government has also issued many policies to facilitate rural development activities such as preferential policies on rural agricultural credit, policies to attract businesses to invest in rural agriculture and policies for vocational training for rural laborers, promulgating the national target program on sustainable poverty reduction, increasing budget investment for rural agriculture, developing cooperative economy, and so on.

The overall indicator measuring the result of the NRD program is the proportion of communes meeting 19 national NRD criteria. According to data from Central coordination office (CCO)–NRD, in the beginning of October 2019, the whole country has 55.3 percent of communes that met 19 NRD criteria, in which 52.4 percent of communes that are officially recognized as NRD commune and 2.9 percent of other communes are making procedure to be acknowledged as NRD commune (CSC-NTPs, 2019). However, the percent of communes meeting new rural criteria varies greatly among the provinces. This stems from the differences in the starting points in the NRD of each province, the economic potentials as well as the effort and methods of each province. Therefore, this paper presents an analysis of NRD results in Vietnam and identifies the factors that influence this outcome in the provinces.

2. Research model

The comprehensive criterion to measure the result of NTP–NRD at provincial level is the percent of communes acknowledged as new rural commune. So, this criterion is used as a dependent variable to identify the determinants on it. It is assumed that the proportion of new rural communes of the given province (Y_i) is a function of several variables as presented in the function of Eqn (1).

$$Y_i = \alpha X_i + \beta D_i + \varepsilon_i \tag{1}$$

In which, X_i is the vector of variables reflecting the resource mobilization of the province i in the NRD while D_i is a category variable that captures the characteristics of the provinces on the natural and socioeconomic conditions. α and β are the estimates related to variables X and D. It is assumed that $\varepsilon \sim (0, 1)$ and meets theoretical assumptions of least square estimation.

63 provinces of Vietnam have large difference in natural and socioeconomic conditions. In order to reduce these differences, the provinces are classified into groups so that the provinces in a given group have the most similar condition while maximin difference between groups. The distribution of the observations into the subgroup can be implemented by methods as cluster analysis (CA) method or propensity score (PS) methods. However, in this research, we use the method of PS stratification because (1) the CA is more commonly accepted and applied in experimental studies (Peck, 2005; Gibson, 2003; Yoshikawa *et al.*, 2001); (2) the CA is formulated using only baseline characteristics, which are exogenous to the treatment (D'Attoma *et al.*, 2017), while PS is also based on baseline characteristics but related to

treatment (in this study, it is the result of the NRD program) and (3) among PS adjustments, PS stratification is one of the more effective ones (D'Attoma *et al.*, 2017; Schafer and Kang, 2008).

A PS is the "conditional probability of assignment to a particular group, given a vector of covariates" (Rosenbaum and Rubin, 1983). The purpose of the PS is to improve the quality of estimates from non-randomized observations through the randomization process (Rosenbaum and Rubin, 1984; Shadish and Steiner, 2010; Stuart, 2010).

Several researchers have showed that PS methods can substantially reduce bias in observed covariates (Austin, 2014; Bai, 2013; Garrido *et al.*, 2014; Stone and Tang, 2013). Consequently, D'Attoma *et al.* (2017) mentioned that over the last three decades, PS methods used in several studies in the different science field as program evaluation, economics, political science, sociology, medicine and educational research. The PS can be used as regression covariate. Hade and Lu (2014) showed that there is a substantial portion of studies using PS adjustment treat, the PS as a conventional regression predictor and the adjustment for the PS through stratification followed by regression appear to be a good practical strategy to reduce the bias associated with non-experimented data.

In this study, we estimate PSs using a logistic regression in which all covariates are used as predictors to estimate the predicted probability that each province can be classified into a group. The provinces are classified into two groups: Group (1) consists of the provinces having more than 50 percent of new rural communes and Group (2) consists of the remaining provinces. The probability $\pi(D = 1)$ of a province that has more than 50 percent of communes that met new rural standards, can be generalized by using Eqn (2):

$$\log it[\pi] = \log\left[\frac{\pi}{1-\pi}\right] = \lambda_0 + \lambda_1 Z_1 + \ldots + \lambda_n Z_n \tag{2}$$

In which, λ_0 is the average probability in log unit of receiving the proportion more than 50 percent of new rural communes across communes in assuming that all the covariates are centered and normally distributed. The parameter λ_1 refers to the effect of variable Z_1, the log odd ratio that $D = 1$ controlling for the other Zs. Maximum likelihood (ML) estimation is used in the logistic model.

The PS with stratification divides or classifies the sample into strata in based on their estimated PS. Cochran (1968) and Rosenbaum and Rubin (1984) found that stratifying a sample based on one continuous variable into five subgroups or quintiles eliminated 90 percent of the bias due to that one confounding variable. Stratification yields a series of subsamples of individuals with estimated PSs from both the treatment and control group.

In this research, based on the PS, the provinces are stratified into five subgroups, then these subgroups are used as category covariates in the linear regression model as presented in Equation (1).

3. Research methodology

3.1 Data

This study uses secondary data to estimate the model. The secondary data come from CCO–NRD, General Statistics Office (GSO) and Provincial Statistical Offices. The data on the number of achieved NRD criteria of a province, the public budget, the number of communes meeting 19 NRD criteria and the proportion of communes approved NRD come from CCO–NRD, the number of communes in each province. The effort level of the province in the implementation of NTP–NRD is based on the evaluation of CCO–NRD expert. The data on the number of communes belonging to Zone I, II and III of minority ethnic and mountainous areas (hereafter called commune 123) is collected from the Decision No. 447/QĐ-UBDT dated September 19, 2013 of Minister of Committee for Ethnic Minority Affairs (CEMA, 2013). Other data came from GSO and Provincial Statistical Offices.

3.2 Variables

The dependent variable (PERNRD) reflecting the result of the NRD is the proportion of communes that meet 19 national NRD criteria. This includes the commune that are approved as the NRD and communes being made to be approved as NRD commune.

Four explicative variables used to run the PS stratification model are: (1) average number of NRD criteria of a commune achieved in 2011 by the province (TCXA2011). This variable captures the starting point of the province in new rural building; (2) per capita income in 2010 (TN2010). This variable reflects economic condition of the province through per capita income; (3) proportion of mountainous commune (TLXAKV123). The province with higher proportion of these communes has higher investment cost in NRD. So, this variable reflects the difficulty of the province in NRD and (4) average population per km^2 ($POP1km^2$). The province with low population density will have more difficulty in mobilizing local resources for new rural building because per capita mobilized resource is higher with lower population density. So, this variable reflects the difficulty in mobilizing local resources. This variable is calculated from data on population and land area of the province in the year 2011.

Several variables used for the impact model as state investment, GDP structure, number of enterprises, rate of workforce is trained, proportion of urban population, average growth rate on per capita income and average growth rate of GDP with several combinations of variables. However, several variables do not give important contribution to the goodness of fit model. Consequently, we kept only the variables that enable the impact model to have the best result. These variables include

(1) Average public budget for one commune in the period 2011–2019 (PINVEST). Public budget includes the budgets coming from central and local governments. New rural building requires a huge investment for building the infrastructure as road, electricity system, school buildings, cultural facilities, etc. and the most resource comes from public investment. So, the higher public investment for the NRD, the higher NRD result;

(2) Average per capita income growth rate in the period 2010–2018 (GRINCOME). Many activities of the NRD is done by households and individuals, and the NRD mobilizes resource contributions from households and individuals. Therefore, if per capita income increases rapidly, households have more financial resources to repair and construct houses, purchase equipment for improving their life (electricity, water and sanitation works), invest in education, medical, etc., and households have a higher ability to contribute financially to the contents of the village's NRD such as making roads, cultural houses, sports facilities, etc. This contribution helps to meet the NRD criteria.

(3) Average gross regional domestic product (GRDP) growth rate in the period 2010–2018 (GRGDP). It is assumed that higher GRDP growth rate increases higher public income increase, then higher public investment is done for the NRD program;

(4) The effort of the provincial authority in the implementation of the NRD program (EFFORT). The role of government in the NRD has been confirmed. The role of the government in building new rural areas is done through the direction and mobilization of the local government system at all levels and sociopolitical organizations to support the NRD program; local governments have specific initiatives to implement the NRD; motivate and encourage rural people and rural stakeholders to contribute to the NRD. The province's effort is assessed through three levels: not trying to carry out the NRD (EFFORT0); they have effort to implement the NRD (EFFORT1) and they have very high effort to implement the NRD (EFFORT2).

The effort level of the provinces is based on the assessment of senior staff of CCO–NRD and the reward issued by the government for the provinces. All the provinces that are rewarded by the government are classed in the very high level of effort. Because the government limits the number of provinces to be rewarded, several provinces with very high effort are not rewarded, so the provinces with very high appreciation of CCO–NRD also are classed in very high effort level. This is relatively appropriate as CCO–NRD is responsible to propose the province for government's reward.

(5) Characteristics of the provinces (SUBGROUP). The provinces are classified into five subgroups based on the PS estimated from the function in Eqn (2).

The variables used for classifying the provinces in groups and for determining the impact on the result of the NRD are presented in Table I.

4. Result and discussion

4.1 Result of new rural development program

The NRD program has been implementing since 2011. Several resources have been mobilized for this program, from public budget to a private sector, the contribution of rural community, households and commercial loans. The public budget comes from central government, provincial, district and commune authorities. Averagely, in the period 2011–2019, each commune has invested 35.7 VND billions from public government at levels and an increased criterion of one commune has invested 4.4 VND billions from public budget. However, these amounts are very different among regions. Generally, the more difficult regions have less

Variable	Definition	Mean	Std. dev
D	= 1 if a province has more than 50% of communes meeting new rural commune; 0 otherwise	0.397	
PERNRD	Proportion of commune approved new rural development of a province	55.3	26.3
TCXA2011	Average number of NRD criteria of a commune achieved in 2011 by a province	5.3	2.0
TN2010	Per capita income in 2010 (VND million)	14.4	5.0
TLXAKV123	Proportion of commune belongs to ethnic minority and mountainous areas	49.4	38.1
POP1km2	Average population per km^2 (person)	495.7	624.4
PINVEST	Average public budget for one commune in the period 2011–2019 (VND billion)	41.0	53.4
GRINCOME	Average per capita income growth rate in the period 2010–2018 (%)	22.7	4.4
GRGDP	Average GRDP growth rate in the period 2010–2018 (%)	13.9	18.5
EFFORT0	A province is evaluated as having no effort in the implementation of NTP–NRD (base category)	41.2	
EFFORT1	A province is evaluated as there is effort in the implementation of NTP–NRD (1/0)	31.8	
EFFORT2	A province is evaluated as there is very effort in the implementation of NTP–NRD (1/0)	27.0	
SUBGROUP1	Subgroup 1 of the provinces classified by PS stratification (base category)	27.0	
SUBGROUP2	Subgroup 2 of the provinces classified by PS stratification (1/0)	14.3	
SUBGROUP3	Subgroup 3 of the provinces classified by PS stratification (1/0)	27.0	
SUBGROUP4	Subgroup 4 of the provinces classified by PS stratification (1/0)	9.5	
SUBGROUP5	Subgroup 5 of the provinces classified by PS stratification (1/0)	22.2	

Table I. Descriptive statistics of variables used in the model

public budget than the more favorable regions (Table II). The highest is in the South East region, in which each commune costs 146.9 VND billions and an increased criterion of one commune costs 12.8 VND billions. The second highest is in the Red River Delta. The lowest amount of public budget for a commune and for an increased criterion of one commune is in the Central Highland, with 14.7 and 1.5 VND billions, respectively.

Together with drastic and active of whole political system (local authority, sociopolitical organization at levels) and rural community, the public budget has significantly important impact of result of the NRD program in the provinces. The statistical test showed a significantly positive linear correlation between average public budget for a commune and the proportion of NRD commune (correlation coefficient is 0.56) and between average public budget for a commune and an increased criterion of a commune (0.48). The regions South East and Red River Delta have more favorable starting point as the average number of NRD criteria in 2011 is higher. The provinces in more favorable regions have higher public income and the households are richer. These conditions favor the NRD implementation and consequently the proportion of NRD commune and average number of NRD criteria after 9 years of the NRD program in these provinces are higher than national average (Table III). The poor regions as the Northern Mountains and Central Highland have the lowest average number of achieved NRD criteria and lowest proportion of NRD communes (Table III). At the national level, until September 2019, there are 55.3 percent of communes that met national NRD criteria.

4.2 Result of PS stratification model

The result of PS subclassification into five subgroups shows clear difference among five subgroups on variables used for PS stratification as presented in Table IV. From subgroup 1 to 5, in direction of gradual increase of subgroup: (1) there are gradual increase of average number of achieved NRD criteria per commune is increasing; gradual increase of per capita income; gradual increase of population density; (2) there is gradual decrease in the proportion of ethnical and mountainous communes. Like that, the subgroup 1 and subgroup 2 are communes with more difficult conditions while the subgroup 4 and subgroup 5 are communes with more favorable condition. The subgroups with more favorable conditions also have higher proportion of NRD communes and are more invested from public budget as shown in Table IV.

The distribution of subgroups is significantly different among regions. Generally, the difficult and poor regions of the Northern Mountains, Central Coast and the Central Highland have high proportion of the subgroups 1 and 2 while the rich regions of Red River Delta and South East have high proportion of subgroup 4 and 5 (Table V). This result is relatively relevant the reality of Vietnam in the NRD.

Table II.
Average public budget for a commune and for an increase of a NRD criterion of a commune in period 2011–9/2019

Region	Public budget/commune (VND billions)			Public budget for increase of a criterion of one commune (VND billions)		
	Mean	Min	Max	Mean	Min	Max
Red River Delta	57.5	30.7	111.5	4.9	2.6	11.4
Northern Mountains	17.6	8.6	35.5	1.9	1.0	4.2
Central Coast	24.7	12.5	52.7	2.3	1.3	4.4
Central Highland	14.7	11.9	16.2	1.5	1.2	1.6
South East	146.9	37.8	345.1	12.8	3.1	29.0
Mekong Delta	27.7	11.9	87.9	2.9	1.3	6.9
Vietnam	35.7	8.6	345.1	4.4	1.0	29.0

Source(s): Author's calculation from data of CCO–NRD in 2019

Region	Average number of achieved NRD criteria of one commune in 2011	Average number of achieved NRD criteria of one commune in 2019	Change of number of achieved NRD criteria of one commune between 2019–2011	Average proportion of NRD commune in 2019
Red River Delta	7.0	18.7	11.7	89.6
Northern Mountains	3.7	12.8	9.1	30.5
Central Coast	5.0	15.9	10.9	56.0
Central Highland	3.9	14.1	10.2	37.6
South East	6.0	17.5	11.5	75.5
Mekong Delta	6.0	15.6	9.6	48.8
Vietnam	5.2	15.6	10.4	55.3

Source(s): Author's calculation from data of CCO–NRD in 2019

Table III. Result of NTP–NRD program from 2011 to 9/2019

Variable	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4	Subgroup 5	Total
TCXA2011	3.0	4.8	5.8	6.5	7.4	5.3
TN2010	10.1	11.8	14.5	17.1	19.8	14.4
TLXAKV123	90.4	49.3	51.1	29.1	6.3	30.4
POP1km2	97.1	204.1	293.8	483.1	1295.1	283.0
PERNRD	28.0	54.8	49.2	60.6	94.9	55.3
PINVEST	16.8	25.2	28.6	34.6	98.4	41.0

Source(s): Author's calculation from data of CCO–NRD in 2019, GSO, 2019

Table IV. Characteristics before implementing the NRD program and rate of NRD communes, public investment by PS subgroups

Region	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4	Subgroup 5	Total
Red River Delta	0.0	0.0	0.0	18.2	81.2	100.0
Northern Mountains	78.6	0.0	21.4	0.0	0.0	100.0
Central Coast	21.4	57.1	14.3	0.0	7.1	100.0
Central Highland	60.0	20.0	20.0	0.0	0.0	100.0
South East	0.0	0.0	33.3	16.7	50.0	100.0
Mekong Delta	0.0	0.0	69.2	23.1	7.7	100.0
Vietnam	27.0	14.3	27.0	9.5	22.2	100.0

Table V. Distribution of PS subgroup in regions

4.3 Result of OLS model

The result of model that evaluates the impact factors on the result of new rural building is presented in Table VI. The model explains 87 percent of change of the proportion of NRD communes of the provinces and the explicative variables included in the model are relevant to assumptions. The impact of PS subgroups is significant and clear. The subgroups with more favorable conditions have higher value of estimation coefficients. If all other variables remain unchanged, the subgroup 5 has the proportion of NRD communes higher than subgroup 1 (base category) that is 56.3 percent.

The growth rate of per capita income is significant and important on the NRD result. Accordingly, an increase of per capita income of 1 percent will increase 0.819 point of percent of NRD communes. The NTP–NRD specifies active role and subject of rural people in the NRD program. The contribution of rural households in the NRD building is in

Table VI.
Estimation result of model of factors impacting the NRD result of the province

Variable	Coefficient	Standard error
PINVEST	0.043	[0.031]
GRINCOME	0.819	[0.340]**
GRGDP	0.055	[0.076]
EFFORT1	3.943	[3.343]
EFFORT2	8.718	[3.543]**
SUBGROUP2	21.241	[4.573]*
SUBGROUP3	15.800	[3.754]*
SUBGROUP4	25.665	[5.303]*
SUBGROUP5	56.267	[4.930]*
Constant	8.529	[7.155]
Observations	63	
R-squared	0.871	

Note(s): * $p < 0.01$, ** $p < 0.05$, *** $p < 0.1$

several forms as working labor, land, asset and cash. The data from CCO–NRD showed that the contributions of rural households represent about 7.4 percent of total financial resources for the NRD building in the period 2011–2019. The contribution of rural households can service for construction of infrastructures at commune and village levels and school construction and represent about 1.26 percent of total income households and the richer households are, the higher is the financial contribution of household (Quang, 2016). Like this, the policy and solutions to increase per capita income will favor the NRD building.

The variable GRDGP has statistically significant at 10 percent level. The growth rate of GRDP or GDP of a province has positive impact on the NRD result. This result is relevant to reality as a high growth rate of GRDP increases not only public income of taxes, but also the income of households. These increased incomes can increase public budget and financial contribution of households for the NRD building. The data from CCO–NRD show that the regions with more favorable economic conditions as South East and Red River Delta, the contribution of rural community represent higher proportion in total financial resource for the NRD program in the period 2011–2019.

The estimation result confirmed the significant role of public authority in the NRD program. This variable is statistically significant. The provinces that are appreciated as having very effort in the NRD program have the proportion of NRD communes 8.7 percent higher than the provinces that are considered as having no effort in the NRD program (base category). The provinces that are evaluated as having effort in the NRD have the proportion of NRD communes 3.9 percent higher than the provinces in the base category. The drastic and active direction and coordination of public authority at levels can mobilize the contribution in different forms of whole political system and rural stakeholders (households, individuals and enterprises) to the NRD program. The public authority has a positive role in mobilizing the contribution of rural community in the NRD program (Luan *et al.*, 2011). An active participation of village community in the NRD program can save the cost of infrastructure construction (Dinh *et al.*, 2010).

5. Conclusion

Based on data at provincial level in the period 2011–2019, the impact of factors on result of the NRD program in the period 2011–2019 is estimated. The result of the NRD program is measured by the proportion of communes meeting all 19 national NRD criteria. The PS stratification method is used to classify the provinces in the subgroup. The variables used

in the PS method is the number of achieved NRD criterion in 2011, per capita income in 2010, the proportion of minority ethnic and mountainous communes of the provinces and population density. Based on PS, 63 provinces are classified into five subgroups with very different characteristics. The subgroup 1 is the most difficult and consists of the provinces in difficult regions as the Northern Mountains, the Central Highland and Central Coast. The subgroup 5 is the most favorable and consists of favorable provinces as Red River Delta and South East.

A part from PS subgroups that shows significant impact on result of the NRD program, the study finds significant impact of the variables as per capita income growth rate and the effort level of the provincial authority. All other variables remain unchanged, the provinces that public authority is evaluated as very high effort have higher proportion of 8.7 percent of NRD communes than the provinces that are considered as having no effort. The increase of per capita income has positive impact on the result of the NRD program.

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