Influence of New Countryside Construction Program on household welfare: Evidence from the Mekong River Delta of Vietnam

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In developing countries, comprehensive rural development programs contribute significantly to exports and generate domestic demand for food as well as provide capital and labor for further industrialization and development. However, the efficacy of these programs remains in question. The National Target Program on New Rural Development, known as New Countryside Construction Program, in Vietnam has been implemented since 2010 as a new policy initiative and approach to rural development with the following key objectives: (i) to improve rural infrastructure; (ii) to foster linkages between the agricultural sector and the industrial and service sectors, and between rural economies and urban economies; (iii) and to improve rural living standards in terms of economic, social, and environmental qualities. The current study uses commune fixed-effect and two-stages-least-squared regressions to estimate the effect of the New Countryside Construction Program on household welfare in The Mekong River Delta of Vietnam in two kinds of models: The small model contains only demographical variables and commune-level variables such as commune general conditions, and initial infrastructure conditions. The large models include additional variables of education, occupation, and commune-level variables as in the small model. Controlling for the endogeneity of the New Countryside Construction Program variable, we find that New Countryside Construction Program has positive effects on household expenditure and the New Countryside Construction Program tends to prone to top 20 expenditure quintiles than to bottom 20 expenditure quintiles.

Key words: New Countryside Construction Program, household welfare, Mekong River Delta, Vietnam.

Introduction

In most developing countries, industrialization and modernization is seen as a pre-requisite fora prosperous, equitable and democratic society, which have been emblemed in many modern theories of development such as the stages of economic growth (Rostow, 1959), the dual economy (Lewis (1954); Lewis (1979)), the structural change model (Clark (1940); Kuznets (1957); Chenery (1960)). During the development process, agriculture and rural society may be adversely affected as a result, and this in turn, can hamper the socio-economic development and growth of the country as a whole (Long et al. (2010); Perry (2011)). Governments in rapidly developing countries in the world such as South Korea, China, have invested a huge number of resources to foster agriculture and rural development (Im et al. (2016); Jacka (2013); Ahlers and Schubert (2009)). In these countries, to build a new countryside, comprehensive programs have been launched, under the names of "the New Village Movement" (also known as the New Community Movement or Saemaul Undong in Korean)) in South Korea in the 1970s, in rural development program Taiwan in 1950s, and in the "new socialist countryside" in China in 2006. These programs are known to contribute significantly to exports, domestic demand for food, and more capital and labor for industrialization and successful development in these countries (Looney, 2012).

The Vietnam National Target Program on New Rural Development (NTP-NRD) during 2010-2020 has been launched under the name of New Countryside Construction Program (NCCP) nationwide in over 9.008 communes (Vietnam National Assembly, 2016). The general objectives of the program are: (1) To build a new countryside with gradually modem socio-economic infrastructure, rational economic structure, and forms of production organization; (2) To associate agriculture with the quick development of industries and services, and rural with urban development under planning; (3) 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 with the socialist orientation. The NTP-NRD is an

overall socio-economic development, political and security, and defense program, covering the following 11 activities: (1) New rural planning, (2) Socio-economic infrastructure development, (3) Rural economic development and income raising, (4) Poverty reduction and social protection, (5) Renovation and development of production organization, (6) Education and training development, (7) Health care, (8) Rural culture, information, and communication, (9) Clean water and rural environment, (10) Operations of local party/government system, and (11) Rural security and public order.

From 2010 to 2015, the NCCP program has mobilized 851,380 billion VND to invest in rural areas across Vietnam. By early 2016, 1761 communes out of a total of 8,920 communes in Vietnam had achieved a set of 19 criteria developed by the NCCP program, equal to 19.7% (Vietnam National Assembly, 2016). The Vietnamese government has considered the NCCP program to be successful (Vietnam National Assembly, 2016). The impact of the NCCP program, however, remains debatable. A study jointly conducted by the International Fund for Agricultural Development (IFAD) and the World Bank (WB) mentions that although the NCCP program in Vietnam has upgraded rural infrastructure and conditions for economic and social improvements in rural Vietnam between 2010 and 2015 (IFAD-World Bank, 2016), it is lacking evidence to support the success of the NRD program (IFAD-World Bank, 2016). Some shortcomings of NCCP programs are indicated in this regard, including (1) the inflexibility of the set of criteria neutralizes any priority local needs in rural transformation, (2) local entities are not empowered when important policy decisions are taken, and (3) local communes are forced to rush for the fulfillment of the criteria regardless of the resources' capacity and management ability (IFAD-World Bank, 2016).

The objective of this study is to assess the impacts of the NCCP program on households' income and living standards in the Mekong River Delta (MRD) of Vietnam. To address the above issue, this study uses surveyed data from Vietnam Household Living Standard Surveys (VHLSS) 2010 when the NCCP program is started and the survey of 2014 when the NRD program has been implemented and successfully recorded in some communes for the first phase of development 2010-2015. The data from VHLSS 2010 and 2014 for the same households in the MRD are selected and information on NCCP is added to each household following NCCP and non-NCCP communes, and each NCCP criteria achieved by those communes as well.

The first research question addressed by this study concerns the impact of the NCCP program on household income in the affected communes? The hypothesis is that households' total income in the treatment communes experienced a significant increase as a result of the NCCP program. The hypothesis is that the NCCP program generally increases income level in a fulfilled commune. The second and final research question is: how are different wealth groups affected by the NCCP program? To answer this question, the population was sub-divided into deciles and we estimated the NCCP program effects on each decile. A greater change in income for the poorest decile would indicate pro-poor attributes of the NCCP program and vice versa. The hypothesis is that the NCCP program increases income inequality by favoring the top-income group due to the inflexibility of the criteria set.

The paper follows the following structure. Section 2 provides a literature review of the paper subject while Section 3 presents the dataset as well as a description of the methodology used to design this research. Section 4 shows empirical results obtained on the basis of data collected and collated in the previous section. Lastly, Section 5 provides a conclusion of the study findings as well as recommendations vis-à-vis future research work in this area.

Literature review

NRD is expected to increase the welfare outcomes of households in Vietnam (Liêng, 2015), like in China (see, for example, Ahlers and Schubert (2009)). It happens through several channels such as infrastructure of various types (Charlery, Qaim and Smith-Hall (2016), Shenggen and Zhang (2004), Im et al. (2016), Kara,Taş and Ada (2016), Rahman (2014)), social capital (Narayan and Pritchett, 1999). Charlery, Qaim and Smith-Hall (2016) find that the new road had a significantly positive impact on mean household income. Shenggen and Zhang (2004) also find that rural infrastructure and education play a more important role in explaining the difference between rural nonfarm productivity and agricultural productivity. Because the rural nonfarm economy is a major determinant of rural income, investing more in rural infrastructure is key to the growth of overall income of the rural population. Kara,Taş and Ada (2016) consider two categories of infrastructure investments: Economic infrastructure investments (i.e., highways, power generation and water facilities), and social infrastructure investments (i.e., education and healthcare). The authors identify how different types of infrastructure expenditures affect regional incomes in Turkey and find that infrastructure expenditures enhanced regional income in Turkey, and social infrastructure investments and education

expenditures demonstrate a significant impact on regional income. Rahman (2014) studies the impact of rural infrastructure on the decision to choose between farm and non-farm enterprises vis-à-vis income by Bangladeshi rural households and finds that rural infrastructure has a significant but inverse impact on enterprise choices vis-à-vis income.

Concerning social capital, Narayan and Pritchett (1999) find that the social capital of a household's village is as important in determining the household's income as are many of the household's characteristics, such as schooling, assets, distance to markets, or gender of the household head.

NRD can also affect household livelihood. Households might be more diversified in income under the impact of infrastructure (Escobal (2001); Abdulai and CroleRees (2001); Deininger and Olinto (2001)). Escobal (2001) examines the determinants of non-farm income diversification in Peru and finds that access to public assets such as rural electrification and roads is an important factor in diversification. Deininger and Olinto (2001), using data from Colombian rural households, confirm the importance of non-farm activities as a source of income and employment. The authors also find that a significant share of poor households engages in a combination of wage labor in jobs with low entry requirements plus self-employment in "marginal" on-farm or informal sector activities. NRD can affect income distribution (Calderon and Servén (2004), Calderón and Chong (2004)) through several ways. One is through the impact of infrastructure (see, for example, Charlery, Qaim and Smith-Hall (2016)), non-farm employment (see, for example, Reardon et al. (2000)). Charlery, Qaim and Smith-Hall (2016) find that the new road had a significantly positive impact on mean household income and contributed to decreasing income inequality, and the poorest households gained most from the construction of the road. Reardon, Berdegué and

Escobar (2001) find that the effect of non-farm employment on inequality is mixed.

Materials and methods

Data sources

This study relies on Vietnam Household Living Standard Surveys (VHLSS) 2010, 2012, and 2014. The VHLSSs were conducted by the General Statistics Office of Vietnam (GSO) with technical assistance from the World Bank. The surveys contain household and community data. Data on households include basic demography, employment and labor force participation, education, health, income, expenditure, housing, fixed assets and durable goods, the participation of households in poverty alleviation programs.

Commune data include demographic status of communes, general economic conditions, non-farm employment, agriculture production, local infrastructure and transportation, education, health, and social affairs. The commune data contained information on natural disasters happening in communes in previous years. Commune data can be merged with household data. Each of the VHLSS covers more than nine thousand households. The data are representative of urban/rural and eight geographic regions. The entire dataset of 2010, 2012, and 2014 household-level VHLSSs covered 6,750, 6,696, and 6,618 rural households, respectively. The entire data set of 2010, 2012, and 2014 commune-level VHLSSs covered 2,199, 669, and 1,716 communes, respectively.In this study, we use the rural samples for the Mekong River Delta. The selected sample of 2010 and 2014 household-level VHLSSs covered 1,455 and 1,440 rural households, respectively. The selected sample of 2010 and 2014 commune-level VHLSSs covered 470 and 278 communes, respectively. Table 1 presents the summary of 2-wave household-level panel data in 2010-2014 with 628 households in each year of which 51 households live in NCCP-qualified communes.

Table 1: Household-level sample, 2010-2014

Year	Non-NCCP		NCCP		Total	
	Obs.	Row (%)	Obs.	Row (%)	Obs.	Row (%)
2010	679	51.95	0	0.00	679	50.00
2014	628	48.05	51	100.00	679	50.00
Total	1,307	100.00	51	100.00	1,358	100.00

Source: Authors' compilation from VHLSS 2010-2014 (Household survey)

Table 2: Commune-level sample, 2010-2014

Year	Non-NCCP		NCCP		Total	
	Obs.	Row (%)	Obs.	Row (%)	Obs.	Row (%)
2010	268	51.94	0	0.00	268	50.00
2014	248	48.06	20	100.00	268	50.00
Total	516	100.00	20	100.00	536	100.00

Source: Authors' compilation from VHLSS 2010-2014 (Commune survey)

Table 2 presents the summary of 2-wave commune-level panel data in 2010-2014 with 268 communes in each

Methods

Model specification

We assume a household welfare indicator is a function of characteristics of households and communities as follows (Glewwe, 1991):

$$\ln Y_{ijt} = \alpha_0 + X_{ijt}\beta_1 + C_{jt}\gamma_1 + NCCP_{jt}\delta_1 + \tau_t + \varepsilon_{jjt} \quad (1)$$

Where the script it denotes for household i in commune j in the year t; Y is a welfare indicator of households; X is a vector of characteristics of households such as demographical variables and socio-economic variables; C is a vector of characteristics of communities such as commune general conditions, and initial infrastructure conditions; NCCP is a dummy variable indicating whether a commune is qualified for NCCP criteria or not; τ is the dummy variable of years; ε is unobserved variables. We use different indicators of household welfare including per capita income, per capita expenditure by levels and by quintiles, and share of incomes by different sources. We use similar specifications as equation (1) for different dependent variables. The effect of NCCP on households is measured by parameters $\delta_1, \delta_2,$ and δ_3.

One challenge faced when estimating the effect of NCCP is the endogeneity of NCPP. The unobserved variables can be correlated with the NCCP. In equation

year. In our data set, there are 20 communes, which have been qualified as NCCP ones in 2014.

(1), unobserved variables εijt include both commune-level (vj) and household-level variables (ui). Since our NCCP is the commune-level variables, they are more likely to be correlated with unobserved commune-level variables. The unobserved commune-level variables can be decomposed into time-variant (v_{j1t}) and time-invariant commune-level variables (v_{jo}) (Equation (2)). In this study, we use the commune fixed-effect regression to eliminate unobserved time-invariant commune-level variables. It is expected that the endogeneity bias will be negligible after the elimination of these unobserved time-invariant variables and the control of observed variables.

$$\varepsilon_{jjt} = u_{it} + v_{jt} = u_{io} + u_{i1t} + v_{jo} + v_{j1t} \quad (2)$$

NCCP and Outcomes

We use a dummy variable that takes the value of 1 if a commune is rewarded as an NCCP one, and takes the value of 0 if otherwise. The unit of analysis is the household and both consumption and income in per capita terms and in terms of quintile, and share of income sources as well are under consideration. Both consumption and incomes have been deflated to January 2010 national prices through the use of monthly and regional price indices calculated as part of the survey and using the General Statistics Office CPI to adjust prices across rounds of the survey.

Table 3: Changes in outcome variables by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	2014	Diff	2010	2014	Diff	
Expenditure	13,798	16,724	2,926	16,488	19,885	3,397	471
Food	6,470	7,596	1,126	6,987	8,287	1,300	174
Nonfood	7,328	3,716	-3,612	9,501	4,654	-4,847	-1,235
Durables	861	1,728	867	5,167	2,927	-2,240	-3,107
Income	16,093	52,352	36,259	17,694	63,865	46,171	9,912
Housing	70	81	11	68	83	15	4
Land	7,096	8,852	1,756	6,656	12,872	6,216	4,460
Fixed assets	17,167	30,774	13,607	30,395	47,472	17,077	3,470
Health	872	1,014	142	778	874	96	-46
Incidence	0.0211	0.0666	0	0.0262	0.067	0	0
Education	380	446	66	532	595	63	-3

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 3 presents a comparison of outcome variables between 2010 and 2014 and between non-NCCP and NCCP groups as well. There are significant increases between 2010 and 2014 within non-NCCP and NCCP groups in terms of total expenditure per capita, food expenditure per capita, income per capita, housing area by household, land by household, and fixed capital assets. Increases in these indicators also occur between non-NCCP and NCCP groups. There are significant improvements between non-NCCP and NCCP groups in terms of health expenditure per capita, health incidence,

and education expenditure per capita.

Table 4 presents a comparison of income shares between 2010 and 2014 and between non-NCCP and NCCP groups as well. There are significant increases between 2010 and 2014 within non-NCCP and NCCP groups in terms of income share from livestock, and a small increase in income share from services, and income share from agriculture. There are significant improvements between non-NCCP and NCCP groups in terms of income share from the enterprise.

Table 4: Changes in income shares by non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	2014	Diff	2010	2014	Diff	
From labor	38.14	39	0.86	53.95	35.56	-18.39	-19.25
From crops	5.07	0.36	-4.71***	5.81	0.67	-5.14***	-0.43
From livestock	0.77	1.89	1.12***	0.1	3.51	3.41	2.29
From forestry	0.18	0.35	0.17	0	0.1	0.1	-0.07
From aquaculture	1.47	10.61	9.14	0	7.61	7.61	-1.53
From services	0	0.01	0.01	0	0.52	0.52	0.51
From enterprise	31.74	20.33	-11.41***	22.97	26.04	3.07***	14.48
From others	22.62	27.45	4.83***	17.17	26	8.83**	4
From agriculture	7.5	13.22	5.72***	5.91	12.41	6.5***	0.78

*Note: *** significant at 1% level, ** at 5% level. Source: Authors' estimation from VHLSS10-14 (Household survey)*

Table 5 presents changes in expenditure deciles (percentage) and a comparison of expenditure deciles between 2010 and 2014 and between non-NCCP and NCCP groups as well. For the Non-NCCP group, expenditure shares of seven deciles increase between 2010 and 2014, whereas for the NCCP group the first 30 deciles decrease between 2010 and 2014. However, expenditure shares from the fourth to the ninth decile increase between 2010 and 2014. NCCP is unlikely to benefit the bottom 30 and the top.

Table 5: Changes in expenditure deciles (percentage) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP		
	2010	2014	Ratio	2010	2014	Ratio
Bottom	3.77	3.79	1.00***	3.96	3.81	0.96***
2nd decile	5.18	5.39	1.04***	5.05	4.89	0.97***
3rd decile	6.09	6.32	1.04***	5.69	5.65	0.99***
4th decile	6.96	7.26	1.04***	6.12	6.63	1.08***
5th decile	8.05	8.15	1.01***	7.37	7.68	1.04***
6th decile	9.14	9.22	1.01***	8.16	8.88	1.09***
7th decile	10.30	10.39	1.01***	9.37	10.63	1.13***
8th decile	12.22	11.98	0.98***	10.86	11.76	1.08***
9th decile	14.98	14.57	0.97***	12.91	14.03	1.09***
Top	23.32	22.92	0.98***	30.51	26.04	0.85***

*Note: *** significant at 1% level. Source: Authors' estimation from VHLSS 2010-14 (Household Survey)*

Table 6 presents changes in expenditure deciles (in terms of the mean of expenditure) and a comparison of expenditure deciles between 2010 and 2014 and between non-NCCP and NCCP groups as well. All deciles are better between 2010 and 2014 for both groups of non-NCCP and NCCP. Only the bottom shows to be better off between NCCP vs. non-NNCP.

Table 6: Changes in expenditure deciles (expenditure mean) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	2014	Diff	2010	2014	Diff	
Bottom	5,268	6,388	1,120	5,452	7,214	1,762	642
2nd decile	7,235	9,071	1,836	7,305	8,959	1,654	-182
3rd decile	8,494	10,612	2,118	8,456	10,884	2,428	310
4th decile	9,669	12,219	2,550	9,609	11,627	2,018	-532
5th decile	11,162	13,757	2,595	11,111	13,551	2,440	-155
6th decile	12,673	15,568	2,895	12,860	15,435	2,575	-320
7th decile	14,310	17,579	3,269	14,360	17,193	2,833	-436
8th decile	16,973	20,368	3,395	16,315	20,693	4,378	983
9th decile	20,786	24,777	3,991	20,761	24,185	3,424	-567
Top	32,239	38,809	6,570	49,401	44,485	-4,916	-11,486

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 7 presents changes in expenditure quintiles (percentage) and a comparison of expenditure quintiles between 2010 and 2014 and between non-NCCP and NCCP groups as well. The results are consistent with expenditure deciles in **Error! Reference source not found.**. For the Non-NCCP group, expenditure shares of three quintiles increase between 2010 and 2014, whereas for the NCCP group the poorest quintile and the richest quintile decrease between 2010 and 2014. However, income shares from the near poorest to the near richest quintiles increase between 2010 and 2014. NCCP is unlikely to benefit both the poorest and the richest.

Table 7: Changes in expenditure quintiles (percentage) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP		
	2010	**2014**	**Ratio**	**2010**	**2014**	**Ratio**
Poorest	8.95	9.18	1.03***	9.01	8.70	0.97***
Near poorest	13.05	13.58	1.04***	11.81	12.29	1.04***
Middle	17.18	17.38	1.01***	15.53	16.56	1.07***
Near richest	22.52	22.38	0.99***	20.23	22.38	1.11***
Richest	38.30	37.49	0.98***	43.42	40.07	0.92***

*Note: *** significant at 1% level. Source: Authors' estimation from VHLSS 2010-14 (Household Survey)*

Table 8 presents changes in expenditure quintiles (in terms of the mean of expenditure) and a comparison of expenditure quintiles between 2010 and 2014 and between non-NCCP and NCCP groups as well. All quintiles are better between 2010 and 2014 for both groups of non-NCCP and NCCP. Only the near richest quintile shows to be better off between NCCP vs. non-NNCP.

Table 8: Changes in expenditure quintiles (expenditure mean) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	**2014**	**Diff**	**2010**	**2014**	**Diff**	
Poorest	6,225	7,711	1,486	6,800	8,211	1,411	-75
Near poorest	9,054	11,427	2,373	9,279	11,149	1,870	-503
Middle	11,918	14,654	2,736	12,044	14,659	2,615	-121
Near richest	15,654	18,948	3,294	15,286	19,526	4,240	946
Richest	26,594	31,827	5,233	33,035	33,959	924	-4,309

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 9 presents changes in income deciles (percentage) and a comparison of income deciles between 2010 and 2014 and between non-NCCP and NCCP groups as well. For the non-NCCP group, income shares of seven deciles decrease between 2010 and 2014, whereas for the NCCP group, the first six deciles decrease between 2010 and 2014. In terms of income, NCCP is unlikely to benefit the six bottom deciles.

Table 9: Changes in income deciles (percentage) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP		
	2010	**2014**	**Ratio**	**2010**	**2014**	**Ratio**
Bottom	2.80	0.59	0.21***	2.60	0.56	0.22***
2nd decile	4.10	2.23	0.54***	4.16	2.01	0.48***
3rd decile	5.16	3.64	0.71***	5.57	3.34	0.60***
4th decile	6.15	4.91	0.80***	6.12	4.14	0.68***
5th decile	7.19	6.24	0.87***	6.78	5.47	0.81***
6th decile	8.35	7.81	0.93***	8.10	6.79	0.84***
7th decile	10.04	9.72	0.97***	9.13	9.41	1.03***
8th decile	12.22	12.41	1.02***	11.22	12.30	1.10***
9th decile	15.72	16.75	1.07***	15.00	16.92	1.13***
Top	28.25	35.70	1.26***	31.33	39.04	1.25***

*Note: *** significant at 1% level, ** at 5% level. Source: Authors' estimation from VHLSS10-14 (Household survey)*

Table 10 presents changes in income deciles (in terms of the mean of income) and a comparison of income deciles between 2010 and 2014 and between non-NCCP and NCCP groups as well. All deciles, except for the bottom, are better between 2010 and 2014 for both groups of non-NCCP and NCCP. The bottom 20 shows to be worse off between NCCP vs. non-NNCP.

Table 10: Changes in income deciles (income mean) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	**2014**	**Diff**	**2010**	**2014**	**Diff**	
Bottom	4,536	3,646	-890	4,131	3,906	-225	665
2nd decile	6,654	13,890	7,236	6,745	11,607	4,862	-2,374
3rd decile	8,393	22,587	14,194	8,295	22,611	14,316	122
4th decile	10,006	30,291	20,285	10,272	30,159	19,887	-398
5th decile	11,609	38,413	26,804	11,518	36,788	25,270	-1,534
6th decile	13,512	48,268	34,756	13,454	47,447	33,993	-763
7th decile	16,181	60,038	43,857	16,106	57,620	41,514	-2,343
8th decile	19,682	77,237	57,555	19,740	82,272	62,532	4,977
9th decile	25,414	104,835	79,421	25,913	103,232	77,319	-2,102
Top	45,563	221,700	176,137	54,625	258,809	204,184	28,047

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 11 presents changes in income quintiles (percentage) and a comparison of income quintiles between 2010 and 2014 and between non-NCCP and NCCP groups as well. The results are consistent with

income deciles in. For the Non-NCCP group, income shares of the four bottom quintiles decrease between 2010 and 2014, whereas for the NCCP group the three bottom quintiles decrease between 2010 and 2014. However, income shares of the richest quintiles increase between 2010 and 2014. NCCP is unlikely to benefit the three bottom quintiles.

Table 11: Changes in income quintiles (percentage) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP		
	2010	2014	Ratio	2010	2014	Ratio
Poorest	6.91	2.82	0.41***	6.76	2.58	0.38***
Near poorest	11.32	8.56	0.76***	11.69	7.48	0.64***
Middle	15.54	14.04	0.90***	14.87	12.26	0.82***
Near richest	22.26	22.13	0.99***	20.34	21.72	1.07***
Richest	43.97	52.45	1.19***	46.33	55.97	1.21***

Note: *** significant at 1% level, ** at 5% level. Source: Authors' estimation from VHLSS10-14 (Household survey)

Table 12 presents changes in income quintiles (in terms of the mean of income) and a comparison of income quintiles between 2010 and 2014 and between non-NCCP and NCCP groups as well. All quintiles are better between 2010 and 2014 for both groups of non-NCCP and NCCP. However, the poorest quintile shows to be worse off between NCCP vs. non-NNCP.

Table 12: Changes in income quintiles (income mean) by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP			NCCP			Diff in Diff
	2010	2014	Diff	2010	2014	Diff	
Poorest	5,590	8,791	3,201	5,438	7,207	1,769	-1,432
Near poorest	9,158	26,348	17,190	9,832	27,139	17,307	117
Middle	12,569	43,205	30,636	12,429	44,605	32,176	1,540
Near richest	18,013	68,754	50,741	17,063	67,891	50,828	87
Richest	35,536	163,835	128,299	39,513	175,037	135,524	7,225

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 13 shows changes in income inequality between 2010 and 2014 and between non-NCCP and NCCP groups as well. Within both non-NCCP and NCCP groups, income inequality increases over 2010-2014.

Table 13: Changes in income inequality by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP		NCCP	
	2010	2014	2010	2014
Top 10/bottom 10	10.04	60.81	13.22	66.26
Top 20/bottom 20	6.36	18.64	7.27	24.29
Income Gini	0.37	0.49	0.39	0.52

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Table 14 shows changes in expenditure inequality between 2010 and 2014 and between non-NCCP and NCCP groups as well. Within both, non-NCCP and NCCP groups, expenditure inequality decreases over 2010-2014.

Table 14: Changes in expenditure inequality by Non-NCCP and NCCP groups, 2010-2014

Outcome	Non-NCCP		NCCP	
	2010	2014	2010	2014
Top 10/bottom 10	4.27	4.13	4.86	4.14
Top 40/bottom 40	2.77	2.65	3.01	2.76
Expenditure Gini	0.29	0.28	0.35	0.32

Source: Authors' estimation from VHLSS 2010-14 (Household Survey)

Household-level confounding variables

Time variant household-level explanatory variables that could be correlated with outcome variables have also been obtained from the data set to serve as controls in the fixed effects regression including, demographic characteristics and socio-economic characteristics. Demographic characteristics are compiled from the household roster and include household size and proportion of members in different age/sex groups to capture changes in household composition resulting from births, deaths and marriages. Socio-economic variables include household head's characteristics, and the proportion of members in a different occupation, and education as well. Summary statistics are reported in Table 15.

Table 15: Summary statistics on household-level covariates, 2010-2014

Covariates	Baseline (2010)		Follow-up (2014)	
	Mean	Std. Dev.	Mean	Std. Dev.
Demographic characteristics				
Household size	3.910	1.536	3.823	1.510
Kinh majority (=1)	0.946	0.227	0.923	0.266
Proportion of elderly	0.119	0.247	0.131	0.237
Proportion of child	0.231	0.205	0.226	0.201
Proportion of female	0.520	0.197	0.501	0.197
Socio-economic characteristics				
Head's age	49	14.143	51	13.393
Head male (=1)	0.753	0.432	0.769	0.422
Head married (=1)	0.795	0.404	0.000	0.000
HH member's occupation				
"Leaders/ Managers" (%)	0.042	0.136	0.035	0.108
"Professionals/ Technicians" (%)	0.015	0.079	0.018	0.099
"Clerks/ Service Workers" (%)	0.123	0.207	0.115	0.211
"Agriculture/ Forestry/ Fishery" (%)	0.003	0.028	0.007	0.060
"Skilled Workers/Machine Operators" (%)	0.004	0.057	0.002	0.025
"Unskilled Workers" (%)	0.000	0.013	0.000	0.000
HH member's educational level				
"No degree" (%)	0.355	0.295	0.322	0.295
"Primary school" (%)	0.308	0.265	0.333	0.275
"Lower Secondary School" (%)	0.141	0.204	0.142	0.205
"Upper Secondary School" (%)	0.058	0.139	0.063	0.151
"College and above" (%)	0.016	0.079	0.023	0.094

Note: HH: Household. Source: Authors' calculation from VHLSS 2010-2014 (Household Survey)

Commune-level confounding variables

Time variant commune-level explanatory variables that could be correlated with outcome variables have also been obtained from the data-set to serve as controls in the fixed effects regression including: (1) commune general conditions, (2) social support programs within three years before 2010, and (3) initial infrastructure conditions three years before 2010.

Commune conditions include several natural disasters, commune with specific natural disaster, communes that self-reported no improvement or improvement in living standards compared to 5 years before the survey, were asked about the reasons, with possible responses including a natural disaster or production risk or number of enterprises (firms, or factories) per 1000 commune members in 2006-2010, and 2001-2005. Summary statistics are reported in Table 16.

Table 16: Summary statistics on commune-level covariates: Commune general conditions

Covariates	Baseline (2010)		Follow-up (2014)	
	Mean	Std. Dev.	Mean	Std. Dev.
Storm in the survey year (=1)	0.074	0.261	0.037	0.188
Storm in the last year (=1)	0.119	0.324	0.140	0.347
Storm in the last two years (=1)	0.047	0.212	0.108	0.310
Storm in the last three years (=1)	0.016	0.126	0.040	0.196
Flood in the survey year (=1)	0.006	0.077	0.007	0.086
Flood in the last year (=1)	0.013	0.114	0.031	0.173
Flood in the last two years (=1)	0.007	0.086	0.018	0.132
Flood in the last three years (=1)	0.000	0.000	0.046	0.209
Drought in the survey year (=1)	0.031	0.173	0.003	0.054
Drought in the last year (=1)	0.004	0.066	0.009	0.094
Drought in the last two years (=1)	0.010	0.101	0.000	0.000
Drought in the last three years (=1)	0.000	0.000	0.001	0.038
Epidemic in the survey year (=1)	0.028	0.165	0.003	0.054
Epidemic in the last year (=1)	0.013	0.114	0.016	0.126
Epidemic in the last two years (=1)	0.012	0.108	0.019	0.137
Epidemic in the last three years (=1)	0.000	0.000	0.013	0.114
Insect in the survey year (=1)	0.242	0.428	0.059	0.236
Insect in the last year (=1)	0.060	0.238	0.090	0.286
Insect in the last two years (=1)	0.069	0.254	0.066	0.249
Insect in the last three years (=1)	0.027	0.161	0.029	0.169
Number of enterprises per 1000 commune members in 2006-2010	0.473	0.574	0.507	0.631
Number of enterprises per 1000 commune members in 2001-2005	0.329	0.431	0.297	0.423

Source: Authors' calculation from VHLSS2010-2014 (Commune survey)

Initial infrastructure conditions include infrastructure programs started three years before 2010 and completed three years before 2010 as well. Summary statistics are reported in Table 17.

Table 17: Summary statistics on commune-level covariates: Infrastructure programs

Covariates	Infrastructure programs started 3 years before 2010		Infrastructure programs completed 3 years before 2010	
	Mean	Std. Dev.	Mean	Std. Dev.
Road to district or province (=1)	0.203	0.402	0.178	0.383
Road within commune (=1)	0.502	0.500	0.524	0.500
Bridge 3 (=1)	0.409	0.492	0.391	0.488
Expand irrigation (=1)	0.242	0.429	0.236	0.425
Concrete irrigation canals (=1)	0.138	0.345	0.138	0.345
Electricity (=1)	0.149	0.356	0.133	0.340
Drinking water (=1)	0.230	0.421	0.232	0.423
Health center (=1)	0.223	0.417	0.186	0.389
School (=1)	0.480	0.500	0.393	0.489

Source: Authors' calculation from VHLSS 2010 (Commune Survey)

Estimation steps

We examine two sets of models: (1) small model and (2) large model. The small model contains only demographical variables and commune-level variables such as commune general conditions, and initial infrastructure conditions. The large models include additional socio-economic variables such as education, occupation, and commune-level variables as in the small model. We tend to use a small set of control variables that are more exogenous or less likely to be affected by NCCP. The control variables should not be affected by the treatment variable of interest, i.e., the NCCP in this study (Heckman, LaLonde and Smith (1999); Angrist and Pischke (2008)).

We use consumption expenditure instead of income as the dependent variable since consumption expenditure is widely used as an aggregate indicator of household welfare and expenditure data contain fewer measurement errors than income data.

NCCP variable is suspected to be endogenous in model (1), and thus the estimators can be inconsistent. We apply commune fixed effect-2SLS (FE-2SLS) regressions to estimate the effect of the New Countryside Construction Program (NCCP) on household welfare. The Stata *xtivreg2* command is explored (Schaffer, 2015). NCCP variable is instrumented by a set of variables related to social support programs within three years before 2010.

Social support programs from the Vietnamese governments and other organizations (such as job creation, hunger elimination and poverty reduction, investment in economic development and infrastructure, investment in culture and education, health and public health, environment/clean water) within three years before 2010. Summary statistics are reported in Table 18.

Table 18: Summary statistics on commune-level covariates: Government programs or/and support programs within three years before 2010

Covariates	Mean	Std. Dev.
Job creation (=1)	0.467	0.499
Hunger elimination and poverty reduction (=1)	0.717	0.451
Investment on economic development and infrastructure (=1)	0.592	0.492
Investment on culture and education (=1)	0.244	0.430
Health and public health (=1)	0.150	0.358
Environment/clean water (=1)	0.236	0.425

Source: Authors' calculation from VHLSS 2010 (Commune Survey)

Empirical results and discussion

We used two models which differ in the number of explanatory variables in order to examine the sensitivity of the estimates of NCCP impacts to the selection of explanatory variables. The small model contains only demographical variables (such as household size, the proportion of adults above 60 in households, proportion of children below 15 in the household, the proportion of female members in the household, and the ethnicity of the household) and commune-level variables such as commune general conditions (such as specific natural disaster in the last three years, number of enterprises per 1,000 people in 5 and 10 years before), and initial infrastructure conditions (such as infrastructure programs started 3 years before 2010 (namely, the road to district or province, the road within the commune, bridge, irrigation, canals, electricity, drinking water, health center, school), and infrastructure programs completed 3 years before 2010 (namely, the road to district or province, the road within the commune, bridge, irrigation, canals, electricity, drinking water, health center, school).

The large models include additional household-level variables related to socio-economic characteristics (such

as the age of household head, the gender of household head, the proportion of household members in occupations, the proportion of household members in education), and commune-level variables such as commune general conditions, and initial infrastructure conditions as in small model.

The effect of NCCP on expenditure level

In Table 19, we present the commune fixed-effects regression of per capita expenditure. In all alternatives of the model with expenditure, results indicate that households in NCCP-qualified commune have a higher

real expenditure per capita of around 119 per cent.

Although the present study primarily focuses on the impact of NCCP, we observe the negative effects of household size/proportion of children on real expenditure per capita. In addition, households living in commune affected by flood during the survey year, or in commune affected by drought during the last three years have the probability of lower real expenditure per capita of 68,1 percent ($e^{-0.383}$) and 36 percent ($e^{-1.03}$), respectively.

Table 19: Commune fixed-effects regressions of household expenditure

Variable	Small model: Real exp. pc	Large model: Real exp. pc
NCCP (Yes=1; No=0)	1.192*** (0.386)	1.022*** (0.348)
Household size	-0.0543*** (0.0152)	-0.0811*** (0.0129)
Proportion of child	-0.591*** (0.103)	-0.258*** (0.0914)
Member occupation		
"Leaders/ Managers" (%)		-0.0374 (0.103)
"Professionals/ Technicians" (%)		0.0371 (0.196)
"Clerks/ Service Workers" (%)		0.0371 (0.0853)
"Agriculture/ Forestry/ Fishery" (%)		0.217 (0.224)
"Skilled Workers/ Machine Operators" (%)		0.838*** (0.235)
"Unskilled Workers" (%)		0.249 (0.227)
Member education		
"No degree" (%)		-0.00151 (0.0993)
"Primary school" (%)		0.282*** (0.104)
"Lower Secondary School" (%)		0.511*** (0.113)
"Upper Secondary School" (%)		1.064*** (0.152)
"College and above" (%)		1.238*** (0.354)
Flood in the survey year (=1)	-0.363* (0.211)	-0.305 (0.267)
Number of enterprises per 1000 commune members in 2001-2005	0.151** (0.0657)	0.155*** (0.0581)
Commune affected by drought during the last three years (=1)	-1.030*** (0.394)	
Observations	1,358	1,358
R-squared	0.010	0.200
Number of communes	679	679
Under identification test (Kleibergen-Paap LM statistic):	16.529	
Chi-sq(6) P-value	0.0112	

*Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Source: Authors' estimation from VHLSS2010*

The effect of NCCP on income distribution

In Table 20, we present the commune fixed-effects regression of expenditure quantiles for the small model. In all quantiles, (we only present 6 quantiles here to save space), results indicate that households in NCCP-qualified communes have a higher real expenditure per capita than those living in non-NCCP communes.

Estimates of the differential impact of NCCP between

the lowest three deciles and the top three deciles indicate that households in NCCP-qualified commune have the higher real expenditure per capita of around 41.5 per cent for the bottom, 34.4 per cent for the 2nd decile, and 33.9 per cent for the 3rd decile. NCCP likely affects the top at the most, about 63,7%. However, the effects on the 8th and 9th deciles are less compared with those on the 2nd and the 3rd ones.

Table 20: Commune fixed-effects regressions of household expenditure quantiles, small model

Variable	Bottom 10	2nd decile	9th decile	Top 10
NCCP (Yes=1; No=0)	0.415*** (0.0064)	0.343*** (0.0071)	0.0561*** (0.0120)	0.637*** (0.0442)
Household size	-0.0277*** (0.0020)	-0.0385*** (0.0009)	-0.0696*** (0.0010)	-0.0468*** (0.0149)
Proportion of elderly	-0.342*** (0.0052)	-0.379*** (0.0054)	-0.0831*** (0.0055)	-0.652*** (0.126)
Proportion of child	-0.749*** (0.0222)	-0.753*** (0.0092)	-0.433*** (0.0073)	-0.974*** (0.0368)
Storm in the last year (=1)		-0.0586***		-0.122

Variable				
		(0.0076)		(0.150)
Storm in the last three years (=1)	-0.0691***	-0.0353	-0.0975***	
	(0.0116)	(0.0260)	(0.0102)	
Drought in the last year (=1)		-0.00971		
		(0.0240)		
Drought in the last two years (=1)		-0.229***	-0.379***	
		(0.0240)	(0.00647)	
Epidemic in the survey year (=1)	-0.253***	-0.200***	-0.483***	
	(0.0045)	(0.0135)	(0.0048)	
Number of enterprises per 1000 commune members in 2001-2005	0.123*** (0.0057)	0.110*** (0.0031)	0.0921*** (0.0034)	-0.143*** (0.0413)
Number of enterprises per 1000 commune members in 2006-2010	0.0282*** (0.0028)	0.0433*** (0.0044)	0.0581*** (0.0033)	-0.0301 (0.0549)
Storm in the last two years (=1)			-0.0334*** (0.0032)	
Flood in the survey year (=1)			-0.288*** (0.0038)	
Epidemic in the last three years (=1)			-0.318*** (0.0057)	
Drought in the last three years (=1)			-0.0715*** (0.0129)	
Constant	9.191*** (0.0044)	9.437*** (0.0054)	10.48*** (0.0079)	8.926*** (0.0555)
Observations	1,358	1,358	1,358	1,358

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Source: Authors' estimation from VHLSS 2010

In Table 21, we present the commune fixed-effects regression of expenditure quantiles for a large model. In all quantiles, (we only present 6 quantiles here to save space), results indicate that households in NCCP-qualified communes have a higher real expenditure per capita than those living in non-NCCP communes.

Estimates of the differential impact of NCCP between the lowest three deciles and the top three deciles indicate that households in NCCP-qualified commune have the higher real expenditure per capita of around 24.8 per cent for the bottom, 16.9 per cent for the 2nd decile, and 14.8 per cent for the 3rd decile. NCCP likely affects the top at the most, about 37,1%. However, the effects on the 8th and 9th deciles are less compared with those on the 2nd and the 3rd ones.

Table 21: Commune fixed-effects regressions of household expenditure quantiles, large model

Variable	Bottom 10	2nd decile	9th decile	Top 10
NCCP (Yes=1; No=0)	0.248***	0.169***	0.111***	0.371***
	(0.0039)	(0.0076)	(0.0014)	(0.0046)
Household size	-0.0279***	-0.0509***	-0.102***	-0.0573***
	(0.0010)	(0.0006)	(0.0011)	(0.0017)
Proportion of elderly	-0.216***	-0.0985***	0.205***	-0.334***
	(0.0073)	(0.0031)	(0.0009)	(0.0305)
Proportion of child	-0.429***	-0.308***	-0.185***	-0.130***
	(0.0154)	(0.0075)	(0.0011)	(0.0072)
Age's head	-0.0006***	0.0005***	-0.0025***	-0.0016***
	(0.0002)	(8.48x10^{-5})	(0.0001)	(0.0002)
Male head (=1)	0.0455***	0.0796***	0.00255	0.00467
	(0.00279)	(0.0027)	(0.0026)	(0.0138)
Head married (=1)	-0.141***	-0.137***	-0.0642***	-0.113***
	(0.0026)	(0.0024)	(0.0007)	(0.0032)
HH member's occupation				
"Leaders/ Managers" (%)	0.282***	0.191***	-0.0657***	0.586***
	(0.0087)	(0.0086)	(0.0012)	(0.0194)
"Professionals/ Technicians" (%)	0.0107	-0.0399***	-0.0365***	0.0203*
	(0.0076)	(0.0112)	(0.00207)	(0.0113)
"Clerks/ Service Workers" (%)	0.233***	0.211***	0.234***	0.413***
	(0.0086)	(0.0033)	(0.0019)	(0.0044)
"Agriculture/ Forestry/ Fishery" (%)	0.0540 (0.0401)	0.0219** (0.0102)	0.119*** (0.0014)	0.149*** (0.0145)
"Skilled Workers/ Machine Operators" (%)	0.936*** (0.0259)	0.766*** (0.0203)	0.337*** (0.0024)	1.502*** (0.0116)
"Unskilled Workers" (%)	1.412***	0.509***	-2.696***	3.610***
	(0.0074)	(0.0162)	(0.0011)	(0.0616)
HH member's educational level				
"No degree" (%)	0.239***	0.157***	-0.0755***	0.0899***
	(0.0096)	(0.0042)	(0.0021)	(0.0242)
"Primary school" (%)	0.434***	0.440***	0.323***	0.349***
	(0.0054)	(0.0082)	(0.0011)	(0.0473)
"Lower Secondary School" (%)	0.798***	0.760***	0.533***	0.612***
	(0.0056)	(0.0041)	(0.0013)	(0.0462)
"Upper Secondary School" (%)	0.816***	0.927***	1.055***	0.948***
	(0.0137)	(0.0095)	(0.0005)	(0.0258)

Variable	Bottom 10	2nd decile	9th decile	Top 10
"College and above" (%)	1.421*** (0.00893)	1.605*** (0.0168)	1.204*** (0.00136)	1.829*** (0.0333)
Storm during the last year (=1)	-0.0231*** (0.0034)	-0.0248*** (0.0033)		-0.0643*** (0.0034)
Storm in the last three years (=1)	-0.0701*** (0.0069)		-0.0873*** (0.0026)	
Flood in the last three years (=1)	-0.0267** (0.0127)	-0.0242*** (0.0091)		
Drought in the last year (=1)	-0.0662*** (0.0044)			
Drought in the last two years (=1)	-0.264*** (0.0059)		-0.512*** (0.0008)	
Number of enterprises per 1000 commune members in 2001-2005	0.0782*** (0.0047)	0.0952*** (0.0017)	0.0372*** (0.0012)	-0.256*** (0.0080)
Number of enterprises per 1000 commune members in 2006-2010	0.0171*** (0.0022)	0.0138*** (0.0012)	0.104*** (0.0013)	0.0565*** (0.0021)
Epidemic in the survey year (=1)		-0.163*** (0.0056)	-0.208*** (0.0010)	
Storm in the last two years (=1)			-0.163*** (0.0017)	-0.0087* (0.0045)
Flood in the survey year (=1)			-0.472*** (0.0037)	
Drought in the last three years (=1)			-0.0867*** (0.0011)	
Epidemic in the last three years (=1)			-0.250*** (0.0009)	
Constant	8.803*** (0.0158)	8.948*** (0.0075)	10.32*** (0.0092)	8.582*** (0.0121)
Observations	1,358	1,358	1,358	1,358

*Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Source: Authors' estimation from VHLSS2010*

Conclusion

The paper estimates the effect of NCCP on household welfare in the Mekong River Delta of Vietnam. It finds that NCCP has a positive effect on household expenditure in all models, both in terms of expenditure level, and expenditure quintile. In all alternatives of the model with expenditure, results indicate that households in NCCP-qualified commune have a higher real expenditure per capita of around 1.1 times.

Estimates of the differential impact of NCCP between the lowest three deciles and the top three deciles in both small and large models indicate that households in NCCP-qualified commune have a higher real expenditure per capita of around 41.5 percent for the bottom, 34.4 percent for the 2nd decile, and 33.9 percent for the 3rd decile. NCCP likely affects the top at the most, about 63.7%. However, the effects on the 8th and 9th deciles are less when compared with those on the 2nd and the 3rd ones.

While efforts were made to identify the impact of NCCP, it is not possible to completely differentiate its impact from the spillover effect since NCCP is said to be a profound and comprehensive social mobilization (in economic, socio-cultural development, productivity, living standards, lifestyle, customs, and traditions). It is also not possible to completely disaggregate NCCP into separated programs to evaluate the total and specific impacts of NCCP.

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