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Government Role in the Risk Sharing of Thai Households

Thanaruk Loharungsee[*]
Department of Trade and International Business Operation, Government Savings Bank, Thailand

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Abstract

This paper estimates the impact of the government's role on the risk sharing of Thai households, using a Household Socio-Economic Panel Survey data set (SES Panel) for the period between 2005 and 2010. This paper applies contrast estimator techniques, developed by Suri (2013), to estimate the extent of risk sharing. The results show that Thai households in rural areas share risks better than those in urban areas in most parts of the country. The contrast estimator also suggests that village funds help households in urban and rural areas to share risk, and government banks play an important role in risk sharing in rural areas. However, public transfers do not help risk sharing mechanisms in either urban or rural areas.

Keywords: risk sharing, partial insurance, government role, contrast estimator, smooth consumption
JEL Classification: O12, O17, O18, O23

[*]**Address:** 470 Phahonyothin Rd, Khwaeng Samsen Nai, Khet Phaya Thai, Krung Thep Maha Nakhon 10400. Email: ThanarukL@gsb.or.th.

1. Introduction

People face significant risks to their livelihoods throughout most developing countries worldwide. These risks include human illness, sickness or death of farm animals, crop failure and disease, droughts and flooding caused by erratic monsoon rains, social unrest, and involuntary redundancy, all of which cause fluctuations in net incomes. While household incomes in developing countries vary greatly, rates of consumption remain remarkably smooth (Townsend, 1994). Risk averse households would be better off if they could cope with risks efficiently. The ability to cope with risk represents an important indicator of the well-being of households. A question of great policy relevance concerns the extent and efficiency of the formal and informal mechanisms available for insuring risk in these economies. These mechanisms include the informal credit market (see Udry (1994)), migration and remittances (see Paulson (2000), formal and informal financial access (see Alem and Townsend (2004,2014)), government policies, such as food subsidies (see Dercon and Krishnan (2003)) and formal financial access (see Townsend and Ueda (2006)).

Significant research concerning evidence of Pareto optimal risk sharing in both developed and developing economies, and testing alternatives to this benchmark model exists. According to the theory of full insurance, if risks are idiosyncratic, as the empirical evidence argues (e.g. Mace (1991), Cochrane (1991), Townsend (1994), and Townsend (1995)), then risk-averse households should group together to share all risks. If risks are shared efficiently, household consumption should be unaffected by idiosyncratic risks. A number of economists have studied full insurance in different countries, including Mace (1991) in the United States, Cochrane (1991) also in the United States, Townsend (1994) in the context of villages in India, and Townsend (1995) in Thailand.

Many papers have been published focusing on risk sharing in Thai households using the Townsend Thai Project and Household Socio-Economic Survey data, such as Townsend (1995), Pawasuttipaisit (1997), Vanitcharearnthum and Jitsuchon (2003), Alem and Townsend (2004,2014), Paweenawat and Townsend (2012), Kinnan and Townsend (2012), Chiappori et al. (2013), Sirisankanan (2013), Shawong (2014), Kinnan (2014), Kilenthong (2015), Samphantharak and Townsend (2016). Several of these papers reject perfect risk sharing, but do find evidence of substantial risk sharing, especially in terms of food consumption, in particular the papers of Deaton (1990) and Townsend (1994). The full insurance model is statistically rejected in urban and rural areas with Thai households. However, many Thai households are involved in various forms of insurance policies, such as insurance among family members, relatives and friends, contracts between employers and employees, unemployment insurance, crop insurance, formal and informal financial networks, and the buying and sellingof buffer stocks (see Lim and Townsend (1998)), that households use to deal with income risks.

Benchmarks of insurance are hard to achieve and tests for full risk sharing do fail, yet we can learn something about the risk coping mechanisms of financial systems by studying them directly. For example, Alem and Townsend (2004, 2014) explored the financial transactions used to assess the impact of the major formal and informal financial institutions of an emerging market economy in terms of Thai households, and linked financial institution assessments to their actual impact on clients. They found that The Bank of Agriculture and Agricultural Cooperatives (BAAC) is particularly helpful in smoothing consumption, consistent with its own operating system, which embeds an implicit insurance operation. While commercial banks smooth investment, largely through formal savings accounts, other institutions seem ineffective. Furthermore, Kilenthong (2015) in their estimation of the impact of formal financial

institutions on the risk sharing of Thai households, suggest that formal financial institutions are effective in helping households share risk if the risk sharing group is large. On the other hand, other mechanisms are more effective when the risk sharing group is more localized/small.

The objective of this study is to estimate the extent of partial risk sharing (i.e. the level of local risk sharing) by using the contrast estimator approach of Suri (2013), which has the added advantage of jointly testing all the implications of perfect risk sharing. This contrast estimator presents the risk sharing problem in terms of a spillover. By contrasting how a household's consumption responds to an idiosyncratic shock (within risk sharing groups, here villages) to how the average village responds to an aggregate shock (between villages), we can estimate the extent of local risk sharing between households in these villages using the Household Socio-Economic Panel Survey data set (SES Panel), conducted by the National Statistical Office of Thailand.

In addition, this paper estimates the impact of government roles on the risk sharing of Thai households. In principle, perfect insurance and financial markets are supposed to provide an efficient risk coping mechanism if the markets do exist. However, markets are incomplete, or do not exist at all in most of the country. This paper also applies a contrast estimator to test whether, and how much, existing government policy can help households to cope with their income risk via government banks, village funds and public transfers. Such a methodology used is closely related to Kilenthong (2015), who takes advantage of this feature to estimate the difference in risk sharing between the two groups, and then interprets the estimated difference as the impact of the existing formal financial institutions on the risk sharing of Thai households.

The results show that Thai households in rural areas share risks better than those in urban areas in most parts of the country. The contrast estimator also suggests that village funds help households in urban and rural areas to share risk, and government banks play an important role in risk sharing in rural areas. On the other hand, public transfers do not help in the risk sharing mechanism both in urban and rural areas. These results suggest that government financial institutions help create a large risk sharing network that links rural households across the country together, and enables them to share risk with each other.

The rest of this paper is outlined as follows: A theory of risk sharing is described in Section 2. Section 3 contains the methodology, which is divided into two parts. Part 3.1 covers the methodology for estimating the extent of partial insurance, and part 3.2 deals with the methodology used for estimating the government role in risk sharing between access and non-access groups. Section 4 describes the data used in the analysis. Estimation results are presented and discussed in Section 5, while Section 6 concludes the paper.

2. A Theory of Risk Sharing

Studies on the impact of shocks on consumption or consumption smoothing have been proposed in two forms. Permanent income hypothesis (PIH), which includes the strict assumption that it is possible that if there is a complete market for credit, transitory income shocks (both idiosyncratic and aggregate) should be smoothed away by borrowing and savings and should not affect consumption patterns. In contrast to PIH, this study focuses on testing a risk sharing hypothesis. Both risk sharing hypotheses and PIH try to explain consumption smoothing, but are different in their inherent concepts and methodologies.

The concepts of perfect risk sharing or full insurance are derived from the work of Diamond (1967) and Wilson (1968), which postulate that, if preferences are time separable and display weak risk aversion, if all individuals discount the future at the same rate, and if all information is held in common, then an optimal allocation of risk bearing of a single good in a stochastic environment implies that all individual consumptions are determined by aggregate consumption, no matter what the date and history of shocks, and so individuals consumptions will move together. In the other words, individual consumption should not depend on individual income, once aggregate consumption is controlled for. Consequently, the optimal allocation of risk bearing is equivalent to allocations consistent with the existence of complete markets, especially markets for contingent claims, as the setting of a social planner in Arrow-Debreu Equilibrium.

The programming problem for the determination of Pareto-optimal allocations can be studied following the steps of Mace (1991) and Townsend (1994). Here, the risk-sharing problem is cast in the setting of a social planner, who maximizes the weighted sum of the expected utilities of individuals subject to an aggregate resource constraint. Optimal resource allocation entails a distribution of the aggregate endowment that equalizes weighted marginal utilities across individuals.

Described below are the general characteristics of the economy, including the information structure, preferences, and endowments.

A. Information

Suppose all households share common information with all other households. Household common information at time t is represented by one of S possible states of the world $s_t = (\varepsilon_1, \varepsilon_2, ..., \varepsilon_t)$, household h given contemporary state ε_t and the prior history of states, $(\varepsilon_1, \varepsilon_2, ..., \varepsilon_{t-1})$, then $s_t = (\varepsilon_1, \varepsilon_2, ..., \varepsilon_t)$. The number of contemporary states is finite, but the number of possible states may be infinite. The term $\pi(s_t) \in (0,1)$ denotes the probability that contemporary state ε_t occurs at time t with $\sum_{s_t} \pi(s_t) = 1$, for all t.

B. Preferences

There are H households living forever, each household is assumed to have preferences that are time-separable and state-separable, with the same discount factor $\rho^t \in (0,1)$. Assuming that utility functions are separable between consumption and leisure, expected lifetime utility for household h, at state s_t is expressed as:

$$\sum_{t=0}^{\infty} \rho^t \sum_{s_t} \pi(s_t) W\left[C^h(s_t), l^h(s_t), \delta^h(s_t)\right], \tag{1}$$

where $W\left[C^h(s_t), l^h(s_t), \delta^h(s_t)\right]$ denotes the basic, within-period utility function for consumption and leisure by household h. Assuming that utility functions are separable between consumption and leisure, household utility can be written as:

$$W\left[C^h(s_t), l^h(s_t), \delta^h(s_t)\right] = U\left[C^h(s_t), \delta^h(s_t)\right] + V\left[l^h(s_t), \delta^h(s_t)\right] \tag{2}$$

Each household gains utility from consumption ($C^h(s_t)$) and preference shocks ($\delta^h(s_t)$). As the notation shows, consumption and shocks can change across time and

state. This study uses a constant absolute risk aversion (CARA) utility[1] (also see Mace (1991)), and assumes homogeneous risk preference, let:

$$U\left[C^h\left(s_t\right),\delta^h\left(s_t\right)\right]=-\frac{1}{\sigma}\exp[-\sigma(C^h\left(s_t\right)-\delta^h\left(s_t\right))]. \tag{3}$$

when households have the same coefficient of constant absolute risk aversion σ.

C. Endowments

Each household h receives an exogenous endowment of the consumption good ($e^h\left(s_t\right)$), and cannot save between periods.

Pareto efficient

The social planner maximizes the weighted sum of the expected utilities of individuals subject to an aggregate resource constraint, for each date and state as follows:

$$\underset{\{c^h(s_t)\}}{Maximize}\sum_{h=1}^{H}\omega^h\sum_{t=0}^{\infty}\rho^t\sum_{s_t}\pi\left(s_t\right)W\left[C^h\left(s_t\right),l^h\left(s_t\right),\delta^h\left(s_t\right)\right], \tag{4}$$

$$s.t.\qquad \sum_{h=1}^{H}C^h\left(s_t\right)\le\sum_{h=1}^{H}e^h\left(s_t\right), \tag{5}$$

with the Pareto weight ω^h satisfying is between zero and one, and THE summation is equal to one. From the first order condition for this problem for two households, h and j,

$$\frac{\omega^j}{\omega^h}=\frac{U_c\left[C^h\left(s_t\right),\delta^h\left(s_t\right)\right]}{U_c\left[C^j\left(s_t\right),\delta^j\left(s_t\right)\right]}. \tag{6}$$

Optimal resource allocation entails a distribution of the aggregate endowment that equalizes weighted marginal utilities across households. When we take the logarithm of equation (6) and aggregate over H households, it follows that consumption for household h is:

$$C^h\left(s_t\right)=\frac{1}{\sigma}\left(\log\omega^h-\frac{1}{H}\sum_{j=1}^{H}\log\omega^j\right)+\frac{1}{H}\sum_{j=1}^{H}C^h\left(s_t\right)+\left[\delta^h\left(s_t\right)-\frac{1}{H}\sum_{j=1}^{H}\delta^j\left(s_t\right)\right], \tag{7}$$

The first term represents the wealth effect or fixed effect of household h, it does not change overtime. The second term denoting aggregate or average consumption, depends on aggregate endowment. The third term denotes demographics, such as age, sex, education, occupation, household size, etc.

3. Methodology

This section on methodology consists of two parts: Part 3.1 deals with the methodology for estimating the extent of partial insurance, whereas Part 3.2 deals with

[1] I also use a constant relative risk aversion (CRRA) utility, The results are not much different from those derived using CARA.

the methodology for estimating the government role in risk sharing between access and non-access groups.

3.1 Methodology for Estimating the Extent of Partial Risk Sharing

The risk sharing implications are recast for empirical implementation. The major implication is that household consumption responds to aggregate risk, but not to idiosyncratic risk. Formally, consider a reduced-form version of equation (7),

$$C_t^{hp} = \alpha^{hp} + \beta C_t^{p} + \theta Y_t^{hp} + \gamma \mathbf{X}_t^{hp} + u_t^{hp} \tag{8}$$

where C_t^{hp} and Y_t^{hp} are the consumption and income shock for household h in group p in period t, respectively, C_t^{p} represents average consumption for group p in period t, α^{hp} is the wealth effect, or fixed effect, for household h in group p in period t (see Cochrane (1991)), and $\mathbf{X}_t^{hp}$ is a vector of demographic for household h in group p in period t. This prediction of full insurance actually comprises a joint test of the null hypothesis that $\beta = 1$ and $\theta = 0$.

As pointed out in Deaton (1990), with no covariates in the specifications, the right hand side of (8) will measure $\hat{\beta}$ to be exactly one, then estimate $\hat{\beta}$ cannot have a behavior interpretation problem. This problem has been discussed by Deaton (1990) and Townsend (1994)[2]. Furthermore, applying the contrast estimator approach of Boozer and Cacciola (2001) and Suri (2013) can be used to estimate the extent of risk sharing among households within subgroups. This method can be summarized as follows. Econometrically, consider again the risk sharing reduced-form,

$$C_t^{hp} = \alpha^{hp} + \beta C_t^{-h,p} + \theta Y_t^{hp} + \gamma \mathbf{X}_t^{hp} + u_t^{hp}, \tag{9}$$

where $C_t^{-h,p} = \frac{1}{P-1}(PC_t^{p} - C_t^{hp})$ is the average consumption by leave-out mean for group p excluding household h in period t, and P is the number of households in group p. The equation (9) can be rewritten in the form of de-mean in group as:

$$C_t^{hp} - C_t^{p} = (\alpha^{hp} - \alpha^{p}) + \beta(C_t^{-h,p} - C_t^{p}) + \theta(Y_t^{hp} - Y_t^{p}) + \gamma(\mathbf{X}_t^{hp} - \mathbf{X}_t^{p}) + (u_t^{hp} - u_t^{p})$$

$$C_t^{hp} - C_t^{p} = \frac{\alpha^{hp} - \alpha^{p}}{1 + \frac{\beta}{P-1}} + \frac{\theta^{W}}{1 + \frac{\beta}{P-1}}(Y_t^{hp} - Y_t^{p}) + \frac{\gamma^{W}}{1 + \frac{\beta}{P-1}}(\mathbf{X}_t^{hp} - \mathbf{X}_t^{p}) + \frac{u_t^{hp} - u_t^{p}}{1 + \frac{\beta}{P-1}}. \tag{10}$$

Equation (10) specifies the within-groups regression equation. The coefficient of the second term $(Y_t^{hp} - Y_t^{p})$ is the within estimator, it measures household consumption responses to purely idiosyncratic shocks, since the village (group) fixed effects control for aggregate shocks (as well as aggregate consumption). In the next step, the average of equation (8) is as follows:

$$C_t^{p} = \alpha^{B} + \theta^{B} Y_t^{p} + \gamma^{B} \mathbf{X}_t^{p} + u_t^{B}. \tag{11}$$

[2] Deaton (1990,1997) uses a group-time dummy to capture the aggregate consumption. Besides, Townsend (1994) subtracts out average group consumption from household consumption and uses this as the dependent variable.

Equation (11) specifies the between-group regression equation. $\hat{\theta}^B$ is the between estimator, it measures household's consumption responses to aggregate shocks.

Using equations (10) and (11)[3], the contrast estimator from a comparison of the within and between estimators can be derived as follows:

$$\hat{\beta} = 1 - \frac{\hat{\theta}^W}{\hat{\theta}^B}, \tag{12}$$

Comparison of these two estimates measures the extent to which household shocks can be smoothed within a village over and above any aggregate shocks. Therefore, the contrast estimator estimates the extent of partial risk sharing, there is evidence of at least some smooth consumption although the allocations of consumption may not be like those expected in fully Pareto optimal conditions.

The contrast estimator reflects the risk sharing problem in terms of spillover at the village level as it reveals insurance or the extent of consumption smoothing that comes from a household being part of a given village. The idea of a spillover is a natural way to think about risk sharing since, theoretically, only aggregate shocks to income, and not idiosyncratic shocks, should have an effect on household consumption. It allows a comparison of how a household's consumption responds to an idiosyncratic shock to how the average village responds to an aggregate shock. In the other words, there will be evidence of risk sharing as an insurance spillover if the within estimate is less than the between estimate.

3.2 Methodology for Estimating the Government's Role in Risk Sharing

To assess the impact of the government's role on consumption insurance, this paper follows a modified version of the financial choice model of Greenwood and Jovanovic (1990). In this model, households choose whether to become a member of a financial institution by weighing the costs and benefits of participation. This paper also applies a contrast estimator to test whether, and by how much, existing government policy can help households cope with their income risks through using facilities offered by government banks, village funds and public transfers. The methodology used is closely related to Kilenthong (2015), who takes advantage of this feature to estimate the difference in risk sharing between two groups, those who have access to formal financial institutions and those who do not.

Government financial institutions such as government banks and village funds, which allow for government transfers to specified groups, have been incorporated in the context of a general equilibrium model in which there are access and non-access groups. Most familiar is the imagined world with a complete *ex-ante* market for financial contracts;that is with risk contingencies and perfect insurance.

3.2.1 Government Banks and Village Funds

To assess the impact of government financial institutions, such as government banks and village funds, on consumption insurance, a modified version of the financial choice model from Alem and Townsend (2004,2014) and Kilenthong (2015) has been constructed. Technically, the risk sharing reduced-form has been modified by adding government financial access on the right-hand side of equation (9), to check which access helps in consumption smoothing. The empirical specification of this is:

[3] Boozer and Cacciola (2001) show that this method of moments estimator, computed as a combination of standard panel estimators, is equivalent to a particular IV estimator of β in equation (8).

$$C_t^{hp} = \alpha^{hp} + \beta C_t^{-h,p} + \theta Y^{hp} + \zeta d^{fi} * Y^{hp} + \gamma \mathbf{X}_t^{hp} + u_t \,, \tag{13}$$

where the government financial dummy d^{fi} is one, if household h has financial access, and zero otherwise. If the estimate $\hat{\zeta}$ is negative and statistically different from zero, it can be concluded that households with government financial access have better consumption insurance. Next, with a similar methodology applied to (9) – (12), the contrast estimator for government financial access groups can be calculated as follows:

$$\hat{\beta} = 1 - \frac{\hat{\theta}^W + \hat{\zeta}^W}{\hat{\theta}^B + \hat{\zeta}^B}, \tag{14}$$

The Contrast estimator for non-government financial access groups can be calculated as in equation (12): $\hat{\beta} = 1 - \frac{\hat{\theta}^W}{\hat{\theta}^B}$. If the contrast estimator for access groups is better than non-access groups, this means that households with government financial have better consumption insurance.

3.2.2 Public Transfers

To assess the impact of public transfers on consumption insurance, a modified version of the risk sharing model from Dercon and Krishnan (2003) and Kilenthong (2015) has been applied. Technically, the risk sharing reduced-form has been modified by adding a public transfer variable to the right-hand side of equation (9), to check which transfers help in consumption smoothing, the empirical specification is:

$$C_t^{hp} = \alpha^{hp} + \beta C_t^{-h,p} + \theta Y^{ha} + \xi T^{hp} + \gamma \mathbf{X}_t^{hp} + u_t \,, \tag{15}$$

where T^{hp} is the public transfers for household h in group p in period t. Next, with a similar process applied to (9) – (12), the contrast estimator for equation (15) can be calculated as equation (12), $\hat{\beta} = 1 - \frac{\hat{\theta}^W}{\hat{\theta}^B}$. This part of this study separates households into two groups: households which have public transfers in the same group, and households without public transfers in the same group. If a contrast estimator for access groups is better than non-access groups, it means that households with public transfers have better consumption insurance.

4. Data

This paper uses Household Socio-Economic Panel Survey data sets (SES Panel) for the periods 2005 – 2007, 2010, 2012 comopiled by the National Statistical Office of Thailand. For the first three rounds (2005-2007), the survey was recorded in May, while the two final (2010 and 2012) rounds were surveyed in January. The SES Panel covers every province in Thailand and includes both rural and urban households in the same data set. The survey has two parts. The first deals with household information concerning every member in a household, including general information about household members, housing characteristics and assets and income from agriculture. The second part concerns individual information about household members aged 15 years or older, including education, health care, employment, income, expenditure and financial status.

Kilenthong (2015) outlined the advantages of using the SES Panel relative to the Townsend Thai Project. This estimation technique needs a sufficient number of

geographical separated areas (as risk sharing groups), and in this project data from 76 provinces (nationally representative) was used. This compares favorably with the Townsend Thai data set (a 13-year panel data set of Thai villages) which covered only six provinces. This large coverage allows the contrast estimator approach of Boozer and Cacciola (2001) and Suri (2013) to estimate the extent of risk sharing among households within subgroups. In particular, this paper uses geographical structure to define risk sharing groups, namely whether they are located in urban or rural areas.

This study uses balanced panel data from 2005 – 2007 and 2010. The first year of data available (the 2005 round) involve a survey of 6,000 households, comprising a total of 16,310 individuals. In retaining only households that have data available for every subsequent year, the final study sample comprised 4,863 households in each round[4], which included 1,640 urban and 3,223 rural households. Data concerning household identification, consumption and income shocks (per month) was used to estimate the risk sharing model data. This data was adjusted to real terms by using the consumer price index (CPI) for each region for urban households, and the rural consumer price index (RPI) for each region for rural households. Moreover, it uses household composition to adjust for male equivalency (age-sex weights), as in Townsend (1994), and adjusts by sampling weight. In this study, the demographic terms for households comprise relevant characteristics of households, such as details of the head of the household, family size and asset indeces. Table 1 provides descriptive statistics of these variables for the whole sample and for each group.

Table 1**:** Summary of Statistics

Variables [Label]	year	Whole kingdom		Urban areas		Rural areas	
		mean	s.d.	mean	s.d.	mean	s.d.
Household consumption (Baht)	2005	1,804.66	1,298.86	2,434.21	1,503.37	1,555.93	1,114.72
	2006	1,764.84	1,263.05	2,463.89	1,471.86	1,503.31	1,063.39
	2007	1,827.04	1,307.85	2,622.44	1,550.86	1,502.92	1,031.97
	2010	1,988.26	1,578.92	2,876.54	1,855.82	1,617.51	1,276.67
[hh_con]	average	1,833.75	1350.46	2,572.16	1,589.20	1,540.87	1,115.09
Household income (Baht)	2005	5,511.65	6,424.82	8,648.33	8,126.71	4,272.32	5,107.08
	2006	5,320.27	6,167.20	8,641.49	7,710.09	4,077.69	4,935.91
	2007	5,547.56	6,411.05	8,970.81	7,841.21	4,152.60	5,107.44
	2010	7,457.40	7,498.65	9,406.18	8,000.34	6,644.02	7,124.13
[hh_inc]	average	5,830.85	6,615.86	8,870.52	7,935.92	4,625.17	5,570.90
Age of head	2005	51.4754	13.9914	50.9633	13.9345	51.6777	14.0106
	2006	51.8141	13.9438	50.9745	13.9372	52.1282	13.9350
	2007	52.5009	14.0227	51.3088	14.0561	52.9866	13.9819
	2010	54.0720	14.3526	52.9199	14.5182	54.5529	14.2574
[hh_age]	average	52.2873	14.0840	51.4253	14.0947	52.6293	14.0656
Dummy if head is male	2005	0.7127	0.4526	0.6854	0.4645	0.7234	0.4474
	2006	0.6978	0.4593	0.6538	0.4759	0.7142	0.4519
	2007	0.6837	0.4651	0.6463	0.4783	0.6989	0.4588
	2010	0.6565	0.4749	0.6150	0.4867	0.6738	0.4689
[hh_sex]	average	0.6915	0.4619	0.6546	0.4755	0.7062	0.4555
Dummy if head completed the vocational school	2005	0.0458	0.2090	0.0889	0.2847	0.0287	0.1670
	2006	0.0452	0.2079	0.0982	0.2977	0.0254	0.1575
	2007	0.0424	0.2016	0.0800	0.2713	0.0272	0.1626
	2010	0.0452	0.2077	0.0916	0.2885	0.0258	0.1586
[hh_voca]	average	0.0447	0.2067	0.0895	0.2855	0.0270	0.1620
Dummy if head completed the university	2005	0.0557	0.2294	0.1246	0.3304	0.0285	0.1664
	2006	0.0570	0.2319	0.1272	0.3333	0.0307	0.1726
	2007	0.0589	0.2355	0.1318	0.3384	0.0292	0.1685
	2010	0.0656	0.2475	0.1387	0.3458	0.0350	0.1838
[hh_univ]	average	0.0586	0.2349	0.1297	0.3360	0.0304	0.1718

[4] Dropping households whose income or consumption is in the top and bottom 1 percent, and those who migrate during survey. There are at least five households in each group.

Variables [Label]	year	Whole kingdom		Urban areas		Rural areas	
		mean	s.d.	mean	s.d.	mean	s.d.
Dummy if agricultural income more than other income [hh_agri]	2005	0.2781	0.4481	0.1130	0.3167	0.3433	0.4749
	2006	0.2719	0.4450	0.1059	0.3078	0.3340	0.4717
	2007	0.2723	0.4452	0.1059	0.3078	0.3401	0.4738
	2010	0.3883	0.4874	0.1189	0.3238	0.5007	0.5001
	average	0.2955	0.4563	0.1107	0.3137	0.3688	0.4825
Number of members in the household [hh_size]	2005	3.1579	1.3722	3.2072	1.4854	3.1385	1.3245
	2006	3.2426	1.4644	3.2506	1.5857	3.2396	1.4165
	2007	3.2456	1.5148	3.2433	1.5283	3.2466	1.5094
	2010	3.4220	1.6897	3.3445	1.8100	3.4543	1.6360
	average	3.2494	1.4953	3.2530	1.5874	3.2480	1.4572
Asset index for household based on durable goods [hh_assi]	2005	53.3542	12.0599	46.2347	13.3520	56.1671	10.2255
	2006	49.7589	13.8456	42.0356	14.4975	52.6484	12.4162
	2007	51.7259	13.3929	44.2056	13.5249	54.7904	12.0633
	2010	40.9859	7.5577	44.9739	8.7700	39.3214	6.2820
	average	49.7583	12.9746	44.4675	13.0481	51.8568	12.3323

Source: Author's calculations.

In addition, this data included details regarding the source of government funds for each household between 2004 and 2010. This information is used to measure government access in this paper. The initial government access involves government banks (SFIs) and state-owned financial institutions established by specific laws, whose duties are to serve government policies in promoting economic development and supporting investment. A household is said to have government bank access if one of its members has borrowed from a government bank, including the Bank of Agriculture and Agricultural Cooperatives (BAAC), the Government Savings Bank (GSB) and the Government Housing Bank (GHB). A second form of government access is provided by village funds; the government plans to upgrade community financial institutions to become village funds serving as the main financial source for the community, essentially a local savings and loan bank run by a village committee. Villagers are eligible by residency to take out a loan, typically limited to 20,000 baht without collateral. A household is said to have village funds access if one of its members has borrowed from a village fund. The final means of government access is provided by public transfers, money or goods assistance from the government. A household is said to have had a public transfer if one of its members has received funds from a public transfer. Table 2. provides a summary of government access for the whole sample, and for each group.

Table 2: Summary of Government Access

		Government Bank		Village fund		Public transfers	
		households	percent	households	percent	households	percent
Whole kingdom	access	1,906	39.19	2,058	42.32	3,430	70.53
	non-access	2,957	60.81	2,805	57.68	1,433	29.47
Urban areas	access	464	28.29	293	17.87	1,083	66.04
	non-access	1,176	71.71	1,347	82.13	557	33.96
Rural areas	access	1,442	44.74	1,765	54.76	2,347	72.82
	non-access	1,781	55.26	1,458	45.24	876	27.18

Source: Author's calculations.

5. Results

This study uses SES Panel data for the period between 2005 and 2010 in Thailand to estimate the extent of risk sharing. The findings in this paper reveal several interesting points. Since the existence of full risk sharing in Thai households can be

rejected[5], I was able to estimate the extent of partial risk sharing (i.e. the level of local risk sharing) by applying the contrast estimator approach of Suri (2013). Table 3 presents within, between and contrast estimation results for households across the whole kingdom, in terms of urban and rural areas, respectively.

Table 3: Contrast Estimators: Within and Between Regressions

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0730***	0.109***	0.0881***	0.104***	0.0622***	0.104***
	(0.00508)	(0.0123)	(0.00707)	(0.0213)	(0.00429)	(0.0150)
hh_age	-27.48***	-132.9*	-29.74***	-26.77	-25.89**	-193.0**
	(6.381)	(52.19)	(7.863)	(71.40)	(8.541)	(62.00)
hh_agesq	0.142*	1.062*	0.190*	-0.101	0.118	1.657**
	(0.0553)	(0.493)	(0.0751)	(0.670)	(0.0723)	(0.568)
hh_sex	-202.1***	-232.7	-160.6*	-292.8	-222.4***	-353.9
	(31.04)	(264.9)	(61.47)	(363.9)	(31.53)	(309.6)
hh_voca	269.1***	1284.7*	207.2*	-42.61	387.5**	1918.7*
	(65.93)	(543.6)	(103.5)	(604.7)	(116.4)	(825.8)
hh_univ	443.9***	588.2	425.8***	-156.2	448.6***	-197.0
	(58.92)	(499.8)	(71.16)	(428.2)	(96.11)	(896.3)
hh_agri	11.12	-981.4***	288.5*	-694.4	-36.09	-459.1*
	(32.53)	(209.1)	(118.8)	(408.5)	(26.98)	(177.3)
hh_size	-55.16***	-22.22	-74.39***	29.33	-41.13***	-118.7
	(8.710)	(76.75)	(11.49)	(93.43)	(11.76)	(88.45)
hh_assi	-9.199***	-4.585	-3.749	-28.33***	-12.09***	-11.67
	(1.725)	(3.619)	(2.220)	(7.089)	(1.598)	(9.400)
Time effect (2006)	3.477	-32.83	-7.780	-89.54	10.61	-59.60
	(8.054)	(36.31)	(14.64)	(54.03)	(8.589)	(53.26)
Time effect (2007)	-3.316	36.16	-2.325	104.1	-3.195	-20.01
	(11.38)	(47.55)	(30.56)	(73.68)	(9.949)	(50.30)
Time effect (2010)	13.37	68.96	19.36	398.0**	14.32	-240.0
	(16.81)	(95.70)	(35.35)	(116.4)	(19.08)	(192.2)
constant	15.16***	5681.2***	20.72**	4686.3*	12.22*	7728.2***
	(4.225)	(1293.4)	(6.502)	(1982.5)	(4.878)	(1611.9)
Households	4,863		1,640		3,223	
Contrast Estimator	0.3315		0.1521		0.3994	
P-Value: $H_0 : \beta = 0$	0.002		0.4154		0.0000	
P-Value: $H_0 : \beta = 1$	0.0000		0.0000		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source: Author's estimations.

Table 3 shows estimates of the contrast estimator ($\hat{\beta}$) for the whole kingdom and rural areas to be 0.3315 and 0.3994, respectively, significantly different from zero. On the other hand, the contrast estimator in urban areas is 0.1521, not significantly different from zero. The between estimates are similar and significantly different from zero, but rural households seem to share idiosyncratic risk better than urban when considered in terms of within estimates. Therefore, contrast estimation results suggest that households in rural areas share risk better than those in urban areas when provinces

[5] I also replicate the tests of full insurance follow by Deaton (1990) and Townsend (1994). The results show that Thai households have rejected full risk sharing across the whole kingdom, both urban and rural areas.

and areas are treated as risk sharing groups. However, the whole kingdom seems well-insured, but only in terms of partial insurance.

The principal findings suggest that Thai households can smooth consumption quite well, relative to the complete market benchmark, yet markets are incomplete or do not exist at all in most of the country. However, these results cannot reveal if such ability to smooth consumption is due to risk sharing or not. In addition, the study tests for the risk sharing behavior of Thai households through various government policies involving government banks, village funds and public transfers. A contrast estimator has been applied to test whether, and by how much, existing government roles can help households cope with their income risk[6].

5.1 Government Banks

To assess the impact of government banks on consumption insurance, estimates of differences in risk sharing between the two groups, access and non-access were studied. The contrast estimation results shown in Table 4 suggest that households in rural areas with government bank access share risk better than those without government bank access. On the other hand, households in urban areas without government bank access share risk better than those with government bank access. Over the whole kingdom, households which have government bank access have better risk sharing than those which do not.

Table 4: Impact of Government Banks on Consumption Insurance

	Whole kingdom		Urban areas		Rural areas	
	access	non-access	access	non-access	access	non-access
Within Estimator ($\hat{\theta}^W$)	0.0673	0.0778	0.0880	0.0878	0.0552	0.0699
Between Estimator ($\hat{\theta}^B$)	0.106	0.111	0.0769	0.117	0.110	0.0980
Contrast Estimator ($\hat{\beta}$)	0.3639	0.3016	-0.1442	0.2492	0.5002	0.2872
P-Value $H_0 : \beta = 0$	0.0005	0.0016	0.6895	0.1292	0.0000	0.0113
P-Value $H_0 : \beta = 1$	0.0000	0.0000	0.0036	0.0000	0.0000	0.0000
Number of Households	1,906	2,957	464	1,176	1,442	1,781

Source: Author's calculations.

5.2 Village Funds

To assess the impact of village funds on consumption insurance, estimates of difference in risk sharing between the two groups, access and non-access were studied. In Table 5, differences in risk sharing between access and non-access groups in all samples can be observed. After controlling for village funds, the contrast estimation results suggest that households with village fund access have better risk sharing than households who do not have such access.

[6]Tables A.1 - A.6 in the appendix presented below, between and contrast estimation results for households with and without government policy considerations.

Table 5: Impact of Village Funds on Consumption Insurance

	Whole kingdom		Urban areas		Rural areas	
	access	non-access	access	non-access	access	non-access
Within Estimator ($\hat{\theta}^W$)	0.0552	0.0790	0.0591	0.0920	0.0524	0.0666
Between Estimator ($\hat{\theta}^B$)	0.106	0.103	0.0978	0.100	0.102	0.0987
Contrast Estimator ($\hat{\beta}$)	0.4792	0.2357	0.3961	0.0842	0.4854	0.3255
P-Value $H_0 : \beta = 0$	0.0000	0.0363	0.0204	0.7141	0.0000	0.0043
P-Value $H_0 : \beta = 1$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Number of Household	2,058	2,805	293	1,347	1,765	1,458

Source: Author's calculations.

5.3 Public Transfers

To reveal the impact of public transfers on consumption insurance, estimates of differences in risk sharing between the two groups, access and non-access were calculated. In Table 6, little difference between access and non-access groups in all samples can be observed. After controlling for public transfers, the contrast estimation results suggest that public transfers do not help in terms of risk sharing mechanisms, both in urban and rural areas.

Table 6: Impact of Public Transfers on Consumption Insurance

	Whole kingdom		Urban areas		Rural areas	
	access	non-access	access	non-access	access	non-access
Within Estimator ($\hat{\theta}^W$)	0.0711	0.0744	0.0840	0.0919	0.0617	0.0619
Between Estimator ($\hat{\theta}^B$)	0.110	0.106	0.0983	0.103	0.105	0.0989
Contrast Estimator ($\hat{\beta}$)	0.3518	0.2952	0.1452	0.1062	0.4137	0.3735
P-Value $H_0 : \beta = 0$	0.0004	0.0075	0.4914	0.6760	0.0001	0.0007
P-Value $H_0 : \beta = 1$	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
Number of Household	3,430	1,433	1,083	557	2,347	876

Source: Author's calculations.

In summary, the contrast estimator results reveal several interesting points. First, the contrast estimation results suggest that households in rural areas share risk better than those in urban areas when provinces and areas are treated as risk sharing groups. Second, government bank access helps households in rural areas share risk efficiently, but government bank access cannot help in the context of urban areas. Next, village funds represent the most helpful mechanism in the sense that they are helpful both in urban and rural areas. As a final point, public transfers do not help in terms of the risk sharing mechanism both in urban and rural areas.

6. Conclusion

The principal ideas within risk sharing theory are derived from Pareto's problem concerning the dilemma of a social planner; the theory implies that all individual consumption is determined by aggregate consumption, no matter what the date and history of shocks, and so distinct facets of individual consumptions will uniformly move together. The prevalence of a full risk sharing model within Thai households has been statistically rejected by several papers, but they have found evidence of substantial risk sharing, especially in terms of food consumption. This means that Thai society

does not have Pareto optimal allocation. However, it does not necessarily imply that idiosyncratic shocks are never insured against among households, it merely suggests partial risk sharing. Consequently, this paper tests for partial risk sharing in Thai households using the contrast estimator approach; with the results suggesting that households in rural areas share risk better than those in urban, when provinces and areas are treated as risk sharing groups. This result is consistent with Shawong (2014), which concluded that the existence of kinship network represents the key factor causing differences in risk sharing between rural and urban areas.

Thai households are far from Pareto optimal allocation. Thus, government stakeholders or social planners should develop policies to help people in Thai society to improve their situation without negatively impacting other citizens. Further study of the risk responses in Thai households is important to develop initiatives to better cope with idiosyncratic shocks. In addition, this study also applies a contrast estimator to test whether, and by how much, existing government policy can help households cope with income risks via government banks, village funds and public transfers. The findings reveal several interesting points.

Firstly, government bank access helps households in rural areas share risk effectively, but such government bank access is of little help in urban areas. Statistically, 77.03% of government bank access stems from the BAAC. The result of this study is consistent with Alem and Townsend (2004, 2014), who estimated the impact of financial institutions on risk sharing in Thai households. They found that the BAAC is particularly helpful in expediting smooth consumption, consistent with its own operating system which embeds an implicit insurance operation. Moreover, Townsend and Yaron (2001) featured the "risk-contingency" nature of lending, in which delayed repayment and possible reduced interest and/or principal is part of the BAAC operating system. This presumably is a mechanism which allows the mitigation of idiosyncratic shocks, though it has not been tested previously.

Second, village funds represent the most helpful mechanism, in the sense that it assists both urban and rural areas. However, funds might not improve risk sharing in villages. There are various reasons supporting such a proposition. Credit transactions take advantage of the free flow of information within communities, which tend to involve close connections, whereas the market is attuned more closely to common information. In other words, exploiting local information is embodied in specific social networks. According to credit insurance research, Udry (1990, 1994) found that credit transactions play a direct role in pooling risk between households through the use of contracts in which the repayment owed by the borrower depends on the realization of random production shocks by both the borrower and the lender. In this information environment, village fund transactions might be viewed as state-contingent contracts that allow direct risk pooling between local committees, fund borrowers and village members. However, village funds are unable to improve the extent of risk sharing in all Thai villages. De La Huerta (2010) suggests that village funds may prosper in areas in which social ties are strong enough to permit individuals to enforce agreements in their community without incurring costs, and the threat of social sanctions exists and is credible.

Finally, public transfers do not help the risk sharing mechanism in either urban or rural areas. There have been many public transfer programs implemented over the past decades as a result of the failure of liberal economic policy in tackling poverty and income inequality. Public transfers may be in the form of income support to vulnerable households to mitigate against idiosyncratic risks. Nevertheless, these policies do not help the risk sharing mechanism. There exists both theoretical and empirical evidence which shows that public transfer programs crowd-out private transfers (see Cox et al.

(1998)). According to evidence drawn from Thai agricultural households in the form of SES Panel data, Kananurak and Sirisankanan (2016) found that there exists empirical evidence of a crowding-out effect in the relationship between public and private transfers. As with households in developing countries, private transfers are one of the most important informal insurance arrangements among households, especially poor households in Thailand. This evidence is consistent with the crowding out of informal insurance linked to public transfer programes recorded by Dercon and Krishnan (2003). In addition, a further reason supports such results. Most public transfers try to help aggregate households shocks, such as flooding and droughts. Thus, these policies do not help risk sharing mechanisms.

Even though this paper has shown that there are some policies which can help households cope with their idiosyncratic risks, there are some issues with potential data limitations, For example, there is a selection bias inherent in the specific borrowing purposes of urban households, mainly non-farming households, which do not borrow from the BAAC or the GHB if they do not borrow money in order to buy a house during the particular year surveyed. This does not mean that these households do not have access to government banks, rather a limitation of the study exists in defining financial access. Moreover, there are large differences between the group accessing village funds in urban areas, the group accessing public transfers in rural areas, and other groups. To investigate more accurately, future studies may separate geographical structure incorporating a greater number of variables than merely the distinction between urban and rural areas.

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Appendix

Table A.1: Contrast Estimator: With Government Bank Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0673***	0.106***	0.0880***	0.0769***	0.0552***	0.110***
	(0.00676)	(0.0136)	(0.0120)	(0.0219)	(0.00645)	(0.0181)
hh_age	-35.77***	-166.3**	-51.89**	-84.78	-31.33**	-197.5**
	(9.859)	(50.19)	(16.38)	(63.46)	(11.47)	(61.84)
hh_agesq	0.222**	1.400**	0.425**	0.384	0.168	1.718**
	(0.0838)	(0.473)	(0.153)	(0.619)	(0.0957)	(0.567)
hh_sex	-216.7***	-360.3	-184.0	-285.3	-218.8***	-421.9
	(59.50)	(280.2)	(147.9)	(440.8)	(58.53)	(314.5)
hh_voca	298.9	1150.2	276.9	-430.7	331.0	1789.1
	(156.7)	(693.3)	(218.8)	(722.8)	(212.4)	(929.3)
hh_univ	474.4***	526.4	387.9*	-71.97	592.8***	121.7
	(103.1)	(574.6)	(156.9)	(456.4)	(140.6)	(1080.8)
hh_agri	-6.293	-890.7***	188.0	-860.3	-40.69	-376.6
	(43.65)	(228.6)	(187.9)	(440.4)	(38.26)	(213.0)
hh_size	-71.01***	-30.07	-94.05***	59.96	-58.08***	-150.3
	(12.34)	(91.02)	(26.52)	(106.2)	(13.10)	(97.81)
hh_assi	-8.398**	-5.459	0.715	-29.64***	-11.81***	-9.221
	(2.578)	(5.083)	(2.814)	(8.264)	(2.852)	(14.37)
Time effect (2006)	-19.05	-28.89	-10.08	-91.09	-20.57	-33.35
	(20.56)	(43.42)	(56.44)	(60.98)	(21.71)	(70.21)
Time effect (2007)	-50.52	20.69	-56.38	86.84	-51.03*	-5.458
	(32.16)	(45.63)	(125.2)	(73.85)	(22.36)	(58.09)
Time effect (2010)	-47.65	6.666	-31.52	405.0**	-50.94	-224.4
	(37.07)	(114.6)	(105.8)	(118.5)	(37.73)	(288.9)
constant	52.72**	6602.3***	81.89	6511.0***	44.26*	7726.3***
	(19.30)	(1247.4)	(49.06)	(1681.4)	(19.62)	(1753.7)
Households	1,906		464		1,442	
Contrast Estimator	0.3639		-0.1442		0.5002	
P-Value: $H_0 : \beta = 0$	0.0005		0.6895		0.0000	
P-Value: $H_0 : \beta = 1$	0.0000		0.0036		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source:Author's estimatons.

Table A.2: Contrast Estimator: Without Government Bank Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0778***	0.111***	0.0878***	0.117***	0.0699***	0.0980***
	(0.00576)	(0.0128)	(0.00823)	(0.0231)	(0.00503)	(0.0139)
hh_age	-23.63***	-105.5	-23.92**	-4.143	-22.47**	-185.4**
	(6.130)	(57.36)	(8.662)	(80.32)	(8.192)	(66.86)
hh_agesq	0.109*	0.792	0.127	-0.280	0.0909	1.572*
	(0.0544)	(0.542)	(0.0805)	(0.742)	(0.0706)	(0.617)
hh_sex	-194.5***	-151.4	-150.8**	-279.6	-227.7***	-286.5
	(29.90)	(274.1)	(45.35)	(368.8)	(33.99)	(324.2)
hh_voca	253.6***	1348.8**	168.2*	133.4	416.2***	1963.2*
	(64.10)	(514.6)	(71.35)	(613.5)	(115.8)	(840.9)
hh_univ	429.0***	599.6	452.3***	-209.6	337.4**	-447.6
	(62.51)	(489.5)	(54.66)	(463.9)	(123.1)	(814.6)
hh_agri	30.77	-1026.6***	330.4*	-661.8	-23.27	-520.2**
	(40.60)	(211.0)	(125.3)	(422.4)	(35.02)	(177.2)
hh_size	-48.44***	-20.16	-69.89***	25.29	-31.14	-97.86
	(11.65)	(72.97)	(16.64)	(92.92)	(16.96)	(86.89)
hh_assi	-9.351***	-4.383	-5.349*	-27.14***	-12.03***	-13.79*
	(1.881)	(3.422)	(2.492)	(6.846)	(1.951)	(6.586)
Time effect (2006)	19.40	-37.43	-2.523	-87.33	36.29	-81.17
	(16.18)	(36.30)	(23.16)	(56.49)	(19.91)	(46.02)
Time effect (2007)	29.90	44.71	24.23	110.7	36.05	-31.76
	(18.45)	(52.31)	(40.52)	(77.49)	(20.07)	(49.35)
Time effect (2010)	56.94*	98.85	32.11	393.6**	72.06*	-254.9
	(27.79)	(97.26)	(51.51)	(122.7)	(34.37)	(147.3)
constant	2.792	4954.2***	10.47	3858.8	-2.005	7640.1***
	(13.14)	(1447.8)	(19.06)	(2295.9)	(16.46)	(1638.6)
Households	2,957		1,176		1,781	
Contrast Estimator	0.3016		0.2492		0.2872	
P-Value: $H_0 : \beta = 0$	0.0016		0.1292		0.0113	
P-Value: $H_0 : \beta = 1$	0.0000		0.0000		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source:Author's estimatons.

Table A.3: Contrast Estimator: With Village Fund Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0552***	0.106***	0.0591***	0.0978***	0.0524***	0.102***
	(0.00443)	(0.0143)	(0.00834)	(0.0239)	(0.00492)	(0.0170)
hh_age	-38.47***	-137.3**	-60.30*	-102.3*	-36.30***	-168.0*
	(10.04)	(49.43)	(28.49)	(47.64)	(10.57)	(65.32)
hh_agesq	0.243**	1.164*	0.425	0.603	0.224*	1.471*
	(0.0866)	(0.456)	(0.262)	(0.433)	(0.0908)	(0.596)
hh_sex	-191.1***	-601.4*	-198.1**	-556.2	-190.9***	-598.0
	(37.41)	(262.1)	(69.34)	(355.2)	(40.90)	(317.5)
hh_voca	130.8	920.8	-185.8	-597.7	262.9*	1230.7
	(93.99)	(615.8)	(106.1)	(572.8)	(119.0)	(1003.8)
hh_univ	377.4*	-354.1	-118.6	-766.7	537.5**	-1084.6
	(149.7)	(429.2)	(157.1)	(538.3)	(200.4)	(761.2)
hh_agri	-36.15	-541.5**	24.22	-541.8	-42.39	-295.2
	(27.15)	(164.2)	(70.73)	(331.1)	(28.69)	(191.9)
hh_size	-39.22**	-115.4	-62.07**	-76.20	-34.76*	-131.3
	(14.22)	(86.11)	(21.63)	(100.7)	(15.69)	(111.7)
hh_assi	-6.984**	-15.62***	-13.86***	-22.65**	-6.081**	-22.61***
	(2.111)	(4.500)	(3.651)	(6.632)	(2.283)	(6.146)
Time effect (2006)	22.51	-80.33	83.78	-122.9	12.47	-97.99*
	(14.10)	(40.86)	(59.83)	(79.15)	(13.76)	(46.58)
Time effect (2007)	0.908	-39.17	45.35	-70.43	-6.496	-46.04
	(19.61)	(41.74)	(65.10)	(62.61)	(20.08)	(47.75)
Time effect (2010)	0.760	-314.2**	-99.06	51.85	8.867	-512.5***
	(19.82)	(98.42)	(71.98)	(93.34)	(20.41)	(138.6)
constant	-8.259	6701.2***	-105.0	6957.3***	5.864	7785.4***
	(16.29)	(1289.8)	(54.54)	(1467.1)	(16.67)	(1655.6)
Households	2,058		293		1,765	
Contrast Estimator	0.4792		0.3961		0.4854	
P-Value: $H_0 : \beta = 0$	0.0000		0.0204		0.0000	
P-Value: $H_0 : \beta = 1$	0.0000		0.0000		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source:Author's estimatons.

Table A.4: Contrast Estimator: Without Village Fund Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0790***	0.103***	0.0920***	0.100***	0.0666***	0.0987***
	(0.00605)	(0.0130)	(0.00779)	(0.0237)	(0.00597)	(0.0141)
hh_age	-20.58**	-124.7	-23.43**	-3.989	-17.50	-217.7**
	(6.982)	(64.11)	(8.606)	(85.81)	(10.25)	(67.98)
hh_agesq	0.0778	0.954	0.136	-0.329	0.0334	1.851**
	(0.0638)	(0.606)	(0.0919)	(0.812)	(0.0852)	(0.626)
hh_sex	-208.1***	35.80	-161.0*	-275.8	-250.3***	-34.78
	(46.05)	(291.7)	(68.01)	(389.1)	(50.54)	(314.4)
hh_voca	287.7***	1238.2*	244.6*	-30.43	424.4**	2076.6*
	(71.35)	(546.0)	(95.88)	(653.8)	(145.4)	(811.3)
hh_univ	397.8***	779.9	440.5***	0.482	336.5**	427.3
	(72.89)	(488.6)	(76.63)	(426.2)	(126.0)	(986.2)
hh_agri	57.94	-1104.2***	402.1*	-536.6	-25.44	-590.3**
	(57.42)	(241.7)	(160.4)	(420.9)	(46.46)	(178.5)
hh_size	-67.35***	11.29	-77.65***	43.30	-56.45***	-92.07
	(8.893)	(79.34)	(13.06)	(100.1)	(13.03)	(79.77)
hh_assi	-10.50***	-4.448	-2.667	-31.57***	-16.97***	-4.955
	(2.591)	(3.940)	(2.257)	(8.268)	(2.073)	(11.76)
Time effect (2006)	-11.12	-29.11	-28.76	-88.37	9.813	-43.62
	(15.63)	(37.42)	(23.26)	(54.00)	(20.36)	(58.42)
Time effect (2007)	-7.063	72.51	-11.37	135.5	1.704	-5.725
	(21.15)	(55.09)	(41.20)	(69.52)	(21.69)	(56.28)
Time effect (2010)	32.06	182.6*	35.48	467.0***	31.90	-61.22
	(31.91)	(92.36)	(40.38)	(118.5)	(44.72)	(224.8)
constant	21.70	5308.6**	34.76*	4236.0	16.76	7816.0***
	(11.68)	(1591.4)	(13.75)	(2319.7)	(17.41)	(1764.7)
Households	2,805		1,347		1,458	
Contrast Estimator	0.2357		0.0842		0.3255	
P-Value: $H_0 : \beta = 0$	0.0363		0.7141		0.0043	
P-Value: $H_0 : \beta = 1$	0.0000		0.0000		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source:Author's estimatons.

Table A.5: Contrast Estimator: With Public Transfer Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0711***	0.110***	0.0840***	0.0983***	0.0617***	0.105***
	(0.00641)	(0.0137)	(0.00882)	(0.0220)	(0.00588)	(0.0168)
hh_pub	0.0224	-0.0359	0.0775*	-0.450**	0.00614	0.227
	(0.0180)	(0.165)	(0.0314)	(0.161)	(0.0144)	(0.143)
hh_age	-23.27***	-143.4**	-22.48*	-41.83	-23.82**	-186.6**
	(6.030)	(53.78)	(10.39)	(71.79)	(7.474)	(61.38)
hh_agesq	0.113*	1.194*	0.126	0.0689	0.110	1.627**
	(0.0497)	(0.503)	(0.0883)	(0.666)	(0.0615)	(0.561)
hh_sex	-166.5***	-386.6	-83.26	-191.9	-201.3***	-484.7
	(35.10)	(274.8)	(55.42)	(373.5)	(38.77)	(326.6)
hh_voca	316.4***	1501.5**	233.9*	398.1	445.9**	1820.0*
	(72.55)	(569.5)	(95.60)	(533.0)	(138.8)	(864.7)
hh_univ	518.7***	849.9	429.0***	-113.6	637.0***	111.1
	(83.17)	(555.9)	(77.74)	(465.5)	(174.6)	(921.6)
hh_agri	-2.556	-874.3***	163.7	-564.9	-25.06	-442.8*
	(29.37)	(211.0)	(97.31)	(408.5)	(29.11)	(188.7)
hh_size	-43.20***	-37.82	-68.09***	2.920	-27.00*	-125.3
	(9.937)	(75.69)	(17.75)	(87.09)	(13.02)	(93.35)
hh_assi	-10.56***	-4.760	-5.200	-30.71***	-13.26***	-11.29
	(2.198)	(3.936)	(3.506)	(6.745)	(1.934)	(9.669)
Time effect (2006)	6.827	-25.30	-20.12	-66.20	15.99	-73.59
	(13.00)	(40.06)	(23.63)	(57.43)	(14.48)	(56.21)
Time effect (2007)	9.093	30.01	-8.054	105.9	14.28	-29.60
	(18.03)	(52.62)	(45.92)	(86.14)	(16.77)	(53.12)
Time effect (2010)	29.80	46.36	7.647	475.4**	38.07	-284.8
	(19.53)	(119.4)	(43.65)	(138.6)	(23.24)	(204.9)
constant	-8.654	5951.3***	-6.512	5114.8*	-9.504	7540.6***
	(11.66)	(1359.5)	(15.70)	(1997.7)	(15.14)	(1621.1)
Households	3,430		1,083		2,347	
Contrast Estimator	0.3518		0.1452		0.4137	
P-Value: $H_0 : \beta = 0$	0.0004		0.4914		0.0001	
P-Value: $H_0 : \beta = 1$	0.0000		0.0000		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source:Author's estimatons.

Table A.6: Contrast Estimator: Without Public Transfer Access

	Whole kingdom		Urban areas		Rural areas	
	Within	Between	Within	Between	Within	Between
hh_inc	0.0744***	0.106***	0.0919***	0.103***	0.0619***	0.0989***
	(0.00739)	(0.0128)	(0.0121)	(0.0259)	(0.00611)	(0.0143)
hh_age	-35.73*	-91.94	-47.50**	21.55	-16.83	-166.4*
	(16.85)	(57.09)	(17.88)	(80.23)	(17.46)	(66.70)
hh_agesq	0.234	0.599	0.385	-0.598	-0.000540	1.346*
	(0.191)	(0.541)	(0.198)	(0.768)	(0.176)	(0.612)
hh_sex	-284.0***	98.46	-282.9**	-219.8	-279.2***	56.46
	(58.97)	(290.9)	(102.9)	(426.3)	(57.71)	(259.7)
hh_voca	211.8*	974.4	184.3	-247.1	320.3*	2127.9**
	(94.29)	(587.7)	(112.0)	(768.6)	(157.1)	(800.8)
hh_univ	370.2***	321.2	425.6***	-97.52	282.8*	-1068.3
	(105.8)	(461.0)	(113.8)	(466.6)	(140.0)	(907.5)
hh_agri	44.50	-1167.2***	564.5*	-936.2	-60.67	-566.8***
	(72.90)	(235.7)	(280.9)	(524.6)	(49.24)	(163.0)
hh_size	-88.60***	-6.528	-76.55**	36.17	-88.07***	-107.5
	(16.36)	(85.05)	(24.38)	(112.4)	(22.16)	(77.67)
hh_assi	-6.453**	-3.100	-0.362	-25.54*	-9.997***	-11.19
	(2.022)	(3.898)	(2.862)	(9.649)	(2.458)	(9.079)
Time effect (2006)	-12.81	-40.95	15.62	-111.5	-13.59	-59.58
	(33.73)	(40.38)	(41.16)	(68.31)	(47.63)	(51.93)
Time effect (2007)	-35.50	47.91	4.496	107.1	-53.39	-14.60
	(38.01)	(44.48)	(69.00)	(71.57)	(40.22)	(49.20)
Time effect (2010)	-39.84	129.3	16.62	387.1**	-64.32	-202.4
	(49.03)	(93.30)	(88.82)	(137.3)	(56.43)	(180.2)
constant	83.80*	4637.0**	89.33*	3448.8	41.91	6999.4***
	(42.15)	(1393.1)	(42.93)	(2271.8)	(37.42)	(1689.1)
Households	1,433		557		876	
Contrast Estimator	0.2952		0.1062		0.3735	
P-Value: $H_0 : \beta = 0$	0.0075		0.6760		0.0007	
P-Value: $H_0 : \beta = 1$	0.0000		0.0001		0.0000	

Note: Robust standard errors in parentheses * p<0.05, ** p<0.01 and *** p<0.001
Source: Author's estimations.