

Safety Nets and Financial Institutions in the Asian Crisis: the Allocation of Within-Country Risk

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PRELIMINARY DRAFT prepared for the IMF Conference on “Macroeconomic Policies and Poverty Reduction”, Washington D.C., March 14-15, 2002.

1. Introduction

During the financial crisis in Asian countries such as Thailand, macro-economic aggregates were used to portray the health or state of the impacted economy. Negative GDP growth was taken to indicate a fall in household welfare, for example. Initially high interest rate policies to encourage foreign (re)investment and subsequent expansionary monetary and fiscal policies were the result. On top of this, as commercial banks and finance companies were thought to be culprits in instigating the crisis, financial sector reforms were also implemented. The focus was on increasing capital adequacy ratios and the reduction of non-performing loans. Finally, as yet another addition, safety net policies recognized that particular groups or sectors might be more vulnerable than others to downturns, if not to the adverse effects of tight policy. Thus, a government agricultural development bank was to be used as an engine of growth, and the government saving banks was to be used to promote village funds and small household business.

From this discussion several related points deserve emphasis. First, macro policy, financial sector reform and safety nets work in varying degrees through the financial system, sometimes through the very same financial institutions. Yet, these policies were implemented without a common conceptual framework. Indeed, there has been little theory-based assessment of the financial institutions or the safety net policies. Nor has there been an integration of any such assessment with the construction of improved macro models.

In Thailand, it appears (ex-post, at least) that macro economic data painted a somewhat misleading picture of the health and well being of Thai population. That is, for the semi-urban and rural sample under consideration here, macro shocks pale in comparison to the diversity of idiosyncratic shocks to households, villages, and regions. During the period of the financial crisis, households and businesses were suffering from regional shocks such as floods, pests, and drought, and from idiosyncratic shocks such as illness and death in the family. More macro shocks such as fewer days worked, increases in input prices (including

* I am very much indebted to the National Institute of Health, the National Science Foundation, the Ford Foundation, the University of Chicago, for research support, and to Mauro Alem, Kaveh Hemmat, Ananth Ramanarayanan and Carlos Perez-Verdia for able research assistance. Helpful comments from the MIT development lunch group and especially from Abhijit Banerjee, Esther Duflo and Joshua Angrist are greatly acknowledged.

increases in business expenses), and decreases in output prices are present as well, but they are only part of the overall story. That is, controlling for the aggregates, one is left with striking residual movements in income, consumption, and investment. Striking also is the diversity of responses across households and businesses, and among the measured responses is use (or disuse) of the formal institutions through which the IMF, World Bank, and Asian Development bank were implementing macro, reform, and safety net policies. We single out here in particular commercial banks, the government's Bank of Agriculture and Agricultural Cooperatives (BAAC), and village-level financial institutions such as rice banks and Production Credit Groups (PCG). We focus in addition on the informal sector and self-insurance strategies. The bottom line is that macro crisis and subsequent policy play a role not only directly in terms of macro shocks to income but also indirectly through the financial institutions that might otherwise intermediate credit and ameliorate idiosyncratic shocks.

All of this suggests an obvious alternative strategy: explicitly incorporate the diversity of shocks, use the theory of an optimal allocation of risk-bearing as a benchmark to evaluate the role of the financial system, and thus appraise financial sector reforms and safety net policies, both for their own importance and in order to formulate improved macro-economic policy, both in crisis periods and in the long run.

This paper utilizes a unique set of panel data for Thailand, and the advantage of hindsight and analysis, to establish and carry out this agenda. It is found that some of the principal safety-net policies put in place in Thailand at the time of its financial crisis were misdirected. Wage earners as an occupation group were not particularly vulnerable as a group, say due to unemployment or unpaid wages. Incomes of this group did not fall on average as much as in the other categories. On the other hand, it is important to distinguish the impact of average income on average consumption from the impact of a deviation of a household's income onto its own consumption deviation, holding aggregates fixed. Using the latter metric, it seems that wage earners (and others in agriculture) in the Northeast would have benefited from some kind of within group safety net, that is increased within-group wage income insurance, even if this had been financed entirely within the group itself.

Further, while households with small businesses were vulnerable as a group to falling incomes, policies to promote small business formation, as though village funds, seem to have been off the mark. Business starts were salient thought this period, and business owners seemed to have had a surprisingly high level of within-group insurance, at least for the purpose of smoothing consumption (this had little to do with village funds). Unfortunately though, investment remained sensitive to household income change. Shrimp growers in Chachoengsao seem especially vulnerable on both consumption and investment to income change.

Safety net policies attempt to target particular groups. There is not apparent in the panel data particular and consistent vulnerability for the elderly, or female-headed households, those with low education or those with low wealth. There is, however, a distinct regional pattern. Apart from low education, all the other potential targeted groups do worse in investment stabilization in the Northeast. But overall, those households suffering a direct consumption impact of bad years lie not in the poorer Northeast but rather in the

industrialized central region. Also there are variations within regions, and drought, flood, pests, and illness compete with macro shocks such as unemployment and price movements in an explanation of investment and consumption change.

As regards financial institutions, reduced lending from commercial banks, whatever the cause, appears to have had a direct adverse impact on some former borrowers. Controlling for selection, it seems that clients of commercial banks in the northeast suffered a direct impact from idiosyncratic income fluctuations to both consumption change and investment and, in contrast, those who managed to increase debt were able to stabilize investment. Another notable and important exception: savings accounts in commercial banks were reduced substantially, and as buffer stocks, these appear to have been a helpful device to the households and small business of the survey.

The Bank for Agriculture and Agricultural Cooperatives (BAAC) is the government's primary development bank, the primary source of formal credit to Thai farmers. It has in place a risk-contingency system under which loans are extended and interest and/or principal partially forgiven for farmers experiencing adverse events, both household specific and regional. Thus, a priori, one would have thought the BAAC would do a reasonably good job in smoothing consumption or maintaining investment. See Townsend and Yaron (2001) for example, and the thesis of Chiawongsee (2000). But the analysis of the consumption and income panel data here shows that the BAAC was not particularly helpful in the central region in early, crisis years, where it was much needed and where it had been an important lender. Reduction in loans was not helpful. The BAAC was helpful in the northeast but not in the crisis period. It is conceivable that the risk-contingency system of the BAAC were misunderstood by outside agencies, and that, as with commercial banks, lending was curtailed accordingly. Indeed on the investment side, those who managed to increase BAAC indebtedness smoothed investment better, but those with reduced indebtedness did worse.

Village funds have long been promoted in Thailand as a cooperative solution to an otherwise restricted financial system. Local, micro credit institutions have been established in many villages, in order to expand credit to farmers or small business as in Poverty Eradication Funds, to promote change of occupation as with Women's Groups, to mobilize saving as with Production Credit Groups, and to provide assistance in emergencies as with Rice Banks. In the larger 1997 retrospective survey, Women's Groups and Production Credit Groups show up as having had a beneficial role in risk reduction, though funds in general suffer from failure and much turnover. (See Kaboski and Townsend (2001)) Unfortunately, the panel data here seem to establish that rice banks, PCG's, and other village funds were particularly vulnerable to the crisis, and their ability to ameliorate regional or idiosyncratic shocks to consumption and investment is mixed. The most consistent result is that those who reduced savings in these funds were also experiencing consumption and investment fluctuations. The re-emergence of savings in village funds in later, post crisis years is apparent in the data, and this continues to be supported and encouraged by government policy.

Apparently, then, the risk-reallocation role of the major formal and quasi-formal financial institutions - commercial banks, BAAC, and village funds - was limited. What alternative did the households and business of the survey have?

Help from friends and relatives, and from money lenders, traders, storeowners and others in the informal sector, might also be thought to have been helpful, especially as commercial banks and even the BAAC restricted their lending. But the informal lending in the data, though a backstop for those under stress, failed to smooth the effect of these adverse shocks onto consumption. Households with increased moneylender and informal borrowing suffered adverse consumption impacts from relatively bad years. Similarly, those who managed to reduce moneylender debt were doing better in stabilization than the others. An important exception emerges however. Moneylenders and the informal sector do appear to be able to help smooth investment.

Self-reliance is particularly appealing in times of global instability. Thai farmers free from drought or flood have ample crops of rice, which they store locally, presumably in anticipation of future shortfalls. But in the data we find little beneficial year-by-year impact, at least not in the short run. Indeed, northeastern farmers in Srisaket who escaped the El Nino drought were increasing their stores of rice in the early “crisis” years even as they reduced consumption. Unfortunately, this seems to have led to reduced insurance, thus giving rice storage its apparently perverse effect¹.

It must be emphasized of course that the standard being employed here is overly strong. A priori, we would not expect many households or businesses to pass the stringent tests of full insurance for consumption and neo-classical efficiency in production, and the observed degree of deviation, while a good standard for evaluation, begs for an explicit alternative model with impediments to trade – private information, limited legal enforcement, or other transactions costs. If we had these models, we could better gauge whether alternative macro or regulatory policies could have improved matters. Neither is there an attempt here, in this paper, to explain movements in the macro aggregates, in consumption or investment, for example. Rather, deviations around measured aggregates are being used in the full insurance tests. But an alternative, more explicit macro model with explicit micro underpinnings and impediments to trade would presumably have something to say about movements in these aggregates. Indeed, the facts that are reported in this paper could be used along with risk-bearing analysis to guide the construction of such models. We return to this topic in the concluding remarks.

2. Data

The panel data used in this paper come from a project funded by the National Institute of Health, the National Science Foundation, and the Ford Foundation. See Townsend et al (1997). An initial cross sectional survey of was fielded in May 1997, before the crisis that began with the devaluation of the Thai baht, in July 1997. Two regions were chosen deliberately, namely the more developed Central region and the relatively poor, semi-arid Northeast. Within each region two provinces were chosen deliberately as each had at least one county that had been sampled in all previous rounds of the larger Socio Economic Survey. In the Central region the provinces of Chachoengsao is adjacent to Bangkok and contains an

¹ Results on rice storage are preliminary. We are searching for a proper instrument to control for selection bias.

industrial corridor that makes it way to the Eastern seaboard. The province of Lopburi is in the fertile central valley north of Bangkok. In the Northeast the province of Srisaket is perhaps the poorest in Thailand, and Buriram represents a transition province as one moves west back toward Bangkok.

Within each province 12 tambons or subcounties were chosen in a stratified random sample designed to pick up ecological variation. See Binford, Lee, and Townsend (2001). Thus all provinces but Lopburi contain two forested tambons. Within each tambon four villages were chosen at random from an enumeration of villages available from the Community Development Department, and within each village 15 households were chosen at random from a listing held by the headman. In addition to the household questionnaire, survey instruments were designed for the headman, village financial institutions, joint liability groups of the BAAC, and soil characteristics.

With the advent of the crisis, funding from the Ford Foundation allowed a resurvey one year later, May 1998, of one third of the original sample. That is, 4 tambons were chosen at random from the original 12 of each province, with the exception that one tambon was set aside for a separate intensive monthly survey and the sub sample was stratified to allow the inclusion of one forest tambon. Otherwise, the same villages and the same households were selected for re-interviews. Thus the target number of household is 960, with an even number in each province. The actual response rate for this 1997-1998 pairing is relatively high. Based on completion of the consumption module, for example, it was 98.6% of the households.

Replacement households were added so as to be able to continue to compute village averages. Then in 1999, and other years to 2001, NIH and NSF funding was used to continue the panel. In 1999, there were successful re-interviews of 96.3% of the 1998 original replacements household. The re-interview rates for 1999-2000 and 2000-2001 are 97.1% and 96.6%. The total numbers of households re-interviewed across pairs of years varies from 909 to 925. The number with usable consumption data over all years is 828, for example.

3. Measured Income Change—Aggregate and Idiosyncratic Movements

Here we construct from the panel data numbers that might be comparable to the national income numbers. We compute for each surveyed household its income level and then deflate by the measured changwat price level. We then add up these income numbers and divide by the population to get the aggregate per capita real income and then look at changes in that aggregate. Thus the growth of per capita national income, based on the limited survey here, is -.07, -.03, -.19 and +.01 from 1997 to 2001, as shown in Table 1. We see that income did fall initially, though the third pair of years, 1999-2000 was the worse 12-month period. More revealing perhaps is the decomposition by region. For the central region, the numbers are: -.17, -.11, -.16, and -.01, while in the Northeast, numbers are +.20, +.14, -.27 and -.00. Clearly, the first two years in the Northeast were quite good.

More representative of the typical household experience perhaps would be the medians of the corresponding real per capita income histograms broken down by province,

with the first two rows for the Central area provinces and the second two for the Northeast. We see a sharp immediate deterioration in real per capita income in the central provinces in the crisis, the 1997-98 year, and rather dramatic recovery in the end. That is, the movement is monotone improving in Chachoengsao, though virtually flat in Lopburi, with the 1999-00 setback, and then again recovery in the end. It is now clearer that Srisaket was spared an adverse impact in the 1997-98 period as there was a dramatic increase in typical real income at that time, an astounding 60%. In turn Buriram had a large increase from 1998-99, of 24%. Both Northeast provinces had their worst year in 99-00 and also “recovery” in the final, 2000-01 period.^{2,3}

In fact, of course, no single number is representative of the overall experience. Figures 1 and 2 plot income change overall, and for each of the four provinces separately. We see the Central provinces of Chachoengsao and Lopburi with left-shifted histograms relative to Northeast provinces of Srisaket and Buriram in early years, but the two central area provinces catch up or shift right relative to the two Northeast provinces in the latter two years.

More generally, one notes the relatively high dispersion in both growth rates and level changes in the population.⁴ The standard deviation of growth rates is very high, for example.

With so much dispersion in the histograms, one wonders if the differences in mean values just reported are significant. This then is the question of whether the macro crisis is strongly evident in the micro data. Regressing the change of household income onto time specific fixed effects, e.g., 97-98, 98-99, 99-20, and 20-01. We see in Table 2 that, in the aggregate, both 1997-1998 and 1999-2000 pairs of years are found to be significantly bad and no single pair of years appears to be good. The Northeast had a significantly bad year in 1999-2000, and 1998-99 was a good year. The Central region experienced significantly bad years in 1997-98 and 1999-2000. On the other hand, the explanatory power of these regressions is terribly low, one percent or less. Targeting the entire population in a given year based on the macro or regional aggregate is seemingly not a particularly good idea. That is, the mean is not representative of typical income movement, even within regions.

Of course, we must take some of the dispersion of measured growth rates as evidence of measurement error in the data. This would of course be typical of panel data. We turn nevertheless to the task of understanding these measured income numbers as the product of more systematic, identifiable factors.

² If we look at changes of real per capita income rather than growth, we find a similar but not identical picture. For the average of the overall aggregate it is (-1105, -488 -2897, 88). Income did drop in the first 1997-98 pair, and then drops by less. But, the mean income change is lowest and negative in 1999-2000 at -2897, more than double the initial 1997-98 crisis, at -1105. The best year is the last year, 2000-2001; at a modest +88, again a weak recovery.

³ But the breakdown by regions is again revealing. This shows that decreases in income were highest in the central area in the first year, that the second year there was only half as bad, that the third was somewhat of a setback, and finally there is the weak recovery in the fourth. Likewise, the Northeast has high positive income changes in 97-98 and 98-99 followed by the set back in 99-00, and a slightly negative 2001, Again the last two years are worse than the first two years.

⁴ For growth rates the minimum is approximately -300% and the maximum is approximately +1500%.

One factor might be occupation-specific differential income growth, given that households are not completely diversified across income sources. For example, 33% to 40% of the surveyed households have wages and salary as the dominant income source, 34%-38% have agriculture, and 4-8% have business.⁵ The reader should be forewarned, however, that business income can be negative in a given year. Many businesses do make losses, especially during this period. Thus the fraction of dominant income “business households” at 6% is much lower than those whose head says that running a business is the primary occupation, at 22%. Also, as the fractions add to 100% among all categories, and households with negative business income have negative numbers attached to that category, categories other than business receive an even higher weight. This has an impact even on the all-household average.

A household’s overall income growth over pairs of years, level change, is regressed onto the fraction of base year income attributable to these and other possible sources.⁶ We do include tambon level controls on the hypothesis that there might be spatial variation determining income changes even controlling for occupation sources. Table 3 is a sample of the typical regression for Chachoengsao and Srisaket in 1997-98 and Table 4 provides an overall summary, reporting by rank order, from positive to negative, the point values of the estimated coefficients. A * denotes significant difference from zero at a 10% confidence level, and overall R²’s.

We can see that those households reliant on wage earnings in the base year do not do as badly as many of the others, that is, coefficients are positive or at least not very negative, and are in the middle to upper half of the rank order of coefficients, with exceptions in the last year. This comes as a surprise since much of the safety net policy was based on the presumption that there would be much unemployment and unpaid wages, that is, wages and remittances were forecasted to fall, bringing down rural incomes. On the other hand, the coefficient for business tends to be close to the bottom of the list, except in the last year. Agriculture tends to lie toward the center or lower part of the list, but its exact position moves about depending on the province or the year. There is little pattern in income from financial sources. These regressions were run including remittances and government transfers. Consistent with the finding on wages, and contrary to expectations, remittances are often at the top of the list⁷.

We can repeat these calculations in percent changes. That is, we regress the percent change in income of each household for each pair of years onto the level of base year income attributed to the various principal occupations. The results are not inconsistent. There is a tendency for wage earners and agriculture to move up in the list.

⁵ Also, for these households the specific occupation sources constitute the bulk of all income but not 100%.

⁶ We exclude in the reported results income from remittances and from the government as these might be thought to be much more of a response rather than cause of income fluctuations, though we do little beyond that here to sort out exogenous from endogenous factors.

⁷ These findings are reconfirmed for the most part by a direct look at the histograms of income growth stratified by dominant source in the base year. Confining attention to the dominant occupation categories, wages/salaries tends to be right-shifted and business is left-shifted, for example. But the graphs are not striking and so are not reported here.

Histograms of level changes confirm and supplement these findings. Illustrative graphs are reported in Figures 3 and 4. The histograms of income change from agriculture and wages are similar to one another in all pairs of years, especially in the Northeast. Business income tends to shift to the left, especially in intermediate years, though there seems to be something of a recovery by 2001 in the central area. However, the left and right tails on the business income histogram are large in all the graphs. Income changes for those primarily in aquaculture tend to be on the high end in the northeast and are hard to pin down in the central region, lying to the left or to the right depending on the year, sometimes with a striking, non-monotone appearance.

Fixed effect regressions, stratifying by occupation and by region, reconfirm the findings from these histograms.

The conclusion is that base-year income, in percent and in absolute magnitude, does predict to some extent growth rates and especially changes, and thus targeting by occupation, using information from mean incomes by occupation, would seem to make some sense. But the wage earning category, while plausible a priori, turned out to be a poor choice for targeting. Many households with a small business, on the other hand, were doing poorly for the first three years, and thus the concern of some policy makers about the impact of the recession on business was validated, *ex post*. As we shall see below, however, the recommended remedies were problematic.

One might note that the R²s on these regressions vary considerably from virtually zero to .42, and are higher for level differences than for growth rates. In fact, the histograms above make clear that there is nontrivial variation in income change (and in growth rates), even controlling for occupation and sources of base year income. Though measurement error still looms as a plausible explanation, it is also possible that other, real factors are at work. That is, there may be much real idiosyncratic movement of income within occupations, as revealed by the histograms, and we should be careful not to confuse the movement of mean income of an occupation with the movement of income of a household specialized in that occupation. This undercuts the notion of targeting by groups and suggests instead that within-group insurance might be needed. Later we shall see if some occupation groups do better than others in this regard⁸.

4. Household Self-Assessment - Income Change and Reported Shocks

⁸ In search of other systematic factors with influence over household income change, we looked specifically at geography, at geo-political units. Indeed, the income regressions above do include tambon fixed effects, and in other regressions we allowed (separately) for changwat or village fixed effects. These location effects are often significant in the growth or income change regressions. Indeed, without them, some of the income categories change or lose significance. However, relatively little of the overall variation is explained by the location variables themselves, whatever the degree of aggregation. However, there are influential and persistent factors. Indeed a household's local position in the income distribution is stable. The correlation coefficients of income in year t to income in year $t-1$ range from .26 to .66 and are particularly high in the central region. Likewise, the correlation of year t to year $t-2$ ranges from .37 to .43 in the central region. Regressions of income in some years onto income in previous years can deliver in many instances high R²'s, as high as 78% for example, depending on the changwat. It is in explaining level changes or growth rates that the fit deteriorates. We see low correlation in changes across pairs of years. Indeed we see negative correlation, and the highest R² is 25%, often lower.

No doubt much behavior is determined by real income change and our measured proxies here, but important as well for behavior would be household expectations, that is, a household's assessment of its own situation and also its assessment of where the economy is headed. We do not attempt to model these assessments or the economy. On the other hand, we did attempt to measure these assessments in the survey, and we report the results here.

Specifically, households themselves were asked whether the most recent year, the past 12 months past, was better or worse than the year before (and to name the causes if the past year was bad.) The questions ask about income, but they could have been interpreted as questions about well-being more generally. In any event, by this standard, there was a slow and consistent deterioration in both regions, and recovery only in the final year.

The result overall, aggregated over both regions, is that 1997-98 was worse than the previous year for 47% of the sampled households (See Table 5). This then moves to 71% for 1998-99, 67% for 1999-2000, and finally down to 54% for 2000-01. Broken down by region we see the same, except that the perceived "recovery" is steeper in the northeast and negligible in the central region. Neither the aggregate nor regional results are strongly consistent with the measured income data⁹, ¹⁰. But households' self-reported assessments are not entirely unrelated to actual households' income change. Household measured income change is regressed onto dummies of its reported change: (worse, better, same). The rank order of the estimated coefficients is consistent, and the worst year coefficient is statistically significant. However, the overall explanatory power of these regressions is quite low¹¹, ¹², ¹³.

Nevertheless, the household responses do seem to convey some information on the underlying causes of income shortfalls. Evident is a plethora of shocks, as reported here in

⁹ For example, there is not in the measured income data a sharp deterioration of income in the second year. Note also that more than half of the households are complaining of having had a relatively bad year, even in the end. Related, the percentage that reported having good or better years remains low. It declines, and finally recovers, that is, 22% at first, then 13% to 14%, and then back to 24%. However, the measured recovery in the central region is not picked up in assessments from the central region. We have seen also that households in the northeast were, contrary to their sentiments, having relative good years in the first two years, and having more bad years in the end.

¹⁰ It does seem that Srisaket's relatively good year from 1997-98 is picked up in the elicited responses across households, relatively speaking, but Buriram's relatively good year from 1998-99 is not.

¹¹ Households seem better at assessing their own income change if the sample is stratified a priori into those experiencing positive and negative actual income changes, and if those saying no change are grouped with those complaining of a bad year. Results are not improved by running the regressions in nominal terms. We note, however, that perceived welfare changes, whether or not tied to measured income change, can show up in consumption, investment, and other variables.

¹² Revealing perhaps, households were also asked if the past year was a bad year for the other households in the same village. These number are even higher than the negative self-reported individual assessment, perhaps a reflection of the belief that a year during the crisis must be a bad year for others if not for one's self. The reports are a little more consistent with measured income change, now at the village level. That is, actual measured change in village income, the average across 15 respondents per village, is regressed onto the household's response. Coefficients are usually significant at a generous 15% level, and the R2's are higher but still terribly low, e.g., 1.5%.

¹³ Similarly, those in business were asked to report on business conditions and the cause of problems, but these reports do not seem much related to the movement of average measured business income.

Table 6 for 1998-99, as an example. Some of these would appear to be aggregate shocks, related to the financial crisis, but many of these are idiosyncratic at the regional, village, or household level. Specifically, each household was asked to name the cause of any self-reported fall in income, and then to rank order the top three causes in importance. The table reports the percentage of households, of those having a bad year, naming a particular adverse event. For example, drought is named in 1997-98 year as the most important cause of income shortfalls, for 35-78% of the households, for an average of 68% if Srisaket's relatively low 35% is excluded. Drought continued its importance in 1998-99, especially in Chachoengsao at 52%, and also now in Srisaket at 55%, but lower in Buriram at 16%. Drought is also less important for the remaining years, with the exception of Lopburi in 1999-00 and Srisaket in 2000-01.

Floods are the next most important adverse event, named in particular in the Northeast interviews: Srisaket in 1998-99 and 2000-01 at 29%-33% and Buriram 2000-01 at 22%. Flooding is named less often in the central region, reaching a maximum of 10% of those responding in Chachoengsao in 2001. We thus have in the sample period a classic example of the climate of semi-arid tropics as represented by the Northeast. Droughts alternate in incidence between Buriram and Srisaket in 1998 and 1999, and drought and floods are often coincident across tambons even within the same province in the same year. Other agricultural shocks, such as pests, and other reasons for low crop yields, are common across all provinces and all years.

As to evident macroeconomic shocks, working fewer days is named by 26% of the households in the Lopburi May 1998 interview, 18% in 1999, and averages around 10% in the latter years of the sample. Complaints of low prices for output (agriculture, fish, or business) are commonplace much of the time, peaking perhaps in 2000 and falling by 2001. High prices of inputs are also important much of the time, perhaps greatest in 1998, and a perpetual complaint in Chachoengsao. High investment costs are an important complaint in the central provinces.

On top of these macro shocks are the idiosyncratic, household-specific shocks. They should not be under-emphasized. A prime example would be reported instances of expenses due to illness. These can average 2% to 7% of the sample depending on the province and year, but reach 13% and 24% of households in Chachoengsao and Lopburi in 1999-2000. Apart from drought, illness is the most frequent complaint in Lopburi in that year, and we have noted earlier that income shortfalls were prevalent there at that time. Death in the family is also mentioned in some provinces in the last two years.

These reported shocks appear to be indicators of real stress. The measured household specific income change was regressed onto these reported adverse events for households claiming to have had a bad year, leaving in the sample with no dummies those having had no reported change or with a reported good year. Adverse events are shown to be lowering households' incomes, even in the measured data. Specifically, on the macro side, higher input prices, working few days, bad business year, and high business expenses are negative and

significant. But so also are idiosyncratic shocks: floods, other agricultural shocks, and death in the family. The macro shocks do appear to be more frequent in the Central region¹⁴.

5. Direct Impact

As noted previously, if a household claimed to have had a year worse than the year before, they were asked for their three most important responses, that is, what they did. They stated either a direct impact, that is, reducing consumption, working harder, changing occupation, reducing productive inputs, or selling assets (disinvestment) – or named a coping mitigation strategy (see below). As we shall see below, these impacts are reflected in the aggregated measured data.

The response given most frequently overall is to reduce consumption, but there is a distinct regional pattern. See Table 7 for 1998, as an example. “Reduced consumption” is named by 48% to 68% of central area households and by 27% to 46% of households in the Northeast. In neither region is there any obvious downward trend over time. Buriram and Srisaket do change orders of magnitude from 98 to 99, as might have been anticipated from the pattern of droughts.

The response “work harder” is more prevalent in the central region - at 30-42% - and is especially high in Lopburi. “Seek additional occupation” is also nontrivial at 26% to 35%, but this varies over provinces and years. Unfortunately, we do not have direct measures of labor effort in the aggregated data to confirm this. The second response may refer to going into business, and that is much apparent in the household data (see below). “Reduce productive inputs” shows up once in 97-98, at 21% in Chachoengsao, that is, in the central area only. In contrast, some northeastern households do mention sales of livestock and equipment, specifically Srisaket in 98 and 99, at 28% and 20%, respectively.

In summary, most of these direct, adverse impacts seem to be more acute in the central region, though named by nontrivial numbers of households in both regions in many of the years. The disinvestment effect would seem to be more acute in the Northeast, however. We now turn to changes as directly measured in the survey.

5.1 Consumption

Actual income changes and the households’ assessments of their situation are likely associated with real impacts, as the household themselves assert. Certainly income, consumption, investment, and employment co-move to a certain extent in the national income numbers^{15, 16}. The average per-capita real consumption numbers show negative if diminishing

¹⁴ Curiously, these regressions have improved if modest explanatory power relative to the self-assessment equations reported earlier, with adjusted R²’s reaching 3-4% depending on the region and year, and the signs, with one exception, are all negative.

¹⁵ In effect, this paper establishes some stylized facts that subsequent research will need to take into account, but we do attempt to explain or model these movements in aggregate variables. Instead, we have two goals. One is to confirm to a certain extent the households’ own reported responses. A second has to do with the risk analysis to follow in a subsequent section. Namely, consumption, labor supply, and investment, however determined, represent not an end point but rather starting points for the analysis of risk-bearing systems. That is, aggregate

growth in the first three years, and finally a recovery in the fourth. Reported numbers are -.24, -.03, -.05 and +.03 corresponding to 97-98, 98-99, 99-00 and 00-01 respectively. Curiously, this pattern in consumption is displayed in both the northeast and central regions separately.

Thus, if consumption were used as a measure of the crisis, and for us it does represent aggregate risk, we would say that the first year was the most severe in both regions, by a large order of magnitude, and the last year was the best year in both regions. The central region shows that a diminishing decline with eventual recovery, somewhat consistent with its income numbers, but so does the Northeast, and we did not see low initial income numbers there.¹⁷

If we use aggregate consumption change as a measure of the crisis, then we find there are significant negative fixed effect initially, 1997-98, and also 1999-00, as reported in Table 2b. The effect of the crisis is evident in both the central and northeast regions separately. In addition the central region has a positive coefficient in the last pairs of years. Overall, there is more common movement in consumption across regions than in income¹⁸.

5.2 Employment

Unfortunately, we do not have direct measurement of employment in these data. We do, however, measure household size and its change year by year and ask as well about in- and out-migration. Recall again the initial policy premise that unemployment would increase substantially and unemployed or unpaid workers would return to their village homes. In the panel data here, average household size changes little, decreasing by .01 in 1997-98 and also by .06 in the last two pairs of years. It does increase by .05 in 1998-99 so only in that second year of the financial crisis is there a hint of returning workers.

More generally, we ask each household whether there had been returning members or departing members within the past 12 months. Households with returning members moves somewhat, from 10.1 % to 13.5% to 11.7% to 12.6%. Thus, the increase in returns in 98-99 is there, but it is not substantial. In contrast, departing members went up steadily, from 18.5% to 19.5%, to 21.7% to 24.7%. Evidently, there is continued out-migration from these semi-urban and rural households, particularly so among Northeast households. Overall, for the five years of the current survey, 20% of the households experienced a returning member and 3% two

(or regional) consumption and aggregate/regional labor supply represent aggregate (regional) risk after various mechanisms have come into play to smooth (or exacerbate) national (regional) income movements. In an optimal allocation of risk, household consumption can drop if it is following aggregate consumption. Controlling for that, the issue will be whether household consumption changes are correlated with household income changes. Likewise, there should be a tendency of investment to be immune from idiosyncratic income changes, once aggregates are controlled for, if the benchmark risk-sharing model were correct.

¹⁶ Here certain key consumption items are measured at the household level and used to estimate aggregate household expenditure category.

¹⁷ The divergence between consumption and income movements can deliver apparently strange results. Consumption drops in the central region in the first year much more than income does and vice versa in the second year. Similarly, the first two years in the northeast have high incomes relative to the second two years, but lower relative consumption. Related to these aggregates, Srisaket households have occasionally large increases in income matched with sustained period-by-period decreases in consumption. In the risk-sharing regressions below, the coefficient in household income change for Srisaket can be negative and significant.

¹⁸ The percent of variation explained, though low, reaches 4%.

returning members, while 31% experienced one departing member and 6% two. So, again the overall percentage of households with returns, at 23%, is easily dominated by the overall percentage with departures, at 37%.

The consumption and income numbers were already adjusted above to account for changes in household size, so these movements in household size do not alter those earlier numbers. Rather, the point here is that aggregate employment as measured in these data by household size and migration does not seem to have gone down much, if at all. This is consistent with the earlier results on the stability of wage and remittance income. Also, non-separability of consumption and leisure in household utility functions would require adjustment of the risk-sharing regressions below to include aggregate employment. We do not have measures of leisure or employment that are accurate enough to do that. Still, it is not obvious from these summary statistics that the risk-sharing consumption regressions below are seriously distorted by the aggregate household employment story.

5.3 Investment

We turn now to investment as illustrated in Figure 5. In the Northeast we see a more or less steady decline in household, agricultural, and business investment, with livestock going counter to the trend. In the central region we see that household, livestock, and agricultural investment either remain relatively strong or recover while business deteriorates markedly. As business investment is a large part of the total, we see by the end that overall investment in the Northeast is roughly one-third of the relatively high 1997-1998 value, and in the central region investment has gone negative. Thus the percentage drops in investment are simply enormous and the picture as of May 2001 is bleak^{19, 20, 21}.

For business investment the percentage numbers are most striking. The fraction investing in business was very high at about 80% of the business population initially, but this then drops to 3% or less. In terms of the average investment levels, business investment in

¹⁹ One sub-item of investment that we could mention in more detail, is close to consumption, namely, household durable goods. We save analysis for future research but report the gross patterns here. In the aggregate, we see that the number disinvesting or selling these items tends to increase over the four years, from about 10% to 23%. On the other hand, the number investing is larger and increases throughout, 25% to 37%, as if some previous trend were continuing. With many not investing at all, the median household investment is often zero, and thus not revealing. So with trepidation we report the household mean. Household mean investment declines in the northeast from 1997 to 2000, but it does rise in the final 12 months, 2000-01. In the central region, investment also declines from the relatively high 1997-98 level and goes negative from 1998-99. There is then a big surge in investment in the 1999-2000 year, though investment goes back down to its initial level by the end.

²⁰ We see in slightly more detail that the number in the population either investing or disinvesting in agriculture is quite low relative to the sampled population; often a given category is less than 10%. Still, it appears that both the percent disinvesting and the percent investing increase over the years, more or less. Thus, the net positive effect is small. In the regional means, agricultural investment in the Northeast drops initially and is then more or less constant, not inconsistent with occasional household reports of asset sales. Yet mean agricultural investment in the central region increases for the first three pairs of years, though it too drops slightly in the end.

²¹ As regards livestock, we see that the percentages with changes are at best a quarter of the population. The percentage investing is increasing slightly overall and in the northeast region, while the percentage disinvesting is slightly decreasing there. The central region displays the opposite pattern. From the regional averages, it is apparent that livestock investment was strong in the northeast, particular so in the latter years. Surprisingly, from the averages, livestock investment in central region also picks up.

Northeast was positive and relatively high in the first, 97-98 year. But then business investment starts dropping. In the central region mean investment moves along these same extreme lines, and actually goes negative in the end, as disinvestment and sales of business assets predominate. Business investment is also large as an order of magnitude, and so it has a great influence on overall total investment (household, livestock, business, and agriculture inclusive).

This movement in business investment reflects and is reinforced by the number of households starting new businesses. Of those not in business in 1997, 27% entered by 1998, a big number which subsides subsequently. Overall, the one year entry rates in 1998, 99, 00, and 01 are 27%, 12%, 16%, and 13% The one year failure rates, of those in business in one year and not in the next: 19%, 17%, 15%, and 17%. Thus, the one-year failure rate, though highest in the first year, is more or less steady, and there is a distinct, large increase in the number of active businesses over the 1997-1998 period.^{22, 23, 24}

However, as noted earlier, movements in these aggregates do not necessarily reflect common movements across households and businesses. In a regression of household specific investment aggregated across all categories onto common time effects (See Table 2c) we find that 1997-1998 and 1999-00 have a significant, and positive, fixed effect, overall and by region. The last 2000-01 pair is also significant and positive overall and in the northeast. Consistent with the drop in investment referred above, the fixed effect is negative from 1998-99 and significant in the Central region.

6. An Optimal Allocation of Risk-Bearing as a Benchmark Standard

To assess how well the financial system functioned during this period, we use an extreme but useful benchmark: an optimal allocation of risk-bearing. The basic idea is that households should be immune from idiosyncratic shocks, once one controls for aggregate shocks. It is as if all income over all households were pooled together in every period and then reallocated among the households according to their initial wealth. Thus in a regression of household-specific consumption onto household-specific income and time- and household-specific fixed effects, the income coefficient should be zero. The common fixed effects should capture the residual effect of common aggregate shocks. Household specific effects should capture wealth differences and these are netted out in taking first differences.

²² Of the business stated in 1998, for most it was one business, but that number increases over time to two or more business while some go back to zero.

²³ Modeling business investment and entry rates must await further research. Suffice it to note here the real average, mean wage and average profit income in levels in the five years is 18,319 vs. 24,472 in 1997, 17,237 to 39,350 in 1998, 17,916 to 34,176 in 1999, 17,476 to 30,613, and 19,396 to 42,137. This spread of business over wage earning appears as well in SES data. Here the spread increased dramatically by the time of the 1998 interview, and business entry appears to have anticipated the increase.

²⁴ The two-year entry rate from 1997-99, 1998-00, and 1999-01 runs from 29 to 23 to 20 and again is decreasing in the end. The three-year rates are 35 to 25, with the same pattern, higher in the beginning. The overall entry rate over 5 years was 37%! The failure rates over two years are 24%, 24%, and 20% (so higher again in the beginning). The three-year rates are 25% and 26%. The latter overall failure rate is 29%. On net, then, the 37% overall entry rate dominates the overall 29% failure rate so there was a net substantial increase of those in business over the five year period (With exceptions, the entry rate is equal or above the failure rate in virtually all columns).

More specifically the benchmark risk-sharing equation can be derived as in Mace (1991), Cochrane (1991), Altoniji-Hayashi-Kotlikoff (1996), Attanasio-Davis (1996) and others. Here following Townsend (1994), one determines Pareto optimal allocations by maximizing a λ -weighted sum of utilities subject to a consumption (and leisure) resource constraint. Thus with utilities separable over consumption and leisure, λ -weighted marginal utilities would be equated to a common Lagrange multiplier μ , essentially the common but state- and date-contingent marginal utility of income. With exponential utility function, adjusting for age of household members, and assuming common risk aversion, σ , we obtain the following equation (1):

$$\frac{\sum_{k=1}^{N_t^j} c_t^k}{\sum_{k=1}^{N_t^j} A_t^k} = \frac{1}{\sigma} \left(\log(\lambda^j) - \frac{1}{N} \sum_{i=1}^N \log(\lambda^i) \right) - \frac{1}{\sigma} \left[\frac{\sum_{k=1}^{N_t^j} A_t^k \log(A_t^k)}{\sum_{k=1}^{N_t^j} A_t^k} - \frac{1}{N} \sum_{i=1}^N \frac{\sum_{k=1}^{N_t^j} A_t^k \log(A_t^k)}{\sum_{k=1}^{N_t^j} A_t^k} \right] + \frac{1}{N} \sum_{i=1}^N \frac{\sum_{k=1}^{N_t^j} c_t^k}{\sum_{k=1}^{N_t^j} A_t^k}$$

Here the dependent variable is the per-capita consumption of household j . The first term on the right-hand side is the household-specific fixed effect, essentially household j 's relative λ^j weight. The second term is a demographic term reflecting the age-adjusted number of members N_t^j of household j relative to the aggregate risk-sharing population. The final term is the average consumption of the risk-sharing population. In practice that term is replaced by a common aggregate time-specific fixed effect. The risk-sharing community could be taken to be the tambon, or alternatively, below, being a member or customer of a particular financial institution, and so here time-specific effects and the demographic term are estimated for each tambon separately.²⁵ Finally household-specific income change or shocks $X_{t,t+1}^j$ are added, though theory predicts these should have zero coefficients. Change in household size (hs) is added to allow for economies of scale. Thus, the final form is the regression equation:

$$(2) \quad \Delta c_{t,t+1}^j = \beta_{t,t+1} D_{t,t+1} + \delta \Delta \bar{A}_{t,t+1}^j + \eta \Delta hs_{t,t+1}^j + \xi \Delta X_{t,t+1}^j + u_{t,t+1}^j$$

Likewise, investment in business and farm assets should be determined by efficiency considerations, and the aggregate shocks, and not at all by household specific, idiosyncratic income movements. The Pareto problem is easily expanded to allow intertemporal production and other ways to carry wealth over time. The first-order conditions would equate the marginal cost of resources used today, say the price of capital $P_{k,t}$ times the marginal utility of foregone income μ_t , the same common marginal utility of consumption as above, to the sum of marginal revenue products under production function f^j over states at the future output date, namely the price of output $P_{q,t+1}$ times the future marginal utility of income μ_{t+1} . But, as is standard, the marginal revenue products of all input factors should be equated over all

²⁵ In the second set of regressions below, there is a set for members and a set for non-members). The household-specific effect is eliminated by taking a first difference, in time. But, change in household size is typically added on the right-hand side, as a further control, capturing potential economies of scale, for example.

households j , e.g., the user or rental cost of capital should be equated to the common marginal revenue product.

$$(3) \quad P_{k,t} \mu_t = \sum_{states,t+1} P_{q,t+1} \mu_{t+1} \frac{\partial f^j}{\partial k}$$

Thus capital in use in the period would be related to contemporary and future marginal utilities of aggregate income, captured by a common time-specific effect, and related to the technology used by households, as capital should be allocated to where it is most productive, for example. But with these controls, capital in use should not be related to household specific income at the time capital and other input decisions are made. Likewise, with these controls, investment or the change of capital in use should have nothing to do with change in household specific income.

It is difficult to control here for the technology in use f^j . It is thus conceivable that contemporary household income, or the change in income, reflects variation in expected returns not well captured by the common fixed effect. Neither have we incorporated adjustment costs or other aspects of the literature on investment. Instead, for symmetry, we proceed to run an investment regression in the cross section that is parallel with the consumption regression derived earlier, namely, household investment onto aggregate time effect, demographic effects, change in household size, and change in household income.

$$(4) \quad I_{t,t+1}^j = \beta_{t,t+1} D_{t,t+1} + \delta \Delta \bar{A}_{t,t+1}^j + \eta \Delta hs_{t,t+1}^j + \xi \Delta X_{t,t+1}^j + e_{t,t+1}^j$$

Indeed, here with our joint household/business survey, we can write down a household budget equation and see that a surplus of income over consumption in a given year must be saved somehow, i.e., put in storage, put into financial savings, or invested, for example. Likewise a deficit must be financed. Thus, if insurance is incomplete, and we take a time difference, then clearly we might suppose a priori that positive changes in household income would, ceteris paribus, be associated with more liquidity and hence positively associated with changes in household investment. Thus we use investment as the parallel dependent variable, and note any change relative to results for each, as they occur.²⁶

We explore below, with these consumption and investment equations, the associations or correlations of insurance, or its absence, with regional, occupational, and household specific attributes. We do not yet attempt to control for selection or assert causality, but rather reserve those efforts for the assessment of financial institutions, which follows in the subsequent section.

²⁶Throughout consumption, income, and investment are measured in real per capita terms, that is consumption, income, and investment are divided by the number of members reported by each household and deflated by the provincial average of prices as measured in the survey. Otherwise we are close the tradition of an empirical literature which tests whether investment is influenced by balance sheet considerations, or mitigated by access to outside finance (see Hoshi, Kashyap and Scharfstein (1991)).

The basic set of consumption regressions with income change as the right hand side variable, and pooling over all households and regions, shows that the full insurance model is rejected with respect to consumption change, that is, the income change coefficient though low is positive at .062 and significant (See Table 8). However, when stratified by region, the coefficient is higher in the central area than for the Northeast, namely .087 versus .004. Indeed, full insurance cannot be rejected in the Northeast though the power of the test is low. These results are consistent with the claimed, higher response of central area households to income shortfalls, though households were not asked to control for aggregate consumption in their responses.²⁷

The regressions with investment as the dependent variable show nontrivial influence of income change, both overall at .068 and by region (See Table 9). Now, however, the coefficient is larger in the northeast, .056 vs. .097.

We also stratified the sample for the consumption and investment equations by median age, by gender of the household head, by education of the household head, and by household wealth. The bottom line for targeting by socio economic group is mixed. See again Tables 8 and 9. Older heads, with median age greater than 50, have lower income coefficients in the regressions of investment in the northeast. In contrast, female headed household do worse in keeping investment immune from income change overall and in the northeast, but in the central region they do better. Overall, and in the central region, less educated households do worse in smoothing consumption but better in keeping investment stable. Less wealthy households smooth consumption and investment worse in the northeast, but low wealth households, overall and in the central region do better in keeping investment stable. Targeting by gender and education might have made some sense, but the results are mixed and vary by region. Low wealth households do seem uniformly more vulnerable in the northeast. With the exception of education, investment is not sensitive for potential target groups in the central region.

Indeed we can also as earlier explore the impact of household-specific income change associated with the named shocks that households attributed to their claimed income shortfalls. That is, shocks and income change are entered multiplicatively. We find that fewer days worked and illness were related to consumption shortfalls overall and in the central region, whereas flood, drought, and pests were the dominant adverse shocks in the northeast. On the investment side, drought and pests are associated with drops in investment. It should be noted however that not a small number of shocks show up as helping to reduce consumption impact of income change²⁸. This gives one pause in the overall interpretation.

²⁷ By province, the regional comparisons are weaker. Chachoengsao does have the least insurance with an income coefficient of .153, but this is followed by Buriram in the northeast at .062. Meanwhile, in Lopburi in the central region one cannot reject full insurance, while for Srisaket the coefficient at -.09 is perverse, that is negative and significant. It should also be noted that the common co-movement as measured by time varying fixed effects also overturns the regional picture. There are 12 out of 64 tambon time dummies significant at the 90% level in the central region, as compared with only 6 in the Northeast. So by that metric risk-sharing is better in the central region.

²⁸ Unpaid debt, business expenses, bad year in business and other agricultural shocks are helping to reduce the impact of income change on investment. Fewer days worked is associated to income-induced changes in investment.

Related we are interested in insurance within and across occupation groups. One can distinguish income sources within households and keep the full sample. One can also stratify the sample by principal occupation as captured by the primary income source, as described earlier. Either way it is clear that there is rank ordering among income coefficients in the consumption regressions. Business income and business owners show up as better insured, with statistically lower income coefficients than other groups, both overall and by region. Note that relative to the reference group, agriculture, the incremental effect of business as an occupation is to lower the coefficients, often below zero. One comes close to accepting the null of full insurance.

But this result is lost when we turn to the investment equations. That is, investment does move with income, and the coefficients are positive and significant. Indeed, overall and in the central region, the business income coefficient is second highest. But in the regressions stratified by primary income source there is no statistical difference from agriculture as a reference group.

In contrast, income from agriculture and fish farmers appear to be among the least well insured. The overall result appears to be driven by the central region. In the consumption regression fish income has the second highest income coefficient, and in the occupation stratification the difference from agriculture is positive and significant. Likewise in the investment regression, fish farmers overall and in the central region have highest income coefficients, though in the occupation stratification there is not much that is statistically significant.

Wage earnings and wage earners also appear to be quite vulnerable, though the results vary by region and by consumption vs. investment. The income coefficients in the consumption regression are high in the central region, though not in the occupational stratification. The income coefficients on investment are high overall and in the central region, though in the occupation stratification in the northeastern wage earners have high coefficients.

Agricultural earnings (inclusive of livestock) and farmers, as the benchmark, are not insured from income fluctuation. For neither consumption nor investment are coefficients zero. This is true overall, especially in the northeast.

7. Mitigating Factors and the Role of Financial Institutions

7.1 Household Reports

We have yet to address the question of what mechanisms were being used to (partially) smooth consumption and investment. Thus we return again to the household's own response of what it did given its reported decline in income.

Use/sell rice in storage shows up in the Northeast at 35-65%, though this response does move around over time and varies in rank order as we might have anticipated, i.e., fluctuating in Buriram and Srisaket according to the droughts. The main finding is that this response is very high overall for the Northeast provinces.

In contrast, in the central region, the dominant response is to use financial savings, at 21-43%. But household use of financial savings does show up in the Northeast, if less consistently, in Srisaket in 1998 at 22% and in Buriram in 1999 by 45%. Borrowing from the government's development bank, the BAAC, is mentioned at 23-31% of population responding but is never mentioned in Lopburi, a central area province. Otherwise, there is no evident pattern over the various years. Help from relatives is named by 21-35% of the households, and is particularly prevalent not only in the northeastern province of Srisaket but also in the central area provinces of Lopburi in all years. In short, this informal mechanism is an important response, and there is no regional pattern.

7.2 Measured Savings

To a certain extent, these claimed responses are reflected in the measured, aggregated responses over households. If we look at aggregated savings, summing over both financial savings and rice storage, we see in the initial 1997-1998 year a decrease so that the mean and median (nominal) change is negative in both regions. However, for 1998-99 there is a recovery in the central region but then the trend goes negative. In the Northeast, mean changes remain negative, but the trend is positive. However, the percentages with increases and decreases are not much different and the median change is often zero.

If we break savings into its various components, that is, financial and rice, and in various institutions, we see contrasting patterns. It should be noted by way of background on these institutions that commercial bank savings averaged almost 60% of total savings in the central region initially, in 1997, but only 25% in the Northeast. BAAC savings averages 10% in three of the four provinces, particularly low in Lopburi, but relatively high in Chachoengsao at 45%. In summary, when aggregated, commercial bank and BAAC financial accounts constitute the bulk of savings in the central region. In contrast, rice storage is relatively large in the Northeast, ranging from 30% to 70% (except for the initial year). In Buriram, there is more savings in rice than in the sum of all other, financial accounts. As regards village funds, PCG's have about 4% of overall savings initially in 1997, and rice banks one half of one percent (rice banks are virtually nonexistent in the central region).

Focusing on movements over time, commercial bank saving accounts drop in the initial 1997-98 year in the Central region and continues to follow aggregate savings there. But in the Northeast, commercial bank savings, though positive initially dropped continually except for the final year. In yet another contrast, rice storage is positive originally in the Central region, and stays positive, though it drops continuously. In the Northeast, rice storage, though high initially, goes negative and roughly follows the movement in commercial bank savings. These movements in average rice storage are echoed by the percentages with increases and decreases.

The story for savings in village funds is mixed. Overall the shares of PCG and rice bank savings drop, e.g., PCG's from 4% to less than one percent (with PCG shares in Lopburi dropping from 14% to virtually zero.) However, the PCG share in the total rises to 1% overall at the end, 2002. Also, the PCG share in the number of accounts, while again falling from .041 to .023, then rises dramatically in the end to .097, that is, to almost 10%^{29,30}. Likewise, PCG savings withdrawals are large in both regions in the initial 1997-98 year. But the average change goes positive after that, amplified by an ever increasing percentage of increases and an ever decreasing percentage with decreases.

7.3 Measured Borrowing

On the debt or liability side of the ledger, aggregate debt increases in the Northeast throughout the four-year period, except for the lowest quartile of the population, but these increases are of a lower order of magnitude in the final two years. In the central region, debt decreases in the first 1997-1998 year, and then mimics the Northeast pattern, positive but diminishing. Thus the initial year is a contrasting experience across the two regions. Overall and by region, the percent with increases in debt easily dominates those with decreases.

We get a better sense of these distinct patterns if, again, we distinguish debt by primary lender, as well as region. The BAAC share in debt is on average higher in the Northeast, at 38-50%, than in the central region, at 25-30%. However, within the Central region, we see that for Chachoengsao the range is relatively high at 39-43%, in contrast to low numbers for Lopburi, at 18%³¹.

But over time the BAAC share in debt increases, and tends to follow the pattern of aggregate debt, increasing in Northeast in the initial year, then rising, by less and less. In the central region, BAAC debt actually goes down in magnitude in the first year, though there is a sharp recovery in the second year, and some expansion in subsequent years as well.

The movement in commercial bank debt is dramatic. In the Northeast, as a percent of total debt, it was only 3-5%, in Srisaket and Buriram, respectively, yet these fell to zero in Buriram by 1998 and to approximately 1% for three years in Srisaket (rising to 2% again by 2001). In Chachoengsao and Lopburi the initial share is higher initially, but the share is reduced by one-half, from .18 to .09 in Chachoengsao and .26 to .13 in Lopburi. That is, in

²⁹ In absolute terms the story is a little more complicated, Village funds, already negligible initially, drop further during 1997-98 period, particularly in the central region. But subsequent years record steady if not ever increasing totals. By the final 2000-2001 period, for example, 90-94% of the transactions in savings are increases. Rice banks, on the other hand, take a hit in the first year in the Northeast and really never regain momentum. What little there was in rice banks in the central region is driven to absolute zero. Still, if we look at numbers of accounts overall we get a different picture, with an ever-increasing percent of the total number, from one percent in 1997 to 3% in 1998.

³⁰ The institutional survey is not inconsistent, but the sample size is limited. Of 45 village institutions resurveyed in 1998 for example, 16 had savings facilities in 1998. The data shows that 10 out of the 16 had an increasing number of savings accounts, 3 a decrease, and 3 no change. Of the 10 surveyed in 1998 and 1999, eight had increases, one had no change, and one a decrease. We can thus infer that institutions were expanding in terms of number of accounts. One also finds newly established institutions in the data.

³¹ Recall that BAAC debt was also low in Lopburi, and savings may be tied to debt. Overall, Srisaket has the highest level of BAAC debt.

levels, commercial bank debt in the Northeast is much reduced³². In the central region there is also a relatively large decrease in the first year. In 1998-99 there was at best small increase, especially for large borrowers, while the final 2001 year is largely negative³³.

In contrast, and perhaps as compensation, the share of debt from relatives and moneylenders moves up. While the share from relatives is more or less steady in central region, at 10%, the share from relatives in the Northeast rises from 7% to 12%.³⁴ Absolute changes display similar patterns.

Share of indebtedness debt to village funds, including PCG's and rice banks, is at one percent or less initially, yet over time these falls to virtually zero. The numbers are slightly better if one considers number of loans, not weighted by value. Then there is something of a recovery for village funds, especially in the Northeast³⁵.

8. A Theory Based, Risk Assessment of Safety Nets and Financial Institutions

A key issue is whether the financial system helped to mitigate (or exacerbate) the impact of idiosyncratic shocks. As a quick and naïve check, households are classified by whether they increased or decreased savings or debt in the various years and the corresponding dummy variables are created. Results are reported in Tables 10 and 11.

However, there is little of significance in the movement of aggregated variables. Those associated with decreases in gross indebtedness in the last two years were stabilizing consumption in both regions. But aggregated savings are rarely significant, neither for those who has positive savings levels in 1997, nor for those with changes in savings during the 5-year period. On the investment side, households with positive savings in 1997 buffer the impact of the crisis only in the Northeast and those with increased indebtedness in central region stabilize investment after the crisis. However, changes in savings and debt do not seem to help, or perhaps were not enough, to stabilize investment during the 5-year period.

But clear patterns emerge, again, when we break savings and credit into their components, by institution or type. We thus address the question of whether participation in particular financial institutions or specific informal mechanisms helped to mitigate the effect of adverse income changes (and other shocks). A naïve approach is to use the information

³² But only 9 people in the first year and no change in the second year, while 2-4 households managed to increase borrowing in 2000 and 2001.

³³ The number of commercial borrowers in the central region varies from 30 to 25 households.

³⁴ The share of moneylender debt is also more or less steady at 6% to 8% with little pattern. An exception is the decrease in indebtedness to moneylenders in Chachoengsao in the initial year.

³⁵ But the story for absolute change is a bit more complicated. Debt to funds in the Northeast drops in the first year, though even then the percentage with increases out weighs the percent with decreases. This then stalls in the second year, and by the last two years there are sustained increases. In the central region, the initial fall is greater. This is then followed with a weak recovery, and then another fall in the 1999-2000 year, and finally a surge at the end, in 2001. It would thus seem that PCG's suffered in bad years, e.g. 1997-98 in the central region, and PCG's and rice banks suffered in 1999-2000 decline of both regions. But, there is a tendency for overall expansion of village funds in the Northeast. The numbers are also slightly different if we consider number of accounts. Lopburi did not fall in 1999-00, for example.

given by the household in the initial 1997 interview, prior to the crisis, on whether it was a member or client of a particular institution at that time, commercial banks, for example. Note that May 1997 is used as it predates any endogenous changes in membership associated with the crisis itself (dated with the devaluation in July 1997). Still, we term this the naïve approach because it does not attempt to control for endogenous selection into institutions in 1997. Wealthier households may sell real assets in a bad year for example, and wealthier households may be more likely to have been commercial bank clients. We shall attempt to correct for selection bias momentarily.

To begin with the naïve approach, we return to regression equations (2) and (4) and examine how household specific consumption change and investment move with household specific income changes. Table 12 displays an example for the BAAC. Note the income coefficient is .183 and a dummy for BAAC client when interacted multiplicatively with income change has a coefficient of .087. The point estimate is statistically significant and indicates that being a client of the BAAC was not helpful. The other variables in this regression are the time-specific fixed effects, one set for clients (dm98-dm01) and one for the non-client group (dn98-dn01). Note that few of these are significant, but it does not appear to be the case that fixed effects are more significant for the client group. Likewise, there is a demographic terms for members (demm) and for nonmembers (demn), which are not significant. To sort out the potential impact of BAAC access, income change is also entered interactively with wealth of the household (w97gy) as well as education (e97gy), age (a97gy), and gender (g97gy) of the head. Note that education and gender appear to reduce the impact of income change, while wealth and age do not have significant effects. Finally, wealth (wth97), education (educ97), age (age97), and gender (gend97) of the household are each entered in levels, to control for movements in the dependent variable that might otherwise be attributed to income change. Mean wealth (mwth97) and mean education (meduc97) of the village of the household is also entered, to control for geography and the anticipation of the inclusion of these variables in a selection equation below.

The selection equation is reported in Table 13. A linear probability model is employed, as an approximation to the true, non-linear membership equation, as in a probit for example. While predicted probabilities are not bounded between zero and one, the linear regression is free from normality assumptions about the error term. Note that wealth (wth97) and gender (gend97) and household size (hs97) are all significant predictors of clientele relationship with the BAAC. The instrument in this equation for individual membership is whether or not the BAAC was lending in the village (dloc), more specifically, the report by the headman in the key informant survey of whether anyone in the village was a BAAC client in 1997. Note that this presence variable has a large coefficient and is a good predictor of household-specific membership. The premise and hope is that this headman response is uncorrelated with other unmeasured variables which might determine household specific consumption change. That is, we hope that this instrument allows the membership variable in the impact regression to be uncorrelated with the error term in the impact equation.

Thus, the key equation, the impact risk-sharing equation, uses predicted membership as the right-hand side membership variable from the first stage of the two-stage least-squares regression, that part of memberships which can be explained by institutional presence.

Scanning down Table 13, we see the impact of BAAC membership is now estimated to be positive (which is perverse), though not significant. This is the key result, and we continue to report this treatment effect in the summary tables.³⁶

The two stage linear approach is a reliable guide to the impact of BAAC membership to the extent that the key instrument is valid. For robustness, we also created from Community Development Department bi-annual Census data another membership or institutional presence variable. Headmen of all villages in Thailand are asked in the CDD survey whether anyone in the village has access to productive credit from one of several named institutions, including the BAAC. (the other variables we use below are commercial banks, village savings funds, and traders). As all villages in each of the survey provinces have been vectorized in our Geographic Information System, we can use the responses from nearby villages in 1994 (the latest year available) to create weighted membership variables for the villages of the Townsend Thai survey. Specifically every pixel is assigned a number by weighting the nearest 12 villages to the center of the pixel, the weight falling inversely with distance. Thus every village, including those of the Townsend Thai data, can be assigned a new number. The weights and number of villages used were chosen to produce non-trivial variation, between zero and one, so that on average there is neither too little nor too much damping. Table 14 reports these results. In the case of the BAAC, the GIS instrument has higher explanatory power in the membership equation and, more to the point, produces again a statistically insignificant, perverse treatment effect in the impact equation.

In practice the GIS variable has several advantages. First the response of any given headman may be inaccurate, so with presumed spatial correlation, the averaging is removing some measurement error. Indeed, we can impute numbers to village that otherwise are missing headmen responses in the CDD data. Second, there may be supply side variation—the BAAC tends to lend to villages near its local district office, for example, and commercial banks tend to lend along roads and near towns. Village funds are promoted by energetic local officials responsible for tambons or amphoes. One hopes these supply side effects pick up an exogenous aspect of the likelihood of household access and have little to do with individual household specific attributes, in particular with unobserved household attributes which determines the response to a bad year. (We also include village level controls for wealth and education to try to sort out further consumption and investment changes that have to do with common economic characteristics of the local area).

We also used other variables for individual membership, and instrumented them as well, as just indicated. We take as an indicator of household membership not reported membership but whether the household had savings in the institutions (or device) in question in the 1997 interview. As households are much more likely to save in commercial banks than to borrow from them, savings is a key indicator of having a relationship. Likewise banks may

³⁶ Many of the coefficients in the IV regression do not change much from the naive regression. The fixed effects have now moved, but they are no longer the same as variables as before, Rather, the predicated probability of membership is used to sort household into two groups, clients and non-clients, according to whether the probability is greater than .5, or not. Now, in the IV results, non-members always have significant fixed effects whereas members rarely do. This is perverse. The coefficients on other variables such as education have moved, but now the two-stage regression sorts out in principle the effect of household education on membership and the effect on consumption change.

be more inclined to lend to households with savings, and indeed the BAAC requires the opening of a savings account in order to disperse funds from borrowing. The BAAC is also engaged as well in an extensive deposit mobilization program. Savings are also used for village level institutions. For Production Credit Groups, deposit mobilization is a key goal, and indeed a PCG is more likely to be acquiring savings from its target population than lending relative to other village funds. See Kaboski and Townsend (2001) for details. (Unfortunately CDD data only distinguish village savings funds, not Program Eradication Programs which lend, for example).

Finally, we return to a more naïve approach but use actual increases or decreases in savings, and in credit, by a household in a given year creating an indicator variable. We take this to be a direct measure of the household's use of the institution, that is, reduced savings, or increased borrowing, as a potential buffer to offset an adverse impact of a low-income year, and vice versa for high-income years. We do not attempt to find instruments for these changes, and certainly not to model these changes, but rather present them along with the instrument variables results. As will be evident, many of the results are consistent with the IV approach, and/or provide an interpretation of the use of the institution, and how that might vary over time.

We turn then to the summary tables for institutions and informal mechanisms. As a further check, and to aid in interpretation, we stratify the data by region (northeast, central), by period as during (1997-1999) and after (1999-2001) the crisis, and finally within region by period.

We see that for consumption change, commercial banks appear to be helpful in some instances, particularly in the Northeast during the crisis (See Tables 15 and 16). That is, by either measure of membership, the coefficient is negative and significant once we instrument. We also see that overall those with decreases in saving did manage to smooth consumption better, and it would appear that that is the mechanism being used in the Northeast. In fact, the reduction of loans from commercial banks appears to have had an adverse effect; decreased indebtedness in the northeast was associated with income-induced consumption fluctuations. In the central region, decreased indebtedness is helpful but only after the crisis. On the investment side, after the crisis, commercial banks seem to have a beneficial impact in the Northeast, again through a decrease in savings, but a perverse impact in the Central region (oddly, through increases in savings). Those that did manage to increase debt during the crisis do uniformly better in investment stabilization and those that decrease debt in the northeast had investment sensitive to income (oddly, decrease in debt in the central region was helpful during the crisis).

Results for the BAAC, reported in Tables 17 and 18, are similar in that the naive regressions appear to be misleading. With instruments, the BAAC is helpful in consumption smoothing in the northeast after the crisis but not helpful in the northeast during the crisis. Related, perhaps, decreased in savings in the BAAC helped in the northeast after the crisis, but apparently was an indicator of stress during the crisis. In the central region, but not in the northeast, decreases in debt are associated with income-induced consumption fluctuations. On the investment side, there is little that is consistent across categories in the instrumented

membership variables, but memberships per se may not be the salient story. Rather one seems to need to distinguish savings from debt, and within debt to distinguish increases from decreases. Those with decreased savings in the BAAC kept investment more steady in the central region in the crisis (but in the northeast increased savings has a perverse effect). The results for debt are dramatic. Those with increases in debt from the BAAC in the crisis always do better, across both regions. In contrast those may have been required to reduce debt do uniformly worse over periods and regions, with few exceptions.

Production Credit Groups, a frequently encountered village fund, appear to be helpful in smoothing consumption in the central region, after the crisis, but seem perverse in the northeast (See Tables 19 and 20). Increases in savings in the crisis years are also perverse in both the central and northeast region, though helpful in the northeast in later, post crisis years. Savings is mandatory in some types of funds. The most salient result is that decreased savings is associated with an adverse effect in the crisis years, always, presumably as an indicator of stress. Debt appears to have no influence. On the investment side, membership in PCG's helped stabilize investment against income movement during the crisis years in the northeast, but for some reason exacerbated investment sensitivity after the crisis. There is no impact in the central region. But again we see the more salient result: decreases in savings, presumably as an indicator of stress, are associated with a perverse effect in crisis years, even in the central region. (oddly, increased in debt in post crisis years are also associated with a perverse effect on investment stabilization in the central region).

Moneylenders are also indicative of stress during the crisis, apparently, as reported in Table 21. That is, those who increased debt in the northeast, and in the central region during the crisis, have higher income coefficient in the consumption regression, and those that managed to decrease debt in the northeast after the crisis were doing better. Likewise, for the informal sector as a whole, decreased in debt is helpful in post crisis years in terms of consumption smoothing. Surprisingly, those with increases in moneylender debt do better in investment in crisis years, uniformly over regions, consistent also with the instrumented equations. For all informal debt, increases help also, but more so in post crisis years (oddly, decreased in debt is associated with more sensitivity in the northeast).

Those with changes in assets, both increases and decreases, were better able to smooth consumption (See Tables 22 and 23). Increases are investment, of course, and so we see a direct relation between investment and consumption smoothing.

9. Concluding Remarks on Macro Models and Economic Policy

This paper has emphasized the role played by financial institutions and safety nets in stabilizing consumption and investment from idiosyncratic shocks, taking as given the realized paths of macro aggregates. The advantage of this approach is that metrics for the evaluation of financial institutions and safety nets come directly from theory and are thus sharply defined. The disadvantage of the approach is that it seemingly avoids the obvious larger goals of understanding the crisis and evaluating macro policy. Here, then, we both summarize the results and broaden the discussion with those larger goals very much in mind.

We need not wander too far from the results already in hand. There is in fact a natural and strong link from the measured micro underpinnings of the Thai economy to the construction of macro models and hence to an evaluation of macro policy. We shall begin the discussion by a consideration of the literature on insurance and credit, one topic at a time.

The paper here has emphasized the role that financial institutions can play in smoothing idiosyncratic shocks. We have found, for example, that the BAAC has been helpful in the northeast after the crisis, though not in the central area. We also found that commercial bank saving accounts were helpful, though the contraction of credit associated with the negative macro shock was not. Earlier, related work of Chiawongsee (2000) using the Socio-Economic Survey and Community Development Dept data established a strong correlation from 1986-1994 between access to the BAAC and commercial banks and the smoothing of shocks at the amphoe (county) level. The work of Townsend and Yaron (2001) has established that the BAAC has an institutional structure which would have allowed this smoothing. Similarly, using retrospective data from 1991-1997 from the Townsend Thai 1997 survey, Kaboski and Townsend (2001) show that certain types of village financial institutions, and institutions with certain policies, have been helpful in smoothing the shortfalls of adverse income years, though in the panel data here village funds do not appear to do so well in the crisis years. We have also established here that family and informal networks, and self-insurance through rice stocks, do not appear to have played salient helpful roles, that is, were insufficient backstops, at least in the short run.

One might be tempted to argue that these contradictory results could be attributed precisely to the crisis itself, that is, that historically financial institutions have played a risk reduction role but that the crisis was characterized by large common adverse shocks hitting households and businesses directly, shocks that could not be insured. But the data here establish more or less firmly that even in times of crisis, macro shocks are dominated by idiosyncratic shocks, at the household, village, and regional level. There remains a role for financial institutions and safety nets to play in the smoothing of these idiosyncratic shocks in crisis periods. Indeed, some of the financial institutions did continue to play that role, at least, as noted, in certain respects.

It is possible in fact to construct a macro model of growth and fluctuations based on these ideas. We take the parable of Greenwood and Jovanovic (1990) as an example. Households and businesses are subjected to both idiosyncratic and common, aggregate shocks. Those without access to the financial system would decide how much to save and where to invest on their own, and such households should fail tests for insurance against the idiosyncratic part, especially if informal networks are limited. Those with access to the financial system would find in addition that direct insurance, and credit contracts with contingencies, allow them to smooth much more of the idiosyncratic part. A fixed, transactions cost might limit access to those with higher wealth, not entirely inconsistent with the results reported here (Note that wealth is typically a positive predictor of access to certain financial institutions, and that risk sharing is better within the northeast for those with higher wealth.) Thus, overall time, growth would be driven not simply by savings and capital accumulation, but also by transitions into the financial sector. Those in the financial sector might choose more productive if riskier investments, for example. Similarly, fluctuations in

aggregate income would be driven not by common aggregate shocks alone, but by the sum of household and regional shocks for those not insured. Such a model would deliver growth rates and inequality movements which vary with financial sector access.

Indeed, such a model can be taken to data from Thailand during its growth period, 1976-1996. The fit of the model with the data is reasonably good. (See Townsend and Ueda (2001) and also Jeong and Townsend (2001)). It would appear, however, that the Thai financial system suffered from distortions that limited access below that which would have been endogenously optimal. That is, distortionary policies appear to have limited access and the provision of insurance. In the calibration exercise these are associated with large welfare costs, not only in terms of unnecessary exposure to risk but also reduced growth. Thus the results here that financial institutions in the crisis played a relatively limited risk-reallocation role can be seen as symptomatic of the same historical distortions. Likewise, risk reallocation during the crisis could have facilitated recovery and resumed growth. Unfortunately, neither the macro policy nor the financial sector reforms seem to have been guided by this principal.

On the credit side, business starts and business and agricultural investment can be limited by wealth. We have seen that access to commercial banks is quite limited in the northeast, for example. Unfortunately the data here are not decisive: wealth does appear to play a role in stabilizing investment against income changes in the northeast but not in the central region. Commercial banks do seem to facilitate investment stabilization in the northeast, and we know that wealth is strongly related to access to commercial banks there. More clearly, those with increases in debt in the BAAC and commercial banks kept investment more steady and conversely for those with decreases. In earlier work with the 1997 survey, Paulson and Townsend (2001) establish that level of start up investment is strongly related to household wealth. Indeed, Paulson and Townsend estimate from data on business starts and wealth various distinct micro models much used in the macro, growth and inequality literature. In Banerjee and Neumann (1993), and in Aghion and Bolton (1992), for example, credit constraints are alleviated by accumulated wealth, as either collateral is increased or the moral hazard problem is mitigated. Growth would be driven not just by capital accumulation, but by transitions into business and cash-crop farming, and by expanded levels of investment in these sectors, as wealth-induced credit constraints are reduced.

A second calibration exercise in Giné and Townsend (2001) thus allows a welfare policy analysis of improved financial intermediation. Growth is shown to be highly sensitive to financial sector expansion. The point is that with additions to allow for aggregate shocks, growth could be sensitive to improved intermediation during downturns. We do know from the work of Bernanke and Gertler (1990), Kiyotaki and Moore (1997), Caballero and Krishnamurthy (2002) among others, that imperfect credit markets can be the cause of crisis and amplify fluctuations. Thus, one could conjecture that the contraction of the credit in Thailand during the crisis may have had a large perverse effect on national income. The work of Paulson and Townsend (2001) give a preliminary guide about where to look for structural improvements in Thai financial institutions and thus financial sector reform could be seen as a substantial tool of macro policy. Likewise, the work of Holmstrom and Tirole (1998) would suggest that expansionary monetary policy and government-financed transfers to those with

shortfalls could have a positive macro effect. The work here suggest certain types of insurance were needed. Thus safety nets would be seen also as substantial tools of macro policy.

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Table 1: Real (per capita) Income Growth

	1997-98	1998-99	1999-00	2000-01
All Sample	-.07	-.03	-.19	.01
<u>By Region</u>				
Central	-.17	-.11	-.16	.01
Northeast	.20	.14	-.27	-.00
<u>By Province</u>				
Chachoengsao	-.13	-.06	-.02	.21
Lopburi	-.14	-.13	-.14	.07
Buriram	-.19	.24	-.21	.17
Srisaket	.60	-.04	-.14	.15

Figure 1

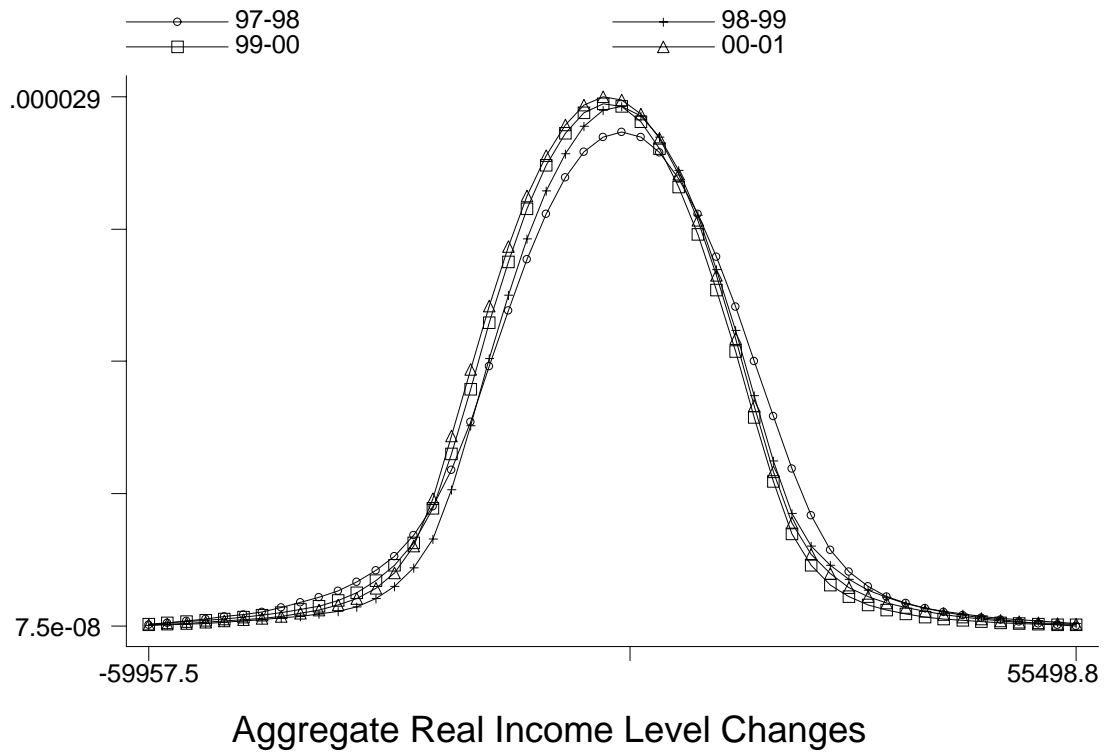


Figure 2

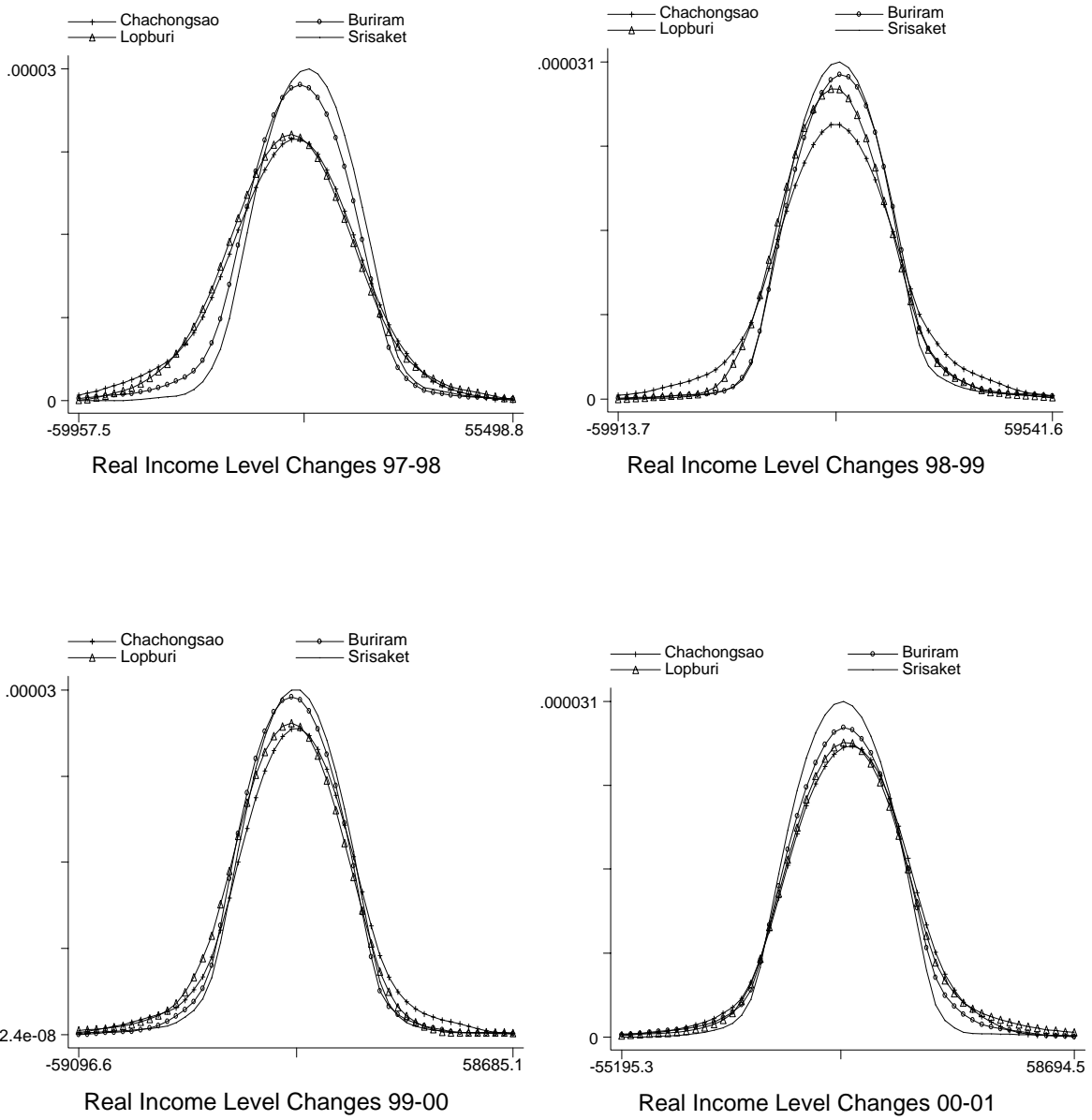


Table 2: Regressing Household income change onto time-specific fixed effects

Time Dummies	All Sample		Central		Northeast	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
1997-98	-1120.163	0.016	-2516.863	0.002	153.652	0.754
1998-99	395.854	0.392	-881.836	0.269	1596.774	0.001
1999-00	-1800.597	0.000	-2099.467	0.008	-1512.011	0.002
2000-01	603.138	0.191	753.864	0.342	459.218	0.349
R2	0.0054		0.0084		0.0091	
Prob>F	0.0001		0.0009		0.0003	
Obs	3618		1756		1862	

Table 2b: Regressing Household Consumption Change onto time-specific fixed effects

	All Sample		Central		Northeast	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
1997-98	-4873.324	0.000	-5332.876	0.000	-4446.596	0.000
1998-99	363.001	0.374	1480.457	0.016	-694.506	0.200
1999-00	-905.69	0.026	-953.273	0.117	-859.524	0.114
2000-01	593.106	0.146	1026.804	0.091	167.893	0.758
R2	0.0382		0.0436		0.0349	
Prob>F	0.0000		0.0000		0.0000	
Obs	3623		1771		1852	

Table 2c: Regressing Household Investment onto time-specific fixed effects

	All Sample		Central		Northeast	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
1997-98	3860.084	0.000	4306.129	0.000	3422.472	0.000
1998-99	-468.128	0.153	-1140.926	0.024	186.333	0.655
1999-00	1580.115	0.000	1628.293	0.001	1533.446	0.000
2000-01	827.785	0.011	780.082	0.122	874.886	0.036
R2	0.0424		0.0443		0.0410	
Prob>F	0.0000		0.0000		0.0000	
Obs	3771		1864		1907	

Table 3: Level Change in Household Income regressed on Fraction of Income by Source

CHACHOENGSARO, 1997-98

. areg gy s1 s2 s3 s4 s5 s6 if changwat==7, a(dtambon);

Number of obs = 177
 F(6, 167) = 21.16
 Prob > F = 0.0000
 R-squared = 0.4438
 Adj R-squared = 0.4138
 Root MSE = 11999

gy	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
agriculture	-.8106709	.1008315	-8.040	0.000	-1.00974	-.6116023
fish	5.463538	1.047505	5.216	0.000	3.395479	7.531596
wages	-.5851372	.0916112	-6.387	0.000	-.7660025	-.4042719
business	-1.029498	.2822386	-3.648	0.000	-1.586713	-.4722827
rentals	-2.000965	1.223141	-1.636	0.104	-4.415777	.413847
financial	-.7279212	.5797051	-1.256	0.211	-1.872416	.4165737
_cons	9348.017	1508.189	6.198	0.000	6370.443	12325.59
dtambon	F(3,167) =		0.034	0.992	(4 categories)	

SRISAKET, 1997-98

. areg gy s1 s2 s3 s4 s5 s6 if changwat==53, a(dtambon);

Number of obs = 231
 F(6, 221) = 19.34
 Prob > F = 0.0000
 R-squared = 0.3568
 Adj R-squared = 0.3306
 Root MSE = 7314.1

gy	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
agriculture	-.6414387	.1061014	-6.046	0.000	-.8505387	-.4323387
fish	-41.62733	31.66884	-1.314	0.190	-104.0389	20.78424
wages	-.5574102	.0719386	-7.748	0.000	-.6991836	-.4156368
business	-.9459641	.2046761	-4.622	0.000	-1.349331	-.5425974
rentals	2.078923	1.086121	1.914	0.057	-.061558	4.219403
financial	-.1563705	.4945824	-0.316	0.752	-1.131072	.8183309
_cons	4895.383	636.2964	7.694	0.000	3641.398	6149.368
dtambon	F(3,221) =		1.758	0.156	(4 categories)	

Table 4: Change (levels) of Real Income of Household regressed on Fraction of Income by Source, by changwat, including tambon fixed effects.

	Chach.	Lopburi	Buriram	Sisaket	
97-98	— Fish*	Fish*	Rentals	— Rentals*	
	— Wages*	— Rentals	— Financial	— Financial	
	Financial	— Wages*	— Wages*	Wages*	
	Agric.*	Financial*	Agric.*	Agric.*	
	Business*	Agric.*	Business*	Business*	
Adj. R ²	0.41	0.42	0.41	0.33	
98-99	Chach.	Lopburi	Buriram	Sisaket	
	— Financial	— Financial	— Financial*	Fish*	
	— Rentals	— Wages	— Rentals	Rentals*	
	Fish	Agric.*	Fish	— Financial	
	Wages*	Rentals	Wages*	— Wages	
Adj. R ²	0.28	0.19	0.17	0.18	
99-00	Chach.	Lopburi	Buriram	Sisaket	
	— Rentals	— Wages	— Rentals	Fish	
	Wages*	Agric.*	— Wages	— Wages	
	Financial	Rentals	Financial	— Rentals	
	Business*	Financial	Agric.*	Agric.*	
00-01	Agric.*	Business*	Business*	Financial*	
	Fish*	Fish	Fish*	Business*	
	Adj. R ²	0.22	0.33	0.20	0.21
	Chach.	Lopburi	Buriram	Sisaket	
	Fish	Business*	— Rentals*	Rentals	
Business	Agric.	— Wages*	Business*		
Rentals	— Financial	Agric.*	— Fish		
— Financial	— Wages	Business*	— Wages		
— Agric.*	Fish	Financial*	Agric.*		
Wages*	Rentals	Fish	Financial*		
Adj. R ²	0.09	0.03	0.12	0.15	

— Negative coefficients * significant at 10%
Coefficients are ranked in descending order.

Figure 3

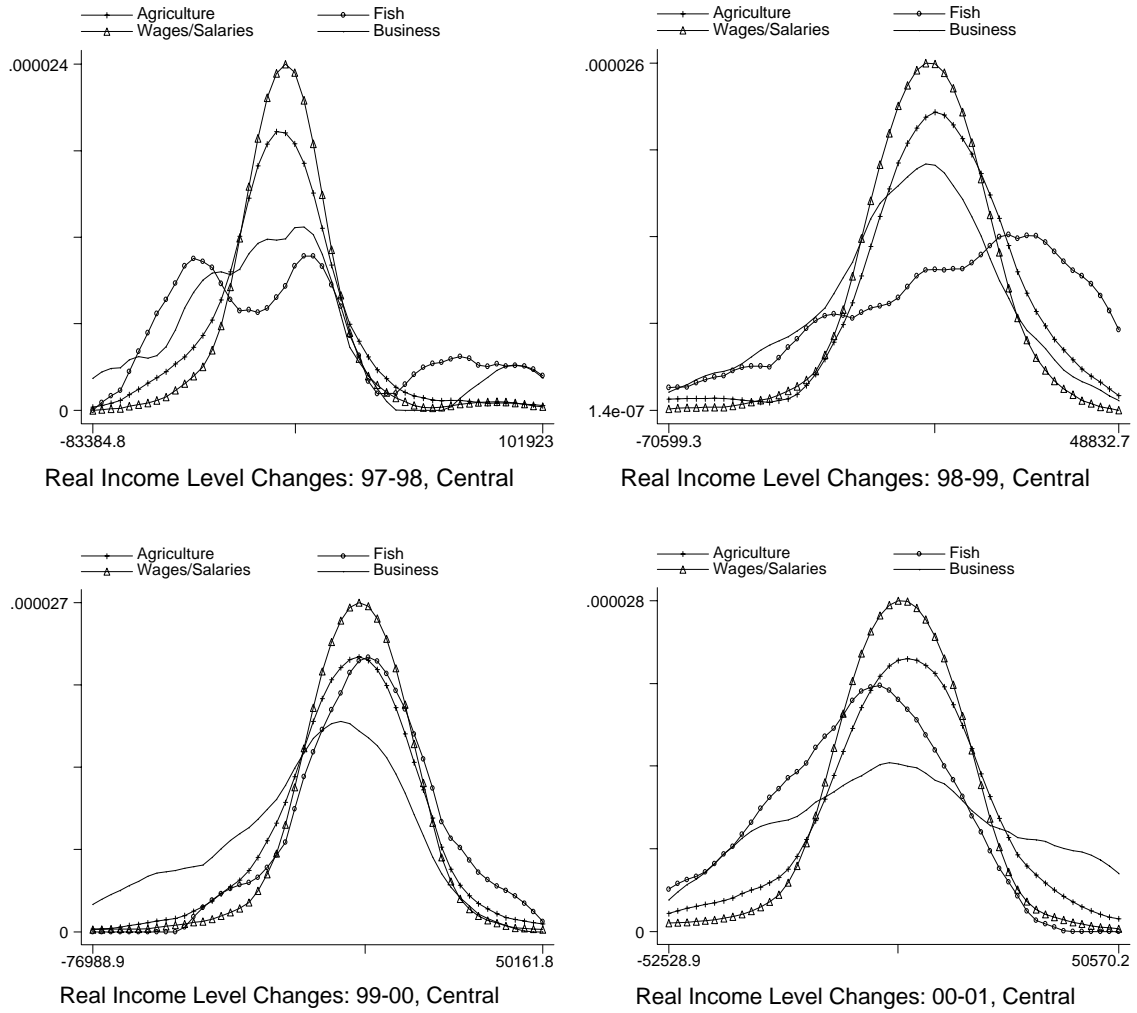


Figure 4

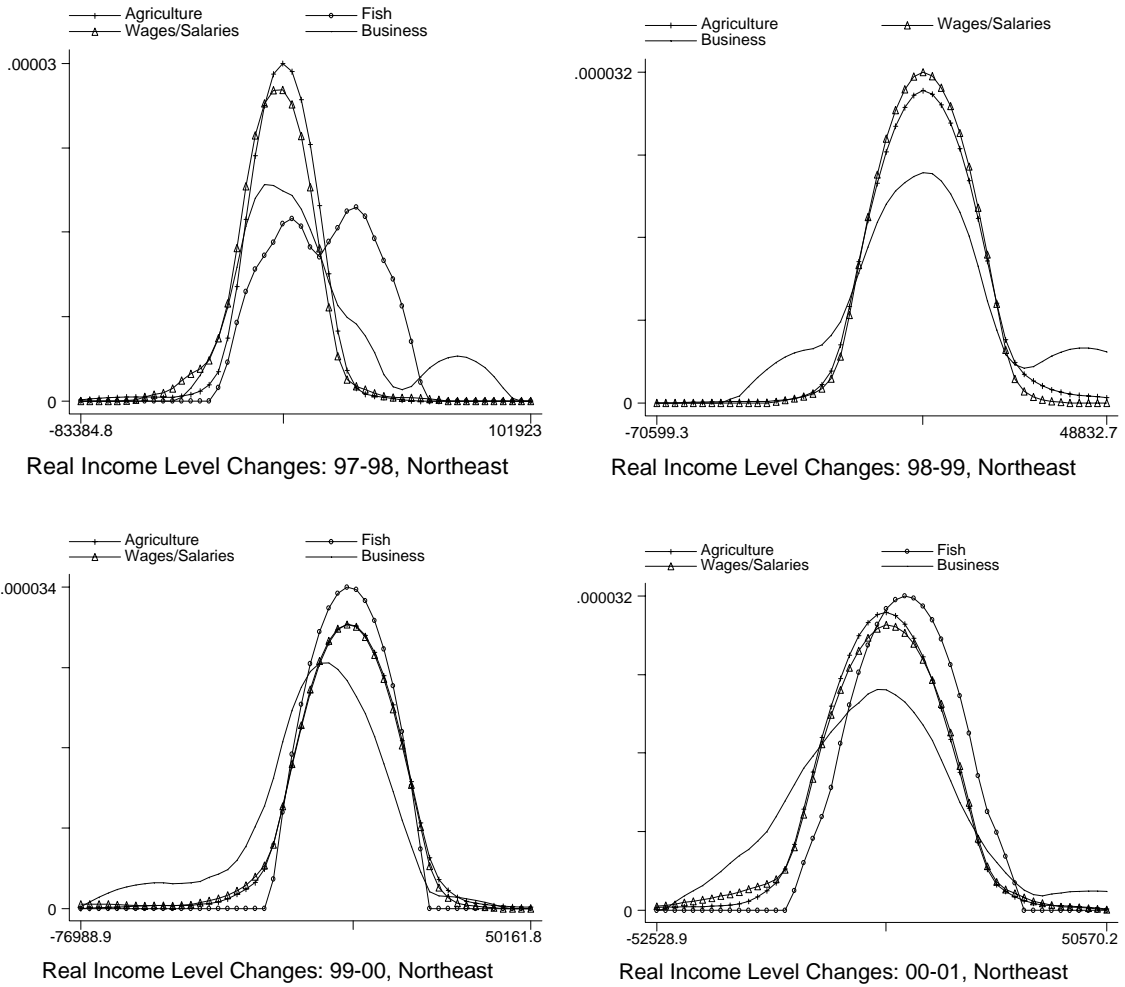


Table 5: Comparison between this year and last year

(from 1998 household resurvey)

	All provinces	Central Region	Chachoengsao	Lopburi	Northeast region	Buriram	Sisaket
Last year worse than year before	452 (47.08%)	236 (49.17%)	100 (41.67%)	136 (56.67%)	216 (45%)	144 (60%)	72 (30%)
Last year better than year before	208 (21.67%)	75 (15.62%)	26 (10.83%)	49 (20.42%)	133 (27.71%)	57 (23.75%)	76 (31.67%)
Unchanged income	300 (31.25%)	169 (35.21%)	114 (47.5%)	55 (22.92%)	131 (27.29%)	39 (16.25%)	92 (38.33%)
# of households	960	480	240	240	480	240	240

(from 1999 household resurvey)

	All provinces	Central region	Chachoengsao	Lopburi	Northeast region	Buriram	Sisaket
Last year worse than year before	681 (70.94%)	318 (66.25%)	160 (66.67%)	158 (65.83%)	363 (75.62%)	168 (70%)	195 (81.25%)
Last year better than year before	125 (13.02%)	54 (11.25%)	25 (10.42%)	29 (12.08%)	71 (14.79%)	43 (17.92%)	28 (11.67%)
Unchanged income	154 (16.04%)	108 (22.5%)	55 (22.92%)	53 (22.08%)	46 (9.58%)	29 (12.08%)	17 (7.08%)
# of households	960	480	240	240	480	240	240

(from 2000 household resurvey)

	All provinces	Central region	Chachoengsao	Lopburi	Northeast region	Buriram	Sisaket
Last year worse than year before	645 (67.19%)	291 (60.62)	161 (67.08%)	130 (54.17%)	354 (73.75%)	168 (70%)	186 (77.5%)
Last year better than year before	136 (14.17%)	74 (15.42%)	37 (15.42%)	37 (15.42%)	62 (12.92%)	44 (18.33%)	18 (7.5%)
Unchanged income	179 (18.65%)	115 (23.96%)	42 (17.5%)	73 (30.42%)	64 (13.33%)	28 (11.67%)	36 (15%)
# of households	960	480	240	240	480	240	240

(from 2001 household resurvey)

	All provinces	Central region	Chachoengsao	Lopburi	Northeast region	Buriram	Sisaket
Last year worse than year before	517 (53.85%)	282 (58.75%)	135 (56.25%)	147 (61.25%)	235 (48.96%)	137 (57.08%)	98 (40.83%)
Last year better than year before	217 (22.6%)	58 (12.08%)	21 (8.75%)	37 (15.42%)	159 (33.12%)	66 (27.5%)	93 (38.75%)
Unchanged income	226 (23.54%)	140 (29.17%)	84 (35%)	56 (23.33%)	86 (17.92%)	37 (15.42%)	49 (20.42%)
# of households	960	480	240	240	480	240	240

Table 6: Reason for Bad Income – Number and % of Households, 1998-1999.

	Chachoengsao	Lopburi	Buriram	Sisaket
11 Flood	17 (10.63%)	0	18 (10.71%)	56 (28.72%)
13 Drought	83 (51.88%)	17 (10.76%)	27 (16.07%)	107 (54.87%)
15 Pests	9 (5.63%)	44 (27.85%)	3 (1.79%)	11 (5.64%)
17 Other reason low crop yield	40 (25%)	49 (31.01%)	27 (16.07%)	100 (51.28%)
19 Fire	0	0	0	10 (5.13%)
21 Low price of output	52 (32.5%)	58 (36.71%)	85 (50.6%)	29 (14.87%)
23 High input price	49 (30.63%)	19 (12.03%)	12 (7.14%)	20 (10.26%)
25 Education expenses higher	8 (5%)	3 (1.9%)	2 (1.19%)	6 (3.08%)
27 Need extra money for ceremony	5 (3.13%)	0	0	10 (5.13%)
29 Lower income due to retirement	0	0	0	0
31 High investment costs	12 (7.5%)	12 (7.59%)	5 (2.98%)	13 (6.67%)
33 Expenses due to illness	4 (2.5%)	4 (2.53%)	4 (2.38%)	6 (3.08%)
35 Building expenses higher	0	0	0	4 (2.05%)
37 Death in family	0	0	0	0
39 Worked fewer days	23 (14.38%)	29 (18.35%)	7 (4.17%)	13 (6.67%)
41 Bad year for hh business	48 (30%)	10 (6.33%)	10 (5.95%)	14 (7.18%)
43 Lost money from gambling	0	0	0	0
45 Unable to repay debts	4 (2.5%)	3 (1.9%)	10 (5.95%)	8 (4.10%)
Other	8 (5%)	18 (11.39%)	3 (1.79%)	9 (4.62%)

Table 7: What did your household do to get by last year, 1998

Changwat	Response to Lower income						
Chachoengsao	Reduce consumption (68%)	Work harder (34%)	Use savings (32%)	Additional occupation (28%)	Reduce productive inputs (21%)		
Lopburi	Reduce consumption (67.6%)	Work harder (43.4%)	Use savings (29.4%)	Help from relatives (18.4%)	Sell jewelry (16.2%)		
Buriram	Use / sell rice in storage (36.1%)	Reduce consumption (36.1%)	Work harder (33.3%)	Help from relatives (26.4%)	Additional occupation (21.5%)	Borrow from BAAC (20.1%)	
Sisaket	Use / sell rice in storage (43.1%)	Reduce consumption (31.9%)	Sell livestock / equipment (27.8%)	Borrow from BAAC (27.8%)	Work harder (25%)	Help from relatives (22.2%)	Use savings (22.2%)

Figure 5

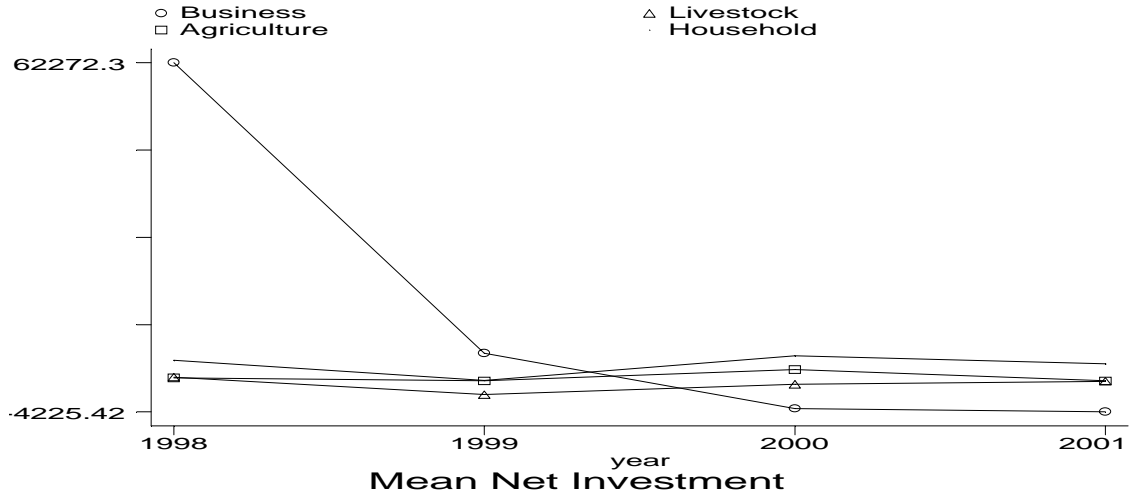
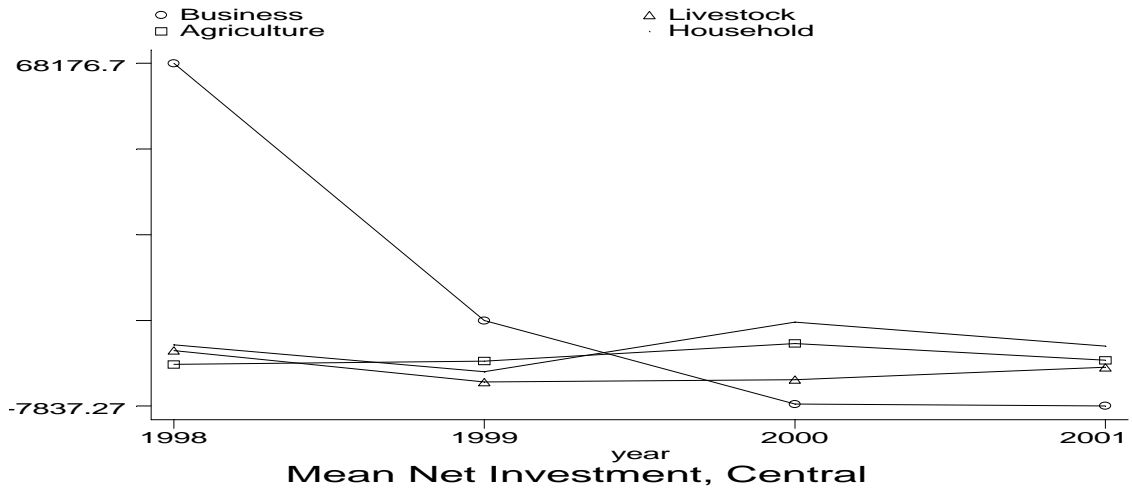
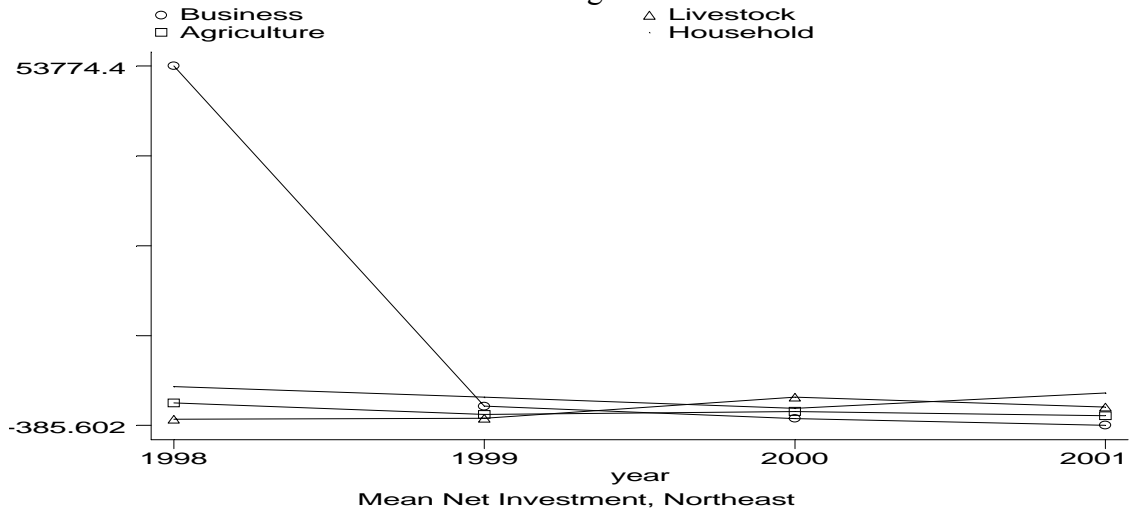


Table 8: Consumption Change on to Income Change. Incremental Effect.

	Overall	Central	Northeast
Whole sample/region	.062***	.087***	.004
By Age [Age > 50]*income change	.039	.046	-.001
By Gender [Female]*income change	-.055	.064	-.036
By Education [years of school]*income change	-.017***	-.030***	.009
By Wealth [wealth in Bhats]*income change	-1.2e-07	-5.4e-08	-4.3e-07***
By income source			
Agriculture	.035**	.027	.071*
Fish farmers	.047***	.050***	-.108
Wage	.067***	.072***	.037
Business	-.031***	-.028**	-.033**
By Occupation group			
Agriculture (Reference Group)	.118***	.126***	.102**
Incremental Effect on income coefficient			
Fish farmers	.219***	.211***	-
Wage	-.039	-.063	.015
Business	-.118***	-.099*	-.186**

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 9: Investment on to Income Change. Incremental Effect.

	Overall	Central	Northeast
Whole sample/region	.068***	.056***	.097***
By Age [Age > 50]*income change	-.033	.033	-.178***
By Gender [Female]*income change	.057*	-.071*	.387***
By Education [years of school]*income change	.008**	.015***	-.007
By Wealth [wealth in Bhats]*income change	1.1e-07**	1.8e-08***	-3.3e-07***
By income source			
Agriculture	.018***	-.009	.043***
Fish farmers	.050***	.070***	-
Wage	-.049***	.057***	-.006
Business	.033***	.065***	.025***
By Occupation group			
Agriculture (Reference Group)	.070***	.079***	.050
Incremental Effect on income coefficient			
Fish farmers	.040	.030	-
Wage	.029	-.062	.241***
Business	-.019	-.032	.016

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 10: Consumption Change on income change. Incremental Effect of Savings and Debt.

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
Aggregate Savings									
Naïve	.009	-.018	.005	.023	.005	-.041	.032	.104	-.083
Change in Aggregate Savings									
Increase	.006	.006	.140	.008	.023	.026	-.002	.088	.028
Decrease	.016	-.006	.207**	-.004	.053	.002	.056	.103	.033
Aggregate Debt									
Naïve	-.025	-.008	-.031	-.015	-.043	.015	-.080	-.031	.106
Change in Aggregate Debt									
Increase	-.016	-.001	-.014	.014	-.040	.022	-.021	.018	-.014
Decrease	-.031	.017	-.069	.028	-.101*	.027	-.115**	.031	-.117*

Note: i) Tambon-specific fixed effects are included in the regression equations.

ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 11: Investment on income change. Incremental Effect of Savings and Debt.

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
Aggregate Savings									
Naïve	-.059*	.017	-.174***	-.093*	-.008	.111	-.047	-.463***	.067
Change in Aggregate Savings									
Increase	.140***	.112**	.082	.179***	.077*	.205***	.081	.142	.078
Decrease	.126***	.146***	-.039	.138**	.097**	.137*	.097*	.057	.108*
Aggregate Debt									
Naïve	-.008	-.048	.074	.037	-.081**	-.018	-.124***	.148*	.043
Change in Aggregate Debt									
Increase	-.002	.001	.001	-.064	.099***	-.107*	.093**	-.022	.126***
Decrease	.058*	-.003	.168***	.104**	-.009	.110*	.006	.148***	-.021

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 12: Example of Impact of BAAC, Naïve Approach

```
. * dtreat indicates treatment (member of BAAC);
. * dtreatgy=dtreat*gy is the interacting term with income change gy;

. * wth97 is household wealth in 1997;
. * educ97 is years of schooling of household's head in 1997;
. * hs97 is number of individuals in the household in 1997;
. * age97 is age of household's head in 1997;
. * gend97 is gender of household's head in 1997;

. * A) if member of BAAC in 1997;
. ** dm98 (99, 00 or 01) is time dummy for members;
. ** dn98 (99, 00 or 01) is time dummy for non-members;
```

Source	SS	df	MS	Number of obs =	3277
Model	3.3814e+10	23	1.4702e+09	F(23, 3254) =	10.43
Residual	4.5854e+11	3254	140914389	Prob > F =	0.0000
				R-squared =	0.0687
				Adj R-squared =	0.0621
Total	4.9235e+11	3277	150244063	Root MSE =	11871

gc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dm98	-6721.441	1544.141	-4.35	0.000	-9749.027	-3693.855
dn98	-5266.372	1429.644	-3.68	0.000	-8069.465	-2463.279
dm99	339.7743	1547.248	0.22	0.826	-2693.904	3373.453
dn99	-1056.099	1432.551	-0.74	0.461	-3864.892	1752.694
dm00	-1846.117	1545.632	-1.19	0.232	-4876.628	1184.394
dn00	-1788.906	1435.696	-1.25	0.213	-4603.866	1026.055
dm01	-337.0843	1540.199	-0.22	0.827	-3356.943	2682.774
dn01	-666.0297	1438.483	-0.46	0.643	-3486.453	2154.394
demm	-7201.29	9475.337	-0.76	0.447	-25779.52	11376.94
demn	2023.717	4995.755	0.41	0.685	-7771.425	11818.86
wth97	-.0049018	.001733	-2.83	0.005	-.0082996	-.001504
educ97	73.57395	88.90732	0.83	0.408	-100.746	247.8939
age97	2.21997	16.76945	0.13	0.895	-30.65977	35.09971
gend97	18.63125	252.1044	0.07	0.941	-475.6682	512.9307
mwth97	.0088454	.0051827	1.71	0.088	-.0013163	.0190071
meduc97	72.61213	273.4175	0.27	0.791	-463.4756	608.6999
hs	-1108.615	181.6731	-6.10	0.000	-1464.82	-752.41
gy	.1829805	.084668	2.16	0.031	.0169725	.3489886
dtreatgy	.086804	.0321697	2.70	0.007	.0237291	.1498788
w97gy	-2.76e-08	8.58e-08	-0.32	0.747	-1.96e-07	1.41e-07
e97gy	-.0186232	.0056906	-3.27	0.001	-.0297807	-.0074657
a97gy	.0002287	.0012871	0.18	0.859	-.002295	.0027524
g97gy	-.0518125	.0195788	-2.65	0.008	-.0902006	-.0134245

Table 13: IV ESTIMATION;

. *predicting probability of being member;

Source	SS	df	MS	Number of obs = 872		
Model	79.6187586	8	9.95234482	F(8, 864)	=	48.75
Residual	176.381241	864	.204144955	Prob > F	=	0.0000
				R-squared	=	0.3110
				Adj R-squared	=	0.3046
Total	256.00	872	.293577982	Root MSE	=	.45182

dtreat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dloc	.1363434	.0336551	4.05	0.000	.070288	.2023988
wth97	2.01e-07	1.16e-07	1.73	0.083	-2.65e-08	4.29e-07
educ97	.0018832	.0060928	0.31	0.757	-.0100752	.0138417
gend97	-.0376562	.0181861	-2.07	0.039	-.0733503	-.0019621
age97	.0011245	.0010479	1.07	0.284	-.0009322	.0031812
hs97	.0131799	.0076655	1.72	0.086	-.0018653	.0282251
mwth97	6.00e-08	3.79e-07	0.16	0.874	-6.84e-07	8.04e-07
meduc97	.0249299	.0168793	1.48	0.140	-.0081993	.0580591

. *dtrtHgy is predicted from selection equation interacted with income change

Source	SS	df	MS	Number of obs = 3285		
Model	3.3290e+10	23	1.4474e+09	F(23, 3262)	=	10.27
Residual	4.5979e+11	3262	140953093	Prob > F	=	0.0000
				R-squared	=	0.0675
				Adj R-squared	=	0.0609
Total	4.9308e+11	3285	150100080	Root MSE	=	11872

gc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dmH98	-3374.391	4924.779	-0.69	0.493	-13030.36	6281.581
dnH98	-5629.883	1413.589	-3.98	0.000	-8401.496	-2858.271
dmH99	-6780.797	4281.408	-1.58	0.113	-15175.32	1613.723
dnH99	-530.2205	1415.947	-0.37	0.708	-3306.455	2246.014
dmH00	1960.538	4034.41	0.49	0.627	-5949.696	9870.771
dnH00	-1838.644	1416.666	-1.30	0.194	-4616.289	939.0004
dmH01	3379.879	4343.095	0.78	0.436	-5135.591	11895.35
dnH01	-555.8271	1416.844	-0.39	0.695	-3333.82	2222.166
demmm	-7846.687	9473.783	-0.83	0.408	-26421.85	10728.48
demnn	2058.825	4999.288	0.41	0.680	-7743.236	11860.89
wth97	-.0053669	.0019691	-2.73	0.006	-.0092276	-.0015062
educ97	80.37538	89.5123	0.90	0.369	-95.13061	255.8814
gend97	6.541463	251.1369	0.03	0.979	-485.8606	498.9435
age97	2.928848	16.76821	0.17	0.861	-29.94845	35.80614
mwth97	.0088782	.0051835	1.71	0.087	-.001285	.0190414
meduc97	58.61978	278.1998	0.21	0.833	-486.8442	604.0837
hs	-1110.909	181.1331	-6.13	0.000	-1466.055	-755.7631
gy	.1631702	.0994625	1.64	0.101	-.0318451	.3581854
dtrtHgy	.2615017	.2351446	1.11	0.266	-.1995442	.7225477
w97gy	-7.25e-08	1.01e-07	-0.72	0.472	-2.70e-07	1.25e-07
e97gy	-.0216967	.0057351	-3.78	0.000	-.0329416	-.0104519
a97gy	-.0000342	.0013401	-0.03	0.980	-.0026617	.0025934
g97gy	-.0480034	.0213686	-2.25	0.025	-.0899007	-.0061062

Table 14: IV ESTIMATION;

. *predicting probability of being member;

Source	SS	df	MS	Number of obs = 872		
Model	83.7600859	8	10.4700107	F(8, 864)	=	52.52
Residual	172.239914	864	.199351752	Prob > F	=	0.0000
				R-squared	=	0.3272
				Adj R-squared	=	0.3210
Total	256.00	872	.293577982	Root MSE	=	.44649

dtreat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gis_baac	.4549096	.0742066	6.13	0.000	.3092633	.6005559
wth97	2.55e-07	1.15e-07	2.21	0.027	2.89e-08	4.81e-07
educ97	-.0042283	.0061514	-0.69	0.492	-.0163018	.0078452
gend97	-.0477606	.0180786	-2.64	0.008	-.0832436	-.0122775
age97	-.0010154	.0011268	-0.90	0.368	-.0032271	.0011962
hs97	.003723	.0078089	0.48	0.634	-.0116035	.0190496
mwth97	6.05e-07	3.82e-07	1.58	0.114	-1.45e-07	1.36e-06
meduc97	-.0153244	.0181817	-0.84	0.400	-.0510099	.020361

. *dtrtHgy is predicted from selection equation interacted with income change

Source	SS	df	MS	Number of obs = 3285		
Model	3.4318e+10	23	1.4921e+09	F(23, 3262)	=	10.61
Residual	4.5876e+11	3262	140637736	Prob > F	=	0.0000
				R-squared	=	0.0696
				Adj R-squared	=	0.0630
Total	4.9308e+11	3285	150100080	Root MSE	=	11859

gc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dmH98	-23033.77	6176.315	-3.73	0.000	-35143.62	-10923.92
dnH98	-5507.719	1401.227	-3.93	0.000	-8255.093	-2760.345
dmH99	1210.578	5204.603	0.23	0.816	-8994.042	11415.2
dnH99	-600.1508	1404.334	-0.43	0.669	-3353.617	2153.315
dmH00	-7293.553	4983.558	-1.46	0.143	-17064.77	2477.667
dnH00	-1701.527	1405.634	-1.21	0.226	-4457.541	1054.488
dmH01	5169.756	4936.43	1.05	0.295	-4509.059	14848.57
dnH01	-507.7945	1405.168	-0.36	0.718	-3262.895	2247.306
demm	-7005.659	9467.228	-0.74	0.459	-25567.97	11556.65
demn	2227.203	4991.282	0.45	0.655	-7559.162	12013.57
wth97	-.004259	.0019114	-2.23	0.026	-.0080067	-.0005113
educ97	63.73339	89.03276	0.72	0.474	-110.8324	238.2992
gend97	-6.270538	250.7458	-0.03	0.980	-497.9058	485.3647
age97	3.071084	16.76597	0.18	0.855	-29.8018	35.94397
mwth97	.0092372	.0052206	1.77	0.077	-.0009987	.0194731
meduc97	43.08521	275.2433	0.16	0.876	-496.5819	582.7523
hs	-1120.741	180.7919	-6.20	0.000	-1475.218	-766.2638
gy	.1056198	.124237	0.85	0.395	-.1379706	.3492102
dtrtHgy	.3150115	.219626	1.43	0.152	-.1156073	.7456304
w97gy	-1.50e-07	1.10e-07	-1.36	0.174	-3.67e-07	6.63e-08
e97gy	-.0184456	.0057957	-3.18	0.001	-.0298092	-.007082
a97gy	.0004369	.0013007	0.34	0.737	-.0021134	.0029871
g97gy	-.0419346	.0224487	-1.87	0.062	-.0859495	.0020803

Table 15: Consumption change on to Income Change. Incremental Effect of the Commercial Bank

	Overall	Region		Period		Central		NE	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	-.016	-.009	-.216***	-.043	.032	-.036	.040	-.264***	-.121
GIS Select	.063	.050	-.678	.018	.255	.193	.026	-1.58**	.603
Headman Select	-	-	-	-	-	-	-	-	-
By Savings									
Naïve	-.023	-.007*	-.252***	-.047	.029	-.030	.066	-243**	-.252***
GIS Select	.093	-.004	-1.06	.060	.260	.128	.056	-2.07**	.728
Headman Select	-	-	-	-	-	-	-	-	-
Change in Savings									
Increase	-.001	-.029	-.014	-.023	-.038	-.010	-.070	-.038	-.005
Decrease	-.064*	-.068	-.060	-.087	-.028	-.089	-.050	-.096	-.007
Change in Debt									
Increase	-.048	-.079	1.647	.088	-.196*	.089	-.181	.287	-.154
Decrease	-.065	-.236**	.520*	.059	-.303***	.041	-.320***	.091	-.130

Note: i) Tambon-specific fixed effects are included in the regression equations.
 ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.
 iii) Headmen responses identified only one commercial bank (in Chachoengsao).

Table 16: Investment on to Income Change. Incremental Effect of the Commercial Bank.

	Overall	Region		Period		Central		NE	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	-.052**	-.030	-.093**	-.090**	-.001	-.079	.026	-.083	-.094**
GIS Select	-.009	.008	-.297	-.137	.130	-.371	.572***	-.302	-1.14***
Headman Select	-	-	-	-	-	-	-	-	-
By Savings									
Naïve	-.042*	-.015	-.110***	-.068*	-.000	-.039	.025	-.111*	-.093**
GIS Select	-.042	.055	-.230	-.170	.072	-.361	.722***	-.203	-1.39***
Headman Select	-	-	-	-	-	-	-	-	-
Change in Savings									
Increase	.015	.030	.049	-.043	.124***	-.103*	.125***	-.030	.154***
Decrease	.027	.074*	-.137***	-.002	.037	-.014	.044	-.012	-.013
Change in Debt									
Increase	-.281***	-.311***	1.00	-.819***	.039	-.817***	.003	-.935***	.015
Decrease	-.168***	-.108	.514***	-.245***	-.064	-.249**	-.057	-.232**	-.018

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively

Table 17: Consumption change on to Income Change. Incremental Effect of the BAAC

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	.087***	.106***	-.063	.117**	.034	.123**	.071	-.145	-.021
GIS Select	.315	.103	.414	.315	.271	-.042	.351	1.70*	-1.80***
Headman Select	.261	.227	-.610	.340	.087	.315	.095	-.041	-1.12*
By Savings									
Naïve	.075**	.075*	.079	.134***	-.014	.149**	-.011	.102	.035
GIS Select	.068	-.078	-1.01	-.057	.307	-.255	.181	-.064	-1.69
Headman Select	.002	.133	-1.05*	.009	-.025	.185	.076	-1.55	-.098
Change in Savings									
Increase	-.028	.019	-.088	-.032	-.016	-.048	-.010	-.104	.006
Decrease	.104**	.214***	-.077	.175***	-.096*	.237***	-.086	.182***	-.203***
Change in Debt									
Increase	-.041	-.002	-.072	-.056	-.026	-.057	-.027	-.118	-.024
Decrease	.050	.168**	-.056	.063	.015	.024	-.022	.094	.005

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 18: Investment on to Income Change. Incremental Effect of the BAAC.

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	-.094***	-.090**	-.092**	-.116***	-.039	-.102*	-.058	-.039	-.036
GIS Select	.027	-.121	-.638*	-.116	.269*	-.267	.110	-.065	.033
Headman Select	-.063	-.020	-.502	-.183	.017	-.119	.073	.022	-.442
By Savings									
Naïve	-.159***	-.124***	-.212***	.203***	-.070**	-.097	-.116***	-.332***	.004
GIS Select	.015	-.175	1.42*	-.146	.258	-.274	-.023	1.23	2.96***
Headman Select	-.071	-.077	.790*	-.165	-.061	-.102	-.099	1.72**	.542
Change in Savings									
Increase	.014	-.003	.033	.084	-.018	.086	-.027	.163**	-.039
Decrease	-.029	-.009	-.038	-.037	-.006	-.107*	.014	-.005	-.024
Change in Debt									
Increase	-.116***	-.140***	-.075	-.174***	-.018	-.264***	-.007	-.125*	-.013
Decrease	.124***	.099	.129**	.187***	.084*	.179**	.152***	.177**	.004

Note: i) Tambon-specific fixed effects are included in the regression equations.

ii) *** indicates 1% significant level, ** 5% and * 10%, respectively

Table 19: Consumption change on to Income Change. Incremental Effect of the PCG

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	.204***	.127*	.438***	.352***	.068	.261**	.011	.470**	.287*
GIS Select	.344	-.106	.969*	.258	.618	.188	-.396	.920	.696
Headman Select	-.188	-.275	-.223	-.261	-.051	-0.010	-.664**	-.985	.529
By Savings									
Naïve	.185***	.118*	.288**	.348***	-.037	.243**	-.026	.428**	-.441**
GIS Select	.728	-.189	1.16*	.689	.954	.179	-.545	1.12	.627
Headman Select	-.223	-.344	-.299	-.303	-.075	-.027	-.818**	-1.43	.632
Change in Savings									
Increase	-.001	.008	.047	.299	-.087	.432*	-.082	.343*	-.141*
Decrease	.507***	.702***	.235	.525***	.396	.561***	.480	.603***	.400
Change in Debt									
Increase	.008	.128	-.347	.123	.052	.344	.081	.231	-.278
Decrease	-.116	.032	.104	-.244	-.079	-.235	-.015	-.312	-.029

Note: i) Tambon-specific fixed effects are included in the regression equations.

ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 20: Investment on to Income Change. Incremental Effect of the PCG.

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	.058	.091	-.149	.171*	-.032	.323***	-.086	-.368**	.129
GIS Select	.431	.014	-.313	-.029	1.45***	-.043	.071	-1.46*	.261
Headman Select	-.117	-.031	-.092	-.606**	.528***	-.244	.192	-.685	.736***
By Savings									
Naïve	.224***	.025	.595***	.427***	-.089*	.183*	-.124**	.569***	.095
GIS Select	.355	-.200	-.690	-.320	1.84***	-.273	-.153	-2.32***	.055
Headman Select	-.230	-.079	-.356	-.943**	.704***	-.341	.211	-1.38*	1.05**
Change in Savings									
Increase	-.043	-.072	-.026	-.120	-.034	-.107	-.056	-.093	-.095*
Decrease	.637***	.131	.990***	.682***	-.023	.686***	-.009	.721***	-.057
Change in Debt									
Increase	.152	.288	-.329	-.032	.293**	-.062	.354**	-.041	-.168
Decrease	-.021	.189	.341	-.199	.131	-.178	.016	.152	.100

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.

Table 21: Consumption change on to Income Change. Incremental Effect of the Moneylender

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
If Borrowing									
Naïve	-.003	-.017	-.045	-.063	.085	-.063	.110	-.251	.061
GIS Select	.674***	.580**	.277	.921***	.199	.658*	.467	.799	-.795**
Change in Debt									
Increase	.085	.060	.172*	.154	-.010	.246**	-.039	.172	-.062
Decrease	-.111	-.054	-.289**	-.116	-.098	-.109	-.090	-.097	-.222*

Investment change on to Income Change. Incremental Effect of the Moneylender.

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
By Membership									
Naïve	-.043	.045	-.218***	-.032	-.062*	.147*	-.080	-.371***	-.052
GIS Select	-.306*	-.098	-.578**	-.591**	.205	-.344	.428*	-.703*	.058
Change in Debt									
Increase	-.171***	-.059	-.294***	-.251***	-.060	-.265***	-.101	-.199*	-.095
Decrease	-.051	.096	.225**	-.070	-.093	-.061	-.144	-.127	-.101

Note: i) Tambon-specific fixed effects are included in the regression equations.
 ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.
 iii) IV only significant in NE.

Table 22: Consumption Change on income change. Incremental Effect of Informal Mechanism

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
Informal Debt									
Naïve	.042	.030	.001	.089*	-.001	.082	-.005	.036	-.023
GIS Select	.236	-.108	-.414	.307	.049	-.457	.129	-.405	.847
Change in Informal Debt									
Increase	.056	.060	.082	.106*	-.024	.115*	-.000	.108	-.061
Decrease	-.044	.032	-.125*	.002	-.091*	.018	-.091	.023	-.177***
Change in Assets									
Increase	-.095**	-.073	-.010	-.168***	.038	-.144**	.063	-.178**	.022
Decrease	-.105**	-.108*	-.016	-.160**	-.003	-.105	.008	-.134	.004
Rice Storage									
Naïve	-.095	-.142	-.207	-.041	-.226	-.159	-.090	-.302	-.031
GIS Select	-.500	-.059	.868	2.35	-5.26**	-1.32	1.59	4.49***	-1.10
Change in Rice Storage									
Increase	-.078**	-.066	.211** *	-.096*	-.005	-.074	-.012	-.057	.086
Decrease	-.049	-.075	.250** *	-.077	.027	-.176	.007	-.032	.100*

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.
iii) IV for informal debt in NE is not significant.

Table 23: Investment on income change. Incremental Effect of Informal Mechanism

	Overall	Region		Period		Central		Northeast	
		Central	NE	During Crisis	After Crisis	During Crisis	After Crisis	During Crisis	After Crisis
Informal Debt									
Naïve	-.028	.137	-.434***	-.088	.066	.105	.266	-.691***	-.235***
GIS Select	-1.28***	-1.17*	2.52***	-1.36**	-1.93***	-.859	-2.42***	3.67***	-.615
Change in Informal Debt									
Increase	-.207***	-.314**	-.039	-.004	-.474***	-.023	-.611***	.027	-.755***
Decrease	.019	-.041	.086	.044	-.000	.062	.004	-.099	-.029
Change in Assets									
Increase	.106***	.101**	.179***	.122**	.080**	.124**	.090**	.073	.074*
Decrease	.089**	.106**	.109*	.127**	.032	.135*	.039	.021	.105**
Rice Storage									
Naïve	-.076	-.275*	-.084	-.128	-.059	-.358	-.042	-.158	.049
GIS Select	-1.19	.948	.874	1.19	-5.73***	2.03	.461	2.30**	-.136
Change in Rice Storage									
Increase	.051*	-.024	.044	.134***	-.054*	.121**	-.062	.151***	-.033
Decrease	.036	.013	.036	-.024	.085***	.002	.104***	-.030	.140***

Note: i) Tambon-specific fixed effects are included in the regression equations.
ii) *** indicates 1% significant level, ** 5% and * 10%, respectively.
iii) IV for informal debt in NE is not significant.