Instruments and Data Comparability: A Progress Report

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Project Background

The Townsend Thai Project has been collecting annual household data in four provinces in Thailand since 1997. In May 1997, the Big Survey spanning four provinces was conducted. These four provinces were Chachoengsao, Lopburi, Buriram, and Sisaket. The first two are situated in the more fertile Central region of Thailand, and the latter two in the poorer Northeast region. In each province, 12 tambons (sub-districts) were randomly selected. Then, four villages from each tambon were chosen. And finally, from each village, 15 households are chosen, making a total of 2,880 households in the sample. The Big Survey compiled detailed information on households, which include data on demographics, income, consumption, asset, borrowing, lending, and agricultural and entrepreneurial activities.

The onset of the Asian financial crisis later in 1997 turned the Big Survey dataset into a natural benchmark of normal times, which can be compared with the fluctuations to come. In May 1998, therefore, the project was expanded and the Annual Resurvey began. One third of the original Big Survey sample (4 tambons randomly chosen from the original 12) was chosen for the Annual Resurvey going forward. The questionnaire for the Resurvey is similar to that used in the Big Survey, but with most stock variables now changed to flow.

In 1998, monthly household surveys also began. The Monthly Baseline Survey was first conducted in August 1998 on 720 households, using a questionnaire similar to that of the Big Survey. From each of the four provinces from the Big Survey, one tambon was selected for the Baseline Survey. This tambon was *different* from those four chosen for the Annual Resurvey. For the Monthly Baseline Survey, the 15 households from each village were augmented with 30 more, making a total of 45 households per village. Information from the Baseline Survey was tracked in subsequent monthly interviews. The monthly questionnaire is different from previous questionnaires used in the Big Survey, the Monthly Baseline, or the Annual Resurvey. Although the information collected in the Monthly Survey is of the same nature as that in the Annual Resurvey, it focuses on capturing changing household, agricultural, and business activities at a much greater detail.

So although the Annual Resurvey and the Monthly Survey grew from the same underlying Big Survey sample, they differ in details and track different populations over time. But because the two surveys provide complementary information, an understanding of the relationship between the two samples

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would be valuable for linking these datasets. For some research questions, the Annual data may be more suitable while for others, the more detailed Monthly data may be needed. To be able to abstract from one to use the other with an understanding of how they are related would allow for more complete insights into any given study.

Scope of the Project

The purpose of this project is precisely to investigate the relationship between the Annual and the Monthly data. The questions of interest include whether or not the two samples differ statistically from each other, and if so, whether this was due to differences in the underlying households, geography, or questionnaires. As a first step, the time series averages of key variables in the Annual and the Monthly data are compared. Then the statistical mean comparison test was conducted to compare the two samples. Results from these initial comparisons showed somewhat divergent trends in the two datasets. This raises concern that the differences may have stemmed from the different questionnaires used for the Annual Resurvey and the Monthly Survey, and the different ways in which some of the variables are constructed. If the two questionnaires, designed to collect similar information, yield different data from otherwise similar households, a revision of the questionnaires would need to be considered. To investigate this possibility, we rely on the subset of the Big Survey sample that was subsequently used for the Monthly Survey, that is, the 15 original households in each village prior to being augmented with 30 additional ones. This subsample has been exposed to both the Annual and the Monthly questionnaires. If the ways in which variables are constructed affected their values, or if the questionnaires unintentionally elicited inconsistent responses, the transition from the Annual to the Monthly questionnaire would be apparent in the households' time series. A close look at this subsample reveals a smooth transition, giving us comfort in the validity of the questionnaires.

The ensuing sections are organized as follows. The first section discusses findings from the time series comparison of the two datasets. Next, results from the mean comparison tests are reported. The third section gives an analysis of the Big Survey and Monthly Survey overlap. Finally, the last section gives a brief conclusion and discusses next steps.

Time Series Comparison

The project begins with a simple comparison of the time series averages of key variables in the Monthly and Annual data. This is done to offer some visual gauge of how the two samples have evolved over time. The comparisons use all available households in the two datasets, including those that reported zero for some categories. For example, households that reported zero business income are included in the calculation of the average business income.

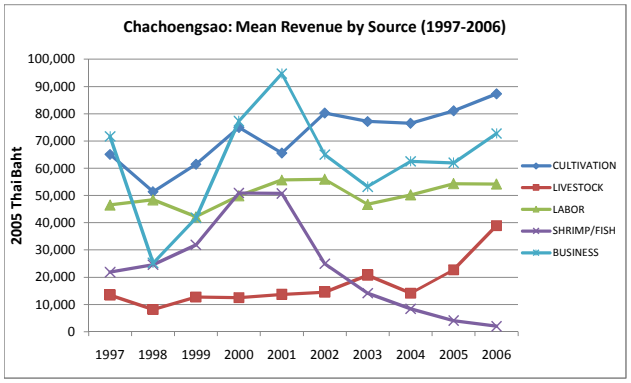
To make monetary figures comparable across years, values were converted to 2005 Thai Baht. Nominal values were deflated using Headline CPI from the Bank of Thailand. CPI tables are included in the Appendix. Monthly data are aggregated up to annual levels prior to taking sample averages. It should be noted that in the Annual Resurvey, interviews are based on a 12-month recall questionnaire. These interviews are typically conducted between April and May of each year, which means that the recall period usually ranges from May of year $t-1$ to April of year t when the survey in question is fielded. However, the Monthly data collection began in September 1999. To maximize the use of available data, annualization of the Monthly data is done from September of year $t-1$ to August of year t. This causes a slight mismatch in the timeframes being compared. But as we shall see, trends

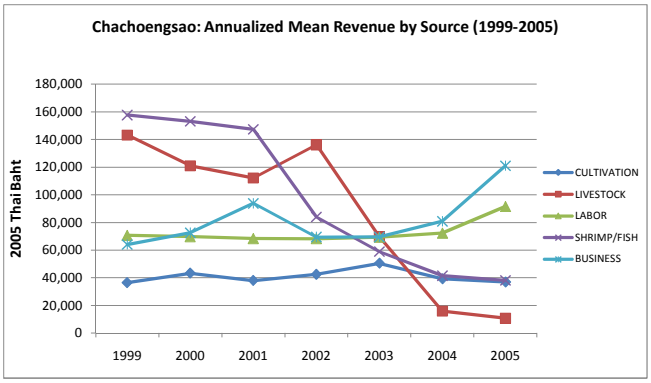
in the two datasets are divergent enough such that it would be difficult to explain the differences with slight mismatch in timing.

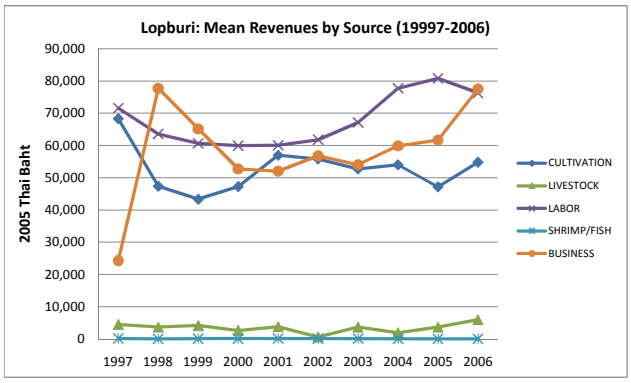
Figure 1 compares Annual and Monthly time series averages for the 4 provinces. Panels on the left are Annual data, while those on the right are annualized Monthly. Note that Annual panels go from 1997 - 2006 while Monthly panels go from 1999 - 2005.

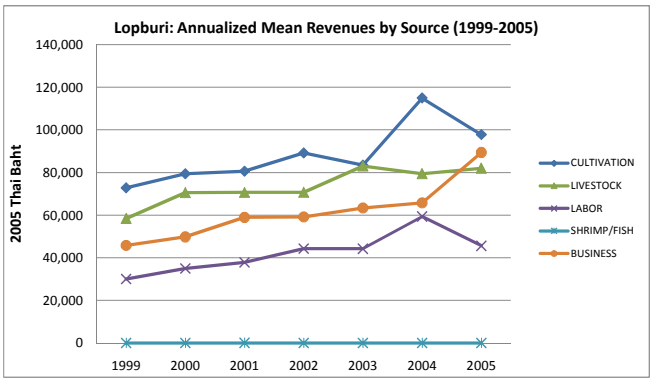
Figure 1a. Revenue Comparisons

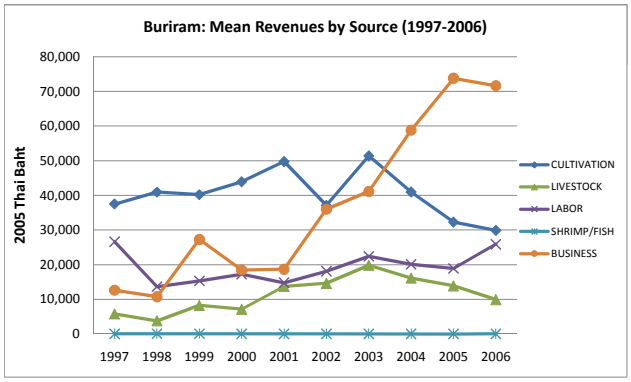
Panels on the left are constructed from the Annual data,.
Panels on the right are constructed from annualizing the Monthly data.

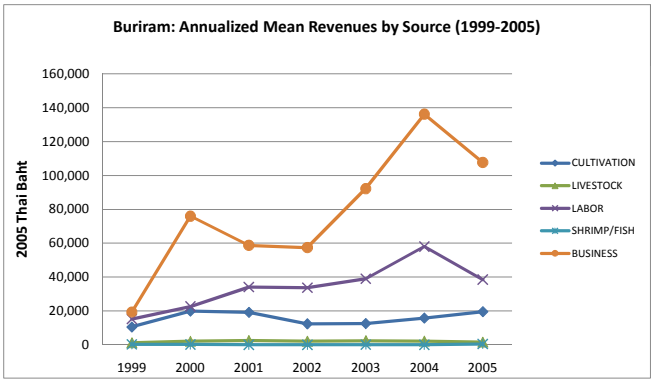


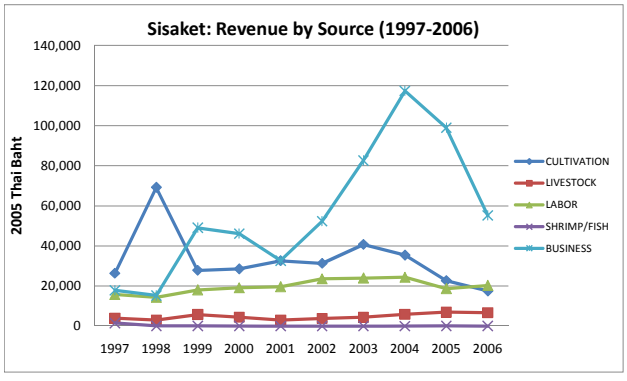












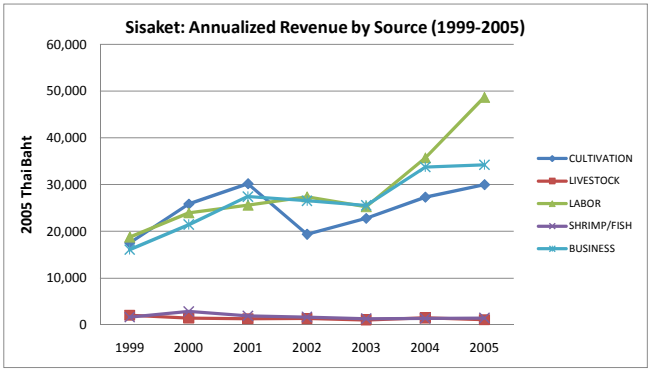
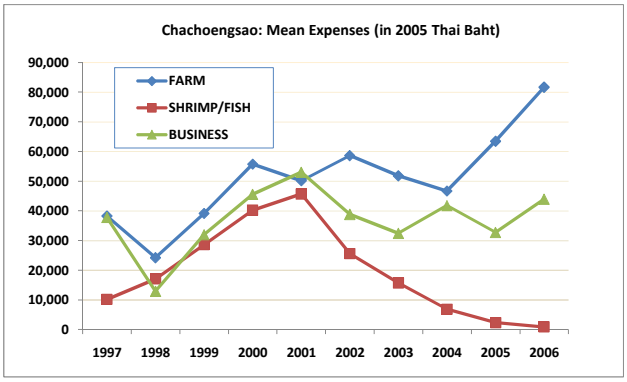
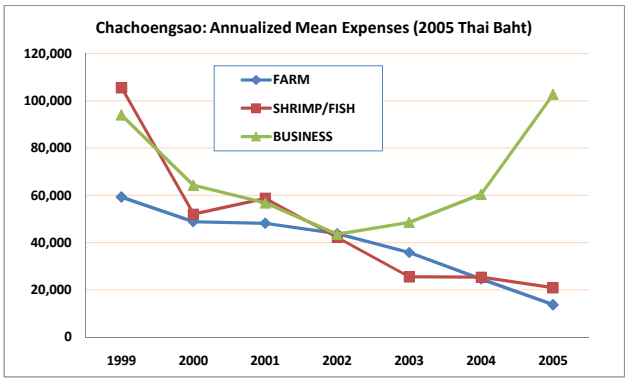
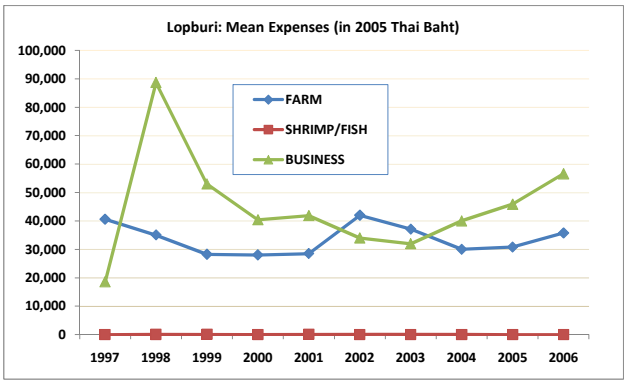


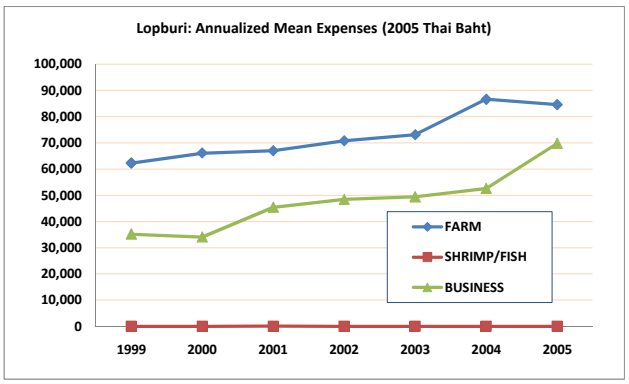
Figure 1b. Expense Comparisons

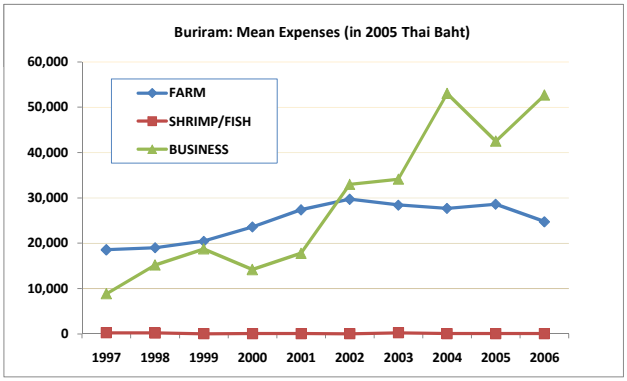
Panels on the left are constructed from the Annual data,.
Panels on the right are constructed from annualizing the Monthly data.

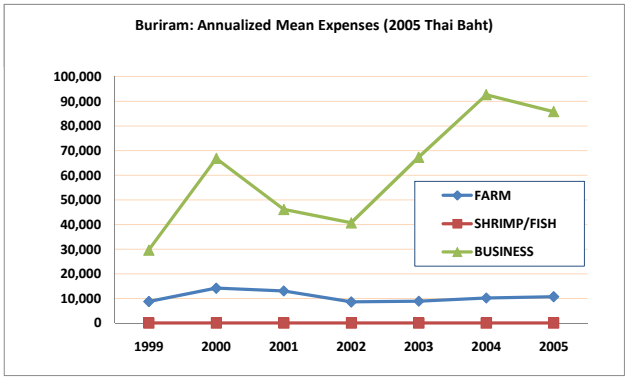


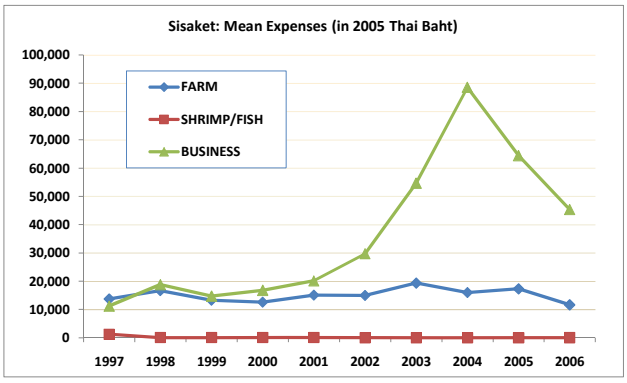












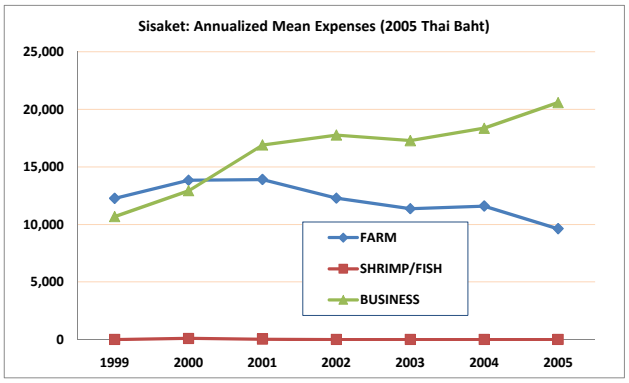
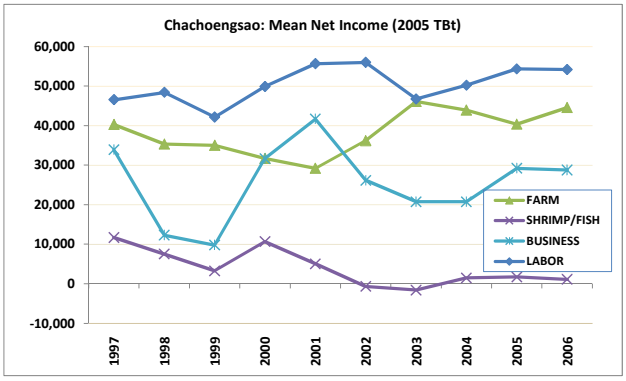
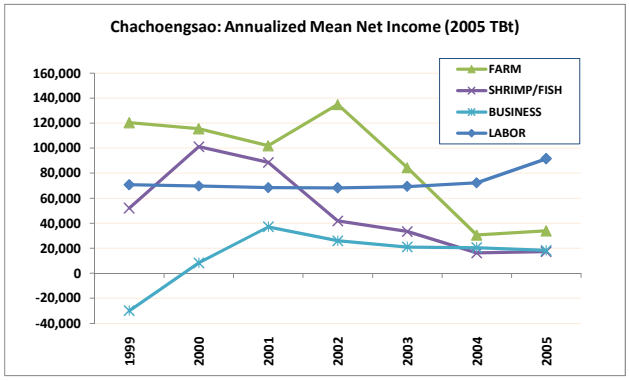
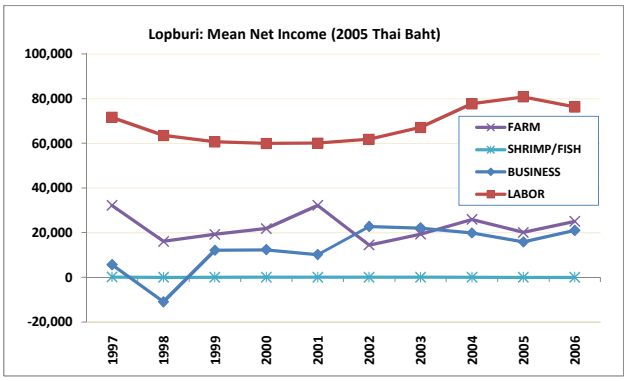


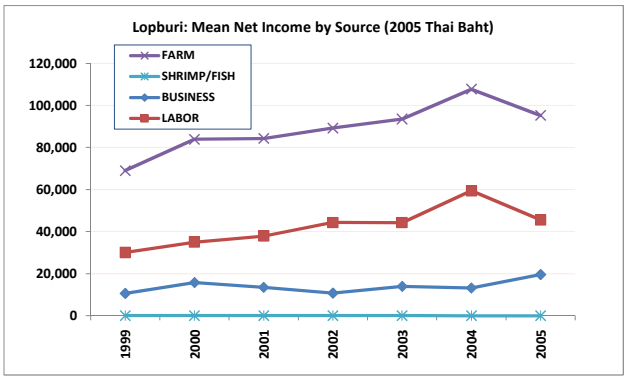
Figure 1c. Net Income Comparisons

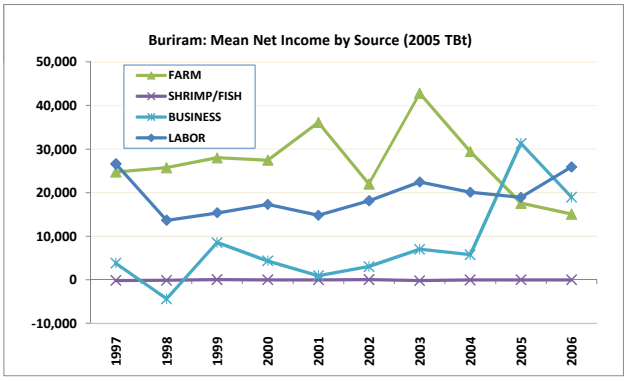
Panels on the left are constructed from the Annual data,.
Panels on the right are constructed from annualizing the Monthly data.

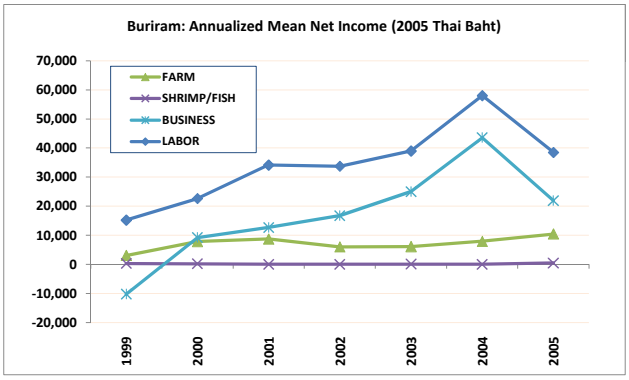


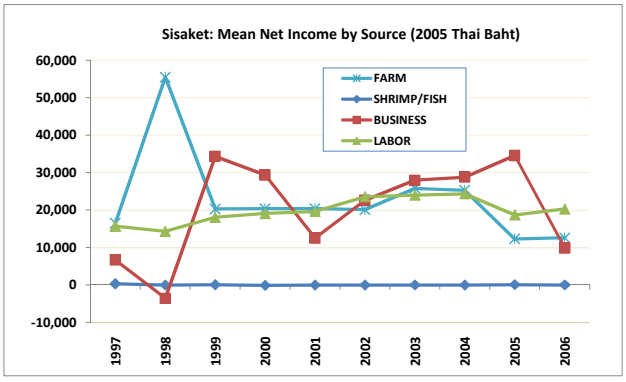


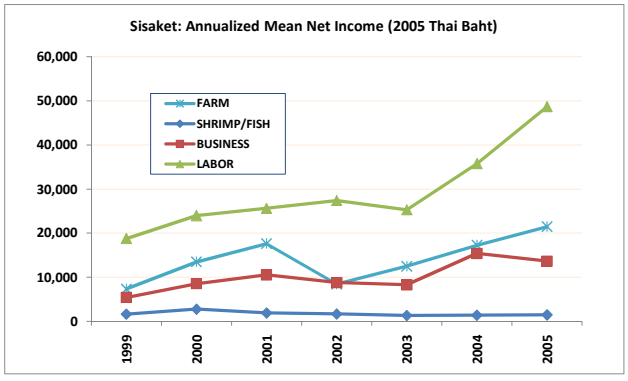












As we can see, initial comparisons of these two panels reveal some differences in the patterns of revenue, expenses, and net income of households across the two datasets. The first thing to note is that most of the annualized Monthly figures are considerably larger than their respective Annual counterparts. This is true for all provinces except Sisaket, where the reverse is true. The disparity in levels is already quite puzzling. But perhaps trumping this puzzle is the vastly different trends that we see in the two datasets.

For the revenue variables, Chachoengsao's Annual panel shows that cultivation and business are important sources of revenues, while fish/shrimp revenue is only of modest importance, and livestock is the least important. In Chachoengsao's Monthly data, however, we see that fish/shrimp revenue is the most significant up to around 2002, when it is outstripped by business revenue. Cultivation and livestock are less important in this panel, with livestock contributing more revenue than cultivation. In both panels, however, shrimp/fish revenue monotonically declined from 2001 onward, while business and labor rise in importance. In Lopburi, the revenue panel from the Annual data shows that labor, business, and cultivation are the most important sources of revenue, and livestock do not seem at all important. The panel from the Monthly data, however, show the reverse– here, cultivation and livestock are the most important revenue sources in Lopburi, followed by business, and with labor being the least important. There are similarities, however, in the *trends* of business, labor, and cultivation revenues. In both panels, these three revenue sources saw and overall upward trend between 1999 and 2005. For Buriram, the Annual data show business revenue growing rapidly in importance between 2000 and 2005, overtaking the relatively high and stable cultivation revenue in 2002. In contrast, the Monthly data show that business revenue has always been a dominant income source in this province while cultivation here is less important than labor. Again, the trends of the two datasets share some common characteristics– the explosive growth of business revenue and the stability of labor revenue. In Sisaket is where we see higher revenue from the Annual data than from the annualized Monthly. A closer look, however, shows that, except for business revenue, most of the other revenue sources range between 10,000 to 50,000 Baht. According to the Annual data, Sisaket's business revenue saw a dramatic rise in 2001, eclipsing all other revenue sources by 2004 before sharply decreasing but still maintaining dominance. While this revenue also rose in the Monthly data, it neither surged nor outgrew the others as in the Annual panel. Morever, the Monthly panel shows a steady growth of labor revenue, a trend not seen in the Annual data.

In costs, visible differences are also observed across the Annual and Monthly panels. In Chachoengsao's Annual panel, all three types of costs– farm, fish/shrimp, and business– trended upward between 1998 and 2001. These upward trends in costs match up with the upward trends in the province's revenue during the same time period. The Monthly panel, however, shows a decline in all three cost categories over this period. In Lopburi's Annual data, business and farm costs took turns rising and falling, whereas in the Monthly data, farm costs were always higher than business costs. For Buriram, for both panels, trends in business costs align with those in business revenue discussed previously. The Annual panel shows business cost beginning to rise in 2001, and eventually outstripping farm costs. The Monthly cost panel, similar to the Monthly revenue panel, shows that business cost, already important in Buriram, grew further in importance between 1999 and 2005.

The consistency in the revenue and cost trends gives us some comfort that the data show real changes in activities. The differences in the trends across the two datasets, however, need to be further explored. To understand how these visual differences translate in terms of statistical significance, we next compare the two samples using the t-test statistical package in Stata.

Mean Comparison Test

The t-test assesses whether the means of two groups are statistically different from one another. This test will give us insight into whether the different means are simply a result of variability in the population or something more fundamental. The null hypothesis of the t-test is that the two samples have the same mean. Two sets of mean comparison tests were carried out on the Annual and Monthly data, and the results are discussed below.

The first set of tests, done by Anan Pawasutipaisit in 1999, compared means of the 1997 Big Survey sample to the 1998 Monthly Baseline sample. Recall that the latter sample is a subset of the first, but augmented with additional households that were not in the original sample. The goal of this test is to understand how the smaller Baseline sample compares to the original Big Survey sample.

The similarity between the Big Survey questionnaire and the Monthly Baseline questionnaire allows for comparisons across many variables. The comparisons are done at the overall level, i.e., inclusive of all households in each dataset, as well as at the regional and the provincial levels. These results are presented in Table 1a.

Table 1a. Summary of Findings from Statistical Test of Same Means (Monthly Baseline Survey 1998 VS. Annual Resurvey 1998)

The first statistical test of same means was done by Anan Pawasutipaisit. The table below summarizes his findings.

R means the null of the same mean is rejected

FTR means the null of the same mean cannot be rejected

H0: Two populations have the same mean

	Overall	Region		Changwat			
Variable to compare		**Central**	**NE**	**Chachoeng**	**Lopburi**	**Buriram**	**Sisaket**
First Difference of Income							
Total income	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Weighted per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth of Income							
Total income	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Weighted per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
First Difference of Consumption							
Total Consumption	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Per capita	FTR	FTR	FTR	FTR	FTR	FTR	R
Weighted per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth of Consumption							
Total Consumption	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Weighted per capita	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Occupation							
Agriculture	R	R	R	R	R	R	R
Business	R	R	R	R	R	R	R
Wage	R	R	R	R	R	R	R
Change in occupation							
Agriculture	R	R	R	R	R	R	R
Business	R	R	R	R	R	R	R
Wage	R	R	R	R	R	R	R
Household size	FTR	FTR	FTR	FTR	R	R	R
Change in HH size	FTR	FTR	FTR	FTR	R	FTR	FTR
Borrowing variables							
Borrow	R	R	FTR	R	R	FTR	FTR
Payback	R	R	R	R	FTR	R	FTR
Annual reported interest rate	R	FTR	R	FTR	FTR	R	R
How long	FTR	R	FTR	FTR	R	R	FTR
Annual calculated interest rate	FTR	FTR	R	FTR	R	R	FTR
Change in Borrowing variables							
Borrow	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Payback	FTR	R	FTR	FTR	FTR	FTR	FTR
How long	FTR	FTR	FTR	R	FTR	FTR	FTR
Annual calculated interest rate	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Annual reported interest rate	FTR	FTR	R	FTR	FTR	FTR	R
Growth in Borrowing variables							
Borrow	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Payback	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Length of loan	FTR	FTR	FTR	R	FTR	FTR	FTR
Annual calculated interest rate	FTR	FTR	FTR	R	FTR	FTR	FTR
Annual reported interest rate	FTR	FTR	R	R	FTR	FTR	R
Lending variables							
Lend	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Payback	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Annual reported interest rate	FTR	R	FTR	R	FTR	FTR	FTR
How long	FTR	FTR	FTR	FTR	FTR	R	FTR
Annual calculated interest rate	FTR	FTR	FTR	FTR	FTR	FTR	R
Change in Lending variables							
Lend	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Payback	FTR	FTR	FTR	FTR	FTR	FTR	FTR
How long	R	FTR	FTR	FTR	FTR	FTR	FTR
Annual calculated interest rate	R	FTR	R	FTR	FTR	FTR	FTR
Annual reported interest rate	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth in Lending variables							
Lend	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Payback	FTR	FTR	FTR	FTR	FTR	R	FTR
How long	FTR	FTR	R	FTR	FTR	FTR	FTR
Annual calculated interest rate	FTR	FTR	R	FTR	FTR	FTR	FTR
Annual reported interest rate	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Deposit variables							
# times deposited	R	R	R	R	R	R	R
Total deposited	R	R	FTR	R	R	FTR	FTR
# times withdrawn	R	R	R	R	R	FTR	R
Total withdrawn	R	R	FTR	R	R	FTR	FTR
Balance	R	R	R	R	FTR	R	R

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	Overall	Region		Changwat			
Variable to compare		**Central**	**NE**	**Chachoeng**	**Lopburi**	**Buriram**	**Sisaket**
Change in Deposit variables							
# times deposited	R	R	R	FTR	R	FTR	R
Total deposited	R	R	FTR	R	FTR	FTR	FTR
# times withdrawn	R	R	R	R	R	FTR	R
Total withdrawn	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Balance	FTR	R	FTR	FTR	FTR	FTR	FTR
Growth in Deposit variables							
# times deposited	R	R	R	R	R	FTR	R
Total deposited	FTR	FTR	FTR	FTR	R	FTR	FTR
# times withdrawn	R	R	FTR	FTR	R	FTR	FTR
Total withdrawn	FTR	FTR	FTR	FTR	R	FTR	FTR
Balance	R	R	R	FTR	R	R	R
Land that HH cultivate/use							
Size	FTR	FTR	R	R	R	R	FTR
Value	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Other Land that HH owns							
Size	FTR	FTR	FTR	R	FTR	FTR	FTR
Value	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Change in Land that HH cultivate/use							
Size	FTR	FTR	FTR	R	FTR	FTR	FTR
Value	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth in Land that HH cultivate/use							
Size	FTR	FTR	FTR	R	FTR	FTR	FTR
Value	FTR	FTR	R	FTR	FTR	FTR	FTR
Change in Other Land							
Size	R	R	R	R	R	R	R
Value	R	R	R	R	FTR	R	R
Growth in Other Land							
Size	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Value	FTR	FTR	FTR	FTR	R	FTR	FTR
Children living outside house							
Age	R	R	FTR	R	FTR	FTR	FTR
Gender	FTR	FTR	FTR	FTR	FTR	FTR	FTR
# times kids send remittance	FTR	FTR	FTR	R	FTR	R	FTR
Amount of remittance	FTR	FTR	FTR	FTR	FTR	FTR	FTR
# times money sent to kids	FTR	FTR	FTR	FTR	FTR	FTR	R
Amount sent to kids	FTR	FTR	R	FTR	FTR	FTR	R
Change in Children living outside house							
Age	FTR	R	FTR	R	FTR	FTR	FTR
Gender	FTR	R	FTR	FTR	R	FTR	FTR
# times kids send remittance	FTR	FTR	FTR	FTR	FTR	R	FTR
Amount of remittance	FTR	FTR	FTR	FTR	FTR	FTR	R
# times money sent to kids	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Amount sent to kids	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth in Children living outside house							
Age	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Gender	FTR	R	R	FTR	R	FTR	FTR
# times kids send remittance	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Amount of remittance	FTR	FTR	FTR	FTR	FTR	FTR	FTR
# times money sent to kids	R	FTR	R	FTR	FTR	FTR	FTR
Amount sent to kids	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Education (years in school)							
Mean of HH	R	R	FTR	R	R	FTR	FTR
Max of HH	FTR	FTR	FTR	R	R	FTR	FTR
Head	R	R	FTR	R	FTR	FTR	FTR
First diff in Education (years in school)							
Mean of HH	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Max of HH	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Head	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Growth in Education (years in school)							
Mean of HH	FTR	FTR	FTR	R	FTR	FTR	FTR
Max of HH	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Head	FTR	FTR	FTR	FTR	FTR	FTR	FTR

The results show that for most of the variables, we fail to reject the null that the two samples have the same means. These variables include income, consumption, education, demographics of children living outside the households, some land variables, and most of the growth variables in income, consumption, lending, and borowing. The two samples, however, seem to differ in terms of occupations both at the overall and at the regional levels. Proportions of households engaged in agrigulture and business, as well as those that work as wage earners are statistically different across the two datasets. The different occupational components of the two datasets may explain some of the other differences at emerge in other variables.

At the provincial level, we see differences in deposit, lending, and borrowing variables. The two Buriram subsamples, for example, differ in terms of loan payback rates, loan interest rates, and loan terms. Borrowing rates and loan terms are also different for the Lopburi subsamples. The Chachoengsao and Lopburi subsamples have different deposit and withdrawal frequencies as well as different total values of deposits or withdrawals. *Changes* in these variables across the two datasets, however, do not seem to differ much, implying that the differences are not driven by divergent growth rates. These differences in bank transaction variables may indicate that households in the two samples have dissimilar access to financial institutions, although no further work has been done to allow for this conclusion.

The second set of mean comparisons test pairs the each year of the Annual Resurvey data with the corresponding annualized Monthly data from 2000 to 2005. Unlike the annualization done before, Monthly data were annualized in such a way that made each "year" directly comparable to its Annual counterpart. To illustrate this point, consider for example the 2000 Annual Resurvey data. These are recall information that pertain to the period from May 1999 to April 2000. To construct the 2000 annualized Monthly data for the mean comparison test, therefore, the same time period is used. This method of aggregation is the reason why there is no annualized Monthly data for 1999. The Monthly data, which start only in September 1998, do not go back far enough to permit 1999 annualization.

Unlike the Big Survey questionnaire and the Monthly Baseline Survey questionnaire which were similar to each other, the questionnaires for the Annual Resurvey and the Monthly Survey differ considerably from each other. The second round of tests was performed on a more limited set of variables. The results from these t-tests are presented in Table 1b.

Table 1b. Summary of Findings from Statistical Test of Same Means (Monthly Survey VS. Annual Resurvey from 1999 - 2005)

R means the null of the same mean is rejected at the 0.1 confidence level

FTR means the null of the same mean cannot be rejected

H0: Two populations have the same mean

Monthly data were annualized such that they matched up with Annual resurvey timeframe

Overall

	2000	2001	2002	2003	2004	2005
Revenue						
Cultivation revenue	FTR	FTR	FTR	FTR	FTR	R
Livestock revenue	R	R	R	R	R	R
Fish/Shrimp revenue	R	R	R	R	R	R
Business revenue	FTR	FTR	FTR	FTR	FTR	FTR
Wage revenue	R	R	R	R	R	R
Interest revenue	R	R	R	R	R	R
Net income	FTR	FTR	FTR	R	FTR	FTR
Expense						
Farm expense	R	R	FTR	FTR	R	FTR
Shrimp/Fish expense	R	R	R	R	R	R
Business expense	R	R	R	FTR	FTR	FTR

Regional

	2000		2001		2002		2003		2004		2005	
	Central	**NE**	**Central**	**NE**	**Central**	**NE**	**Central**	**NE**	**Central**	**NE**	**Central**	**NE**
Revenue												
Cultivation revenue	R	R	FTR	R	FTR	R	FTR	R	R	R	R	FTR
Livestock revenue	R	R	R	R	R	R	R	R	R	R	R	R
Fish/Shrimp revenue	R	R	R	R	R	R	R	R	R	R	R	R
Business revenue	FTR	FTR	FTR	FTR	FTR	FTR	FTR	FTR	FTR	FTR	FTR	FTR
Wage revenue	FTR	FTR	FTR	R	FTR	R	FTR	R	FTR	R	FTR	R
Interest revenue	R	R	R	R	R	R	R	R	R	R	R	R
Net income	R	R	R	R	FTR	R	FTR	R	FTR	FTR	FTR	R
Expense	R	R	R	R	R	R	R	R	R	R	R	R
Farm expense	R	FTR	R	R	FTR	R	R	R	R	R	FTR	R
Shrimp/Fish expense	R	FTR	R	FTR	R	FTR	R	R	R	FTR	R	FTR
Business expense	FTR	FTR	FTR	FTR	FTR	FTR	R	FTR	FTR	FTR	R	FTR
Total Consumption	R	R	R	R	R	FTR	R	FTR	R	FTR	R	FTR

This second round of tests rejects the null of same sample means at a higher frequency than in the first round. The higher rejection rate could be due to the annualization of monthly variables, although we were careful to standardize the timeframes being compared. It could also be the case that the two subsamples diverge over time as an accumulated result of local economic conditions. This seems unlikely, however, as it is not obvious that the null rejection rate is growing over time.

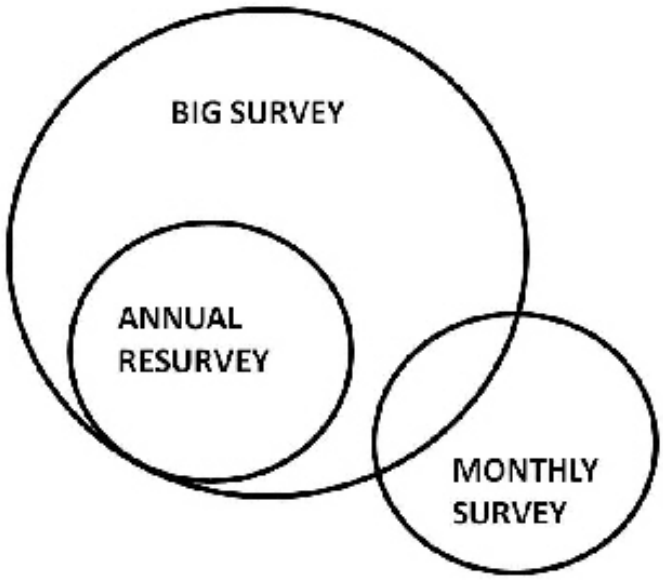
These findings do not provide a clear answer on whether the two datasets are comparable. A big concern that emerges is that the way in which the underlying variables are constructed may have led to the evidently different trends in the two samples. To see why this may be a concern, consider, for example, livestock revenue data. This information on the Annual Resurvey is based on figures provided by the households. In the Monthly Survey, households are asked detailed questions about livestock activities, and livestock revenue is backed out from this information. If the method of backing out this variable is incorrect, there will be no useful links between the two datasets.

To investigate whether this were indeed the case, we next narrow our focus on those households that were exposed to both the Annual and the Monthly questionnaires.

Analysis of Overlap

To see if different construction of variables (that are intended to be the same) has led to the observed differences in the two datasets, we go back to the overlap of the Big Survey sample and the Monthly sample. Recall that the Monthly survey sample comprises a subset of the original Big Survey as well as additional households.

2*Overlap*



1*.jpg*

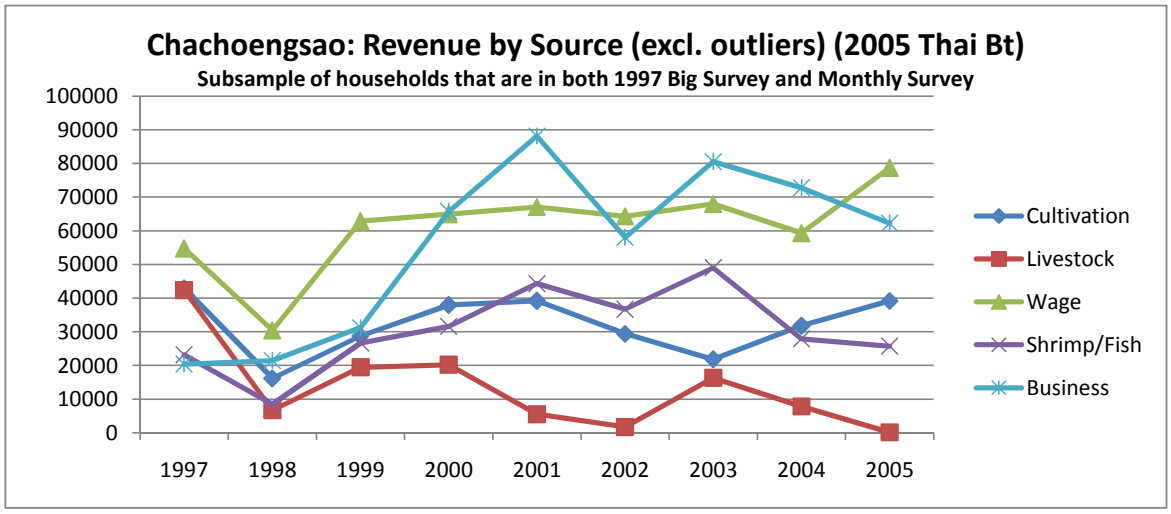
This overlap is valuable for this next exercise because households in here are those that were initially interviewed in May 1997, then re-sampled and interviewed in the 1998 Monthly Baseline Survey, and subsequently remained in the Monthly Surveys. In other words, these are the households that were first interviewed with annual-type instruments (Big Survey of 1997 and Baseline Survey of 1998),

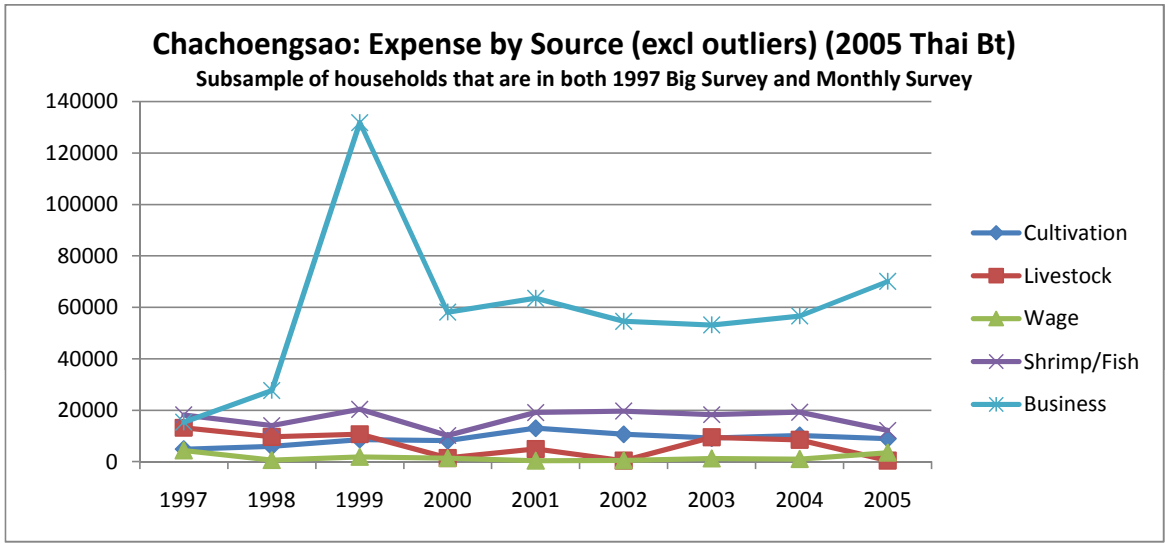
and then with monthly-type instruments (Monthly Survey beginning in 1999). Since the underlying population did not change, one would expect the time series of household variables to be relatively smooth over time. If the two types of questionnaires extracted the same information, and the two sets of variables were constructed in such a way that made them comparable, we would not expect to see any disruptions in the time series between 1998 and 1999, the point of transition between the two types of questionnaires.

Focusing on this subsample reduces the sample size for analysis to around 55-60 households per province per year. Four forms of averages were calculated– using all data, dropping zeros, dropping outliers, and dropping both zeros and outliers, where outliers are defined as values that lie above or below 2.5 standard deviations from the mean. Dropping outliers from the samples got rid of some disturbances, while dropping zeros merely shifted the graphs upward slightly. Figure 3 shows the graphical summaries of the time series. Here only the averages without outliers are presented.

Figure 3a. Time Series Average (2005 Thai Baht): CHACHOENGSAO

1997 Annual Survey (Big Survey) and Monthly Survey Overlap





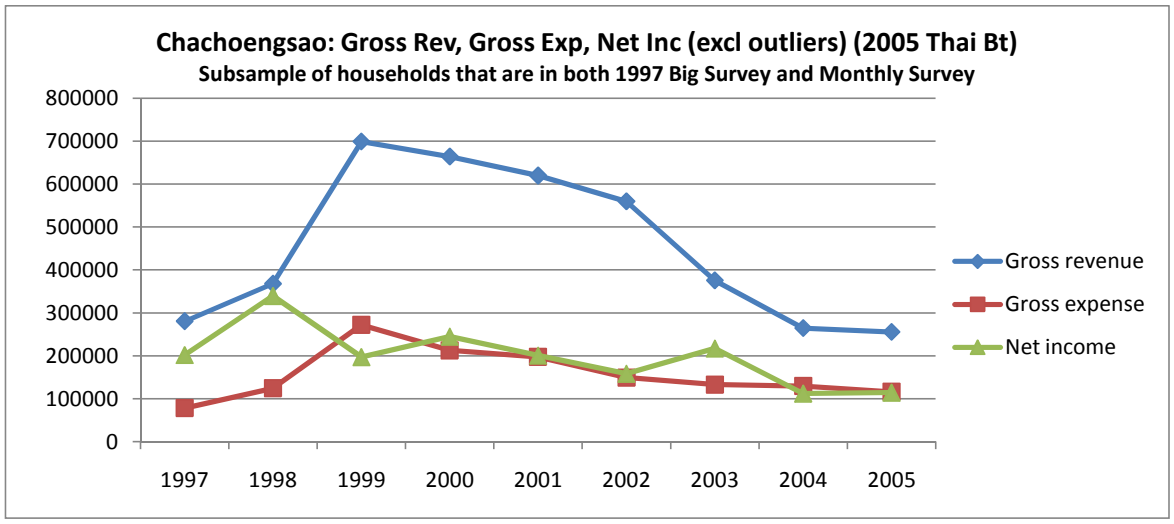
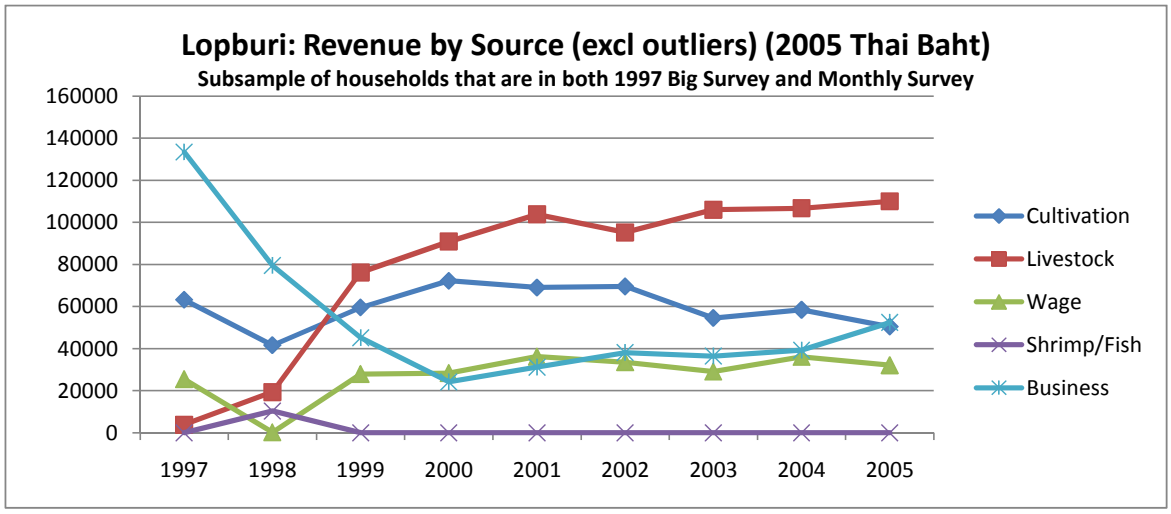
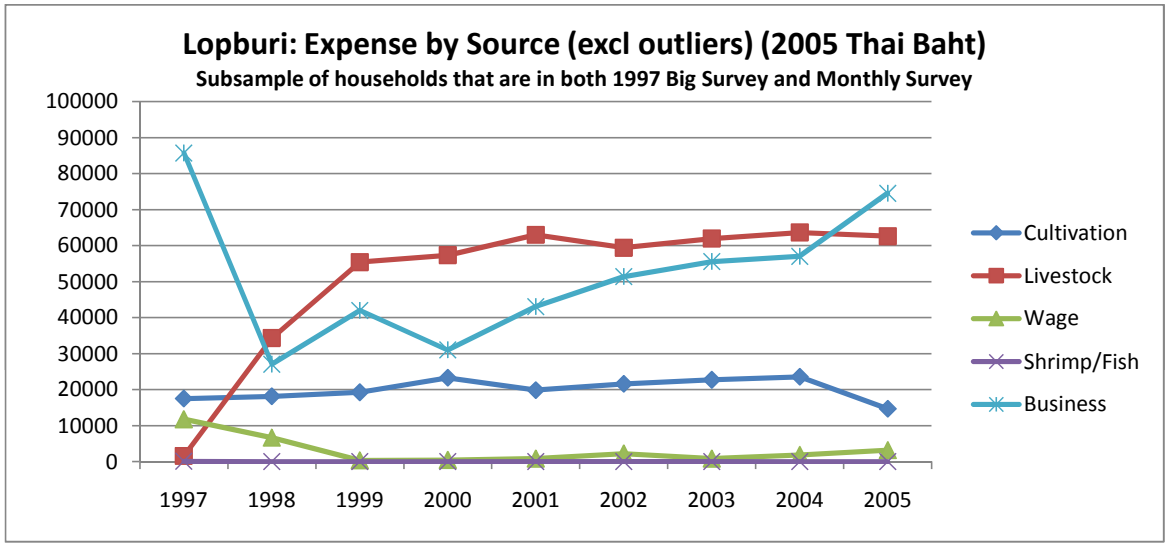


Figure 3b. Time Series Average (2005 Thai Baht): LOPBURI

1997 Annual Survey (Big Survey) and Monthly Survey Overlap





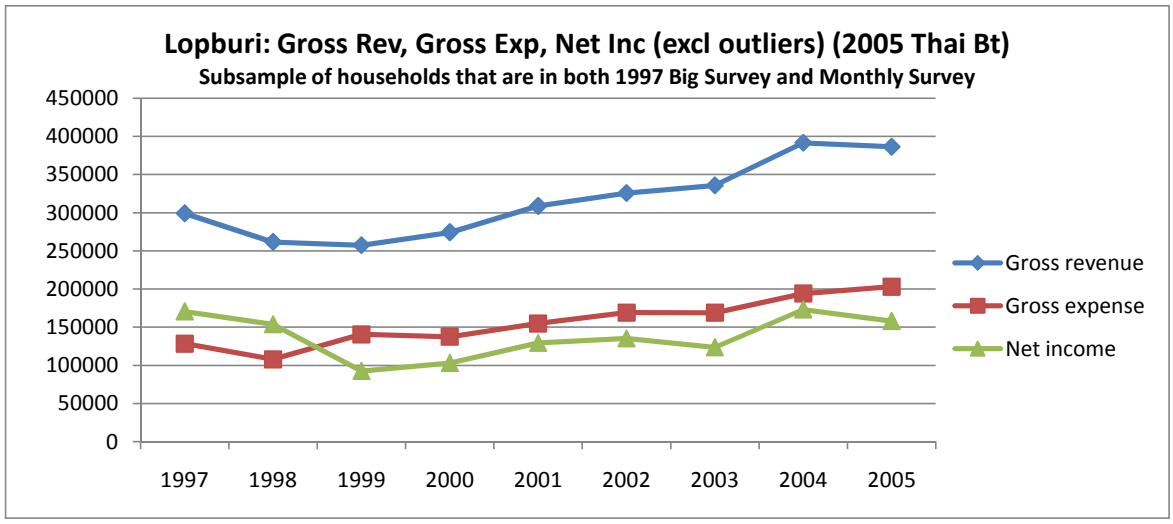
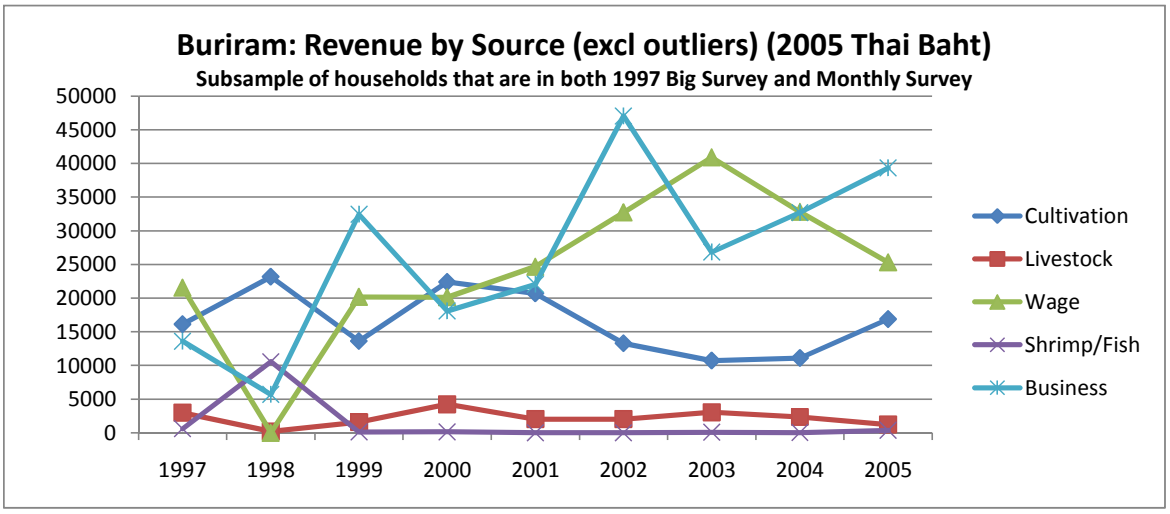
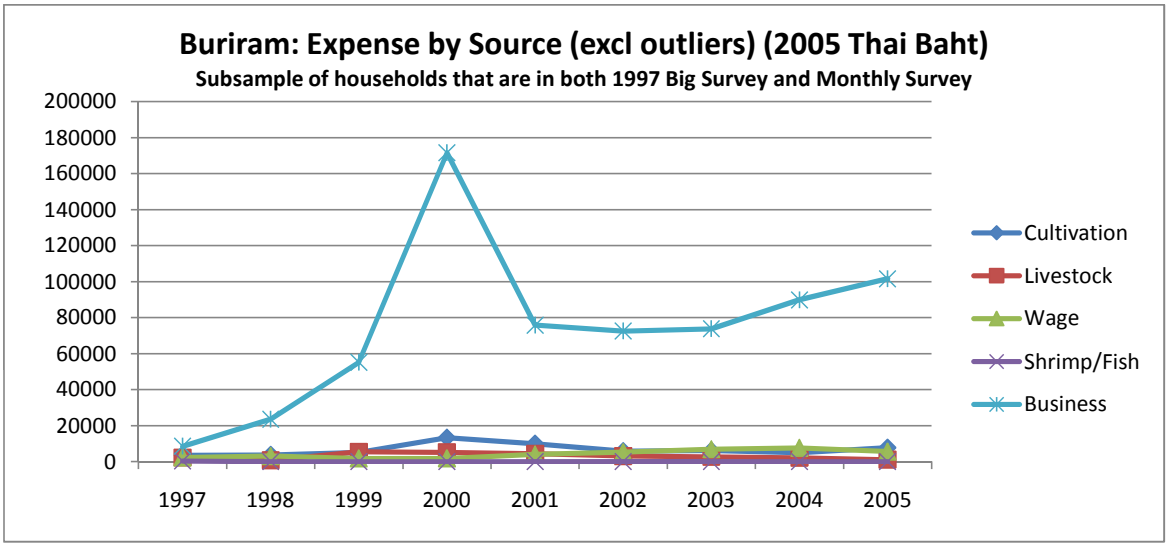


Figure 3c. Time Series Average (2005 Thai Baht): BURIRAM

1997 Annual Survey (Big Survey) and Monthly Survey Overlap





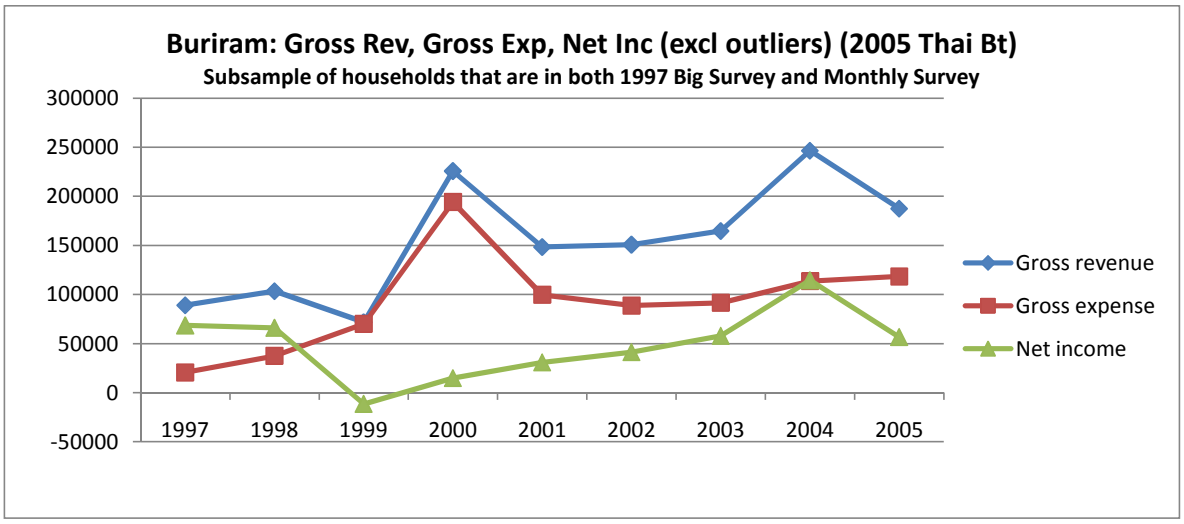
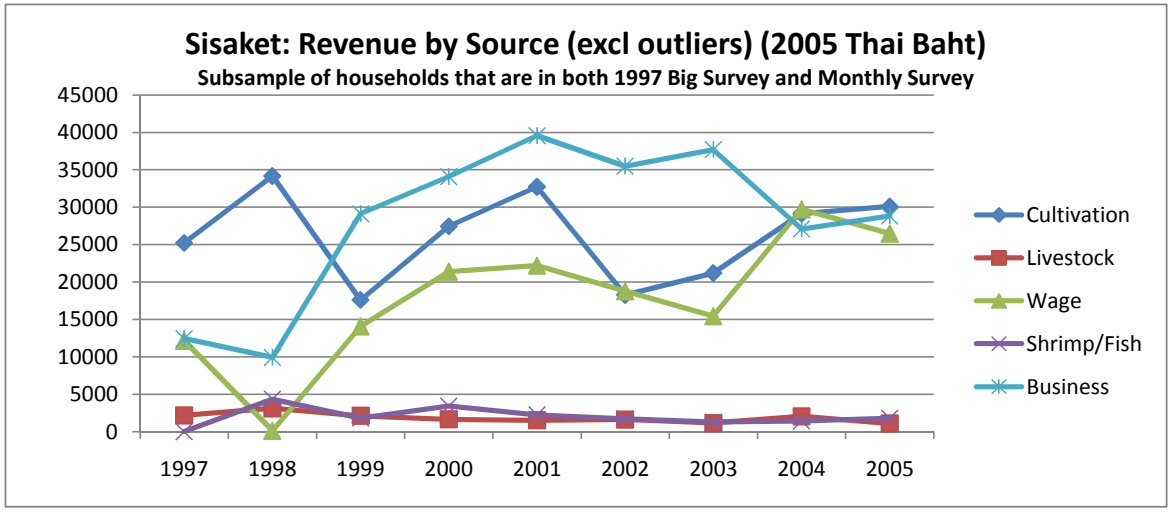
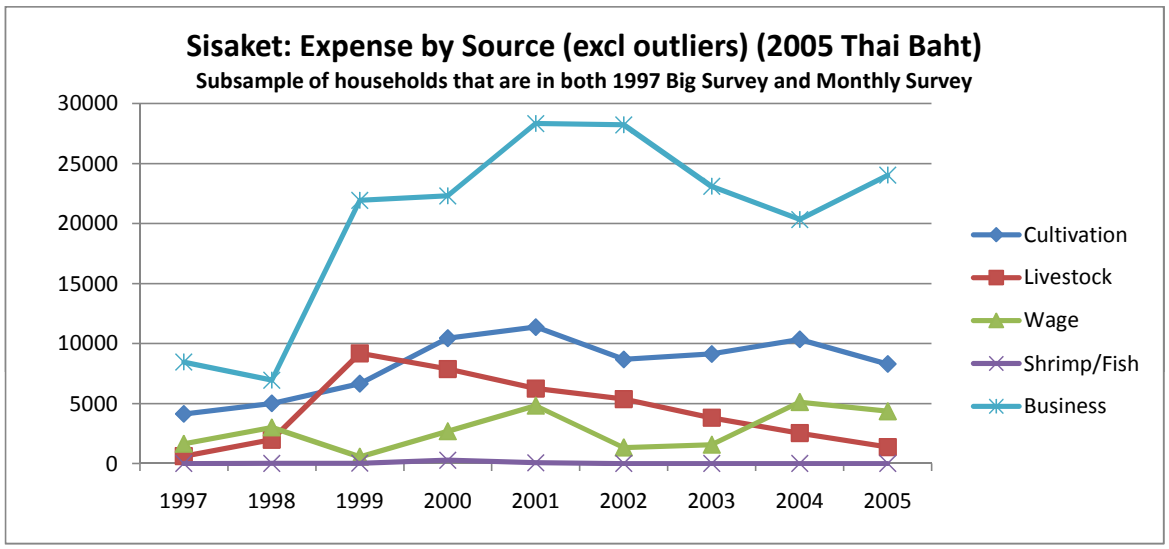
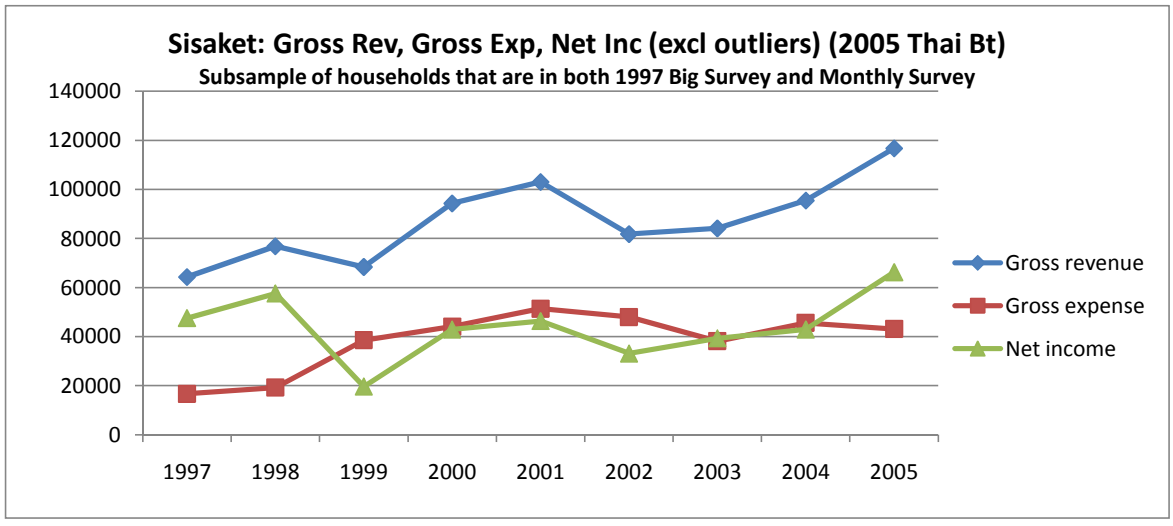


Figure 3d. Time Series Average (2005 Thai Baht): SISAKET
1997 Annual Survey (Big Survey) and Monthly Survey Overlap







The graphical summaries show notably smooth trends at the point of transition, between 1998 and 1999. This gives us some comfort on two levels. First, the same variables constructed separately seem comparable across instruments. Second, changing from the Annual to the Monthly questionnaire did not result in any apparent disruption in time trends. The different trends across the two samples that prompted this study therefore are unlikely to be driven by faulty variable construction or questionnaire differences. While it should be noted that some extreme swings are seen in Chachoengsao's revenue variables and Sisaket's expense variables between 1997 and 1999. But these swings do not systematically appear across all variables, and are likely attributable to repercussions from the 1997 financial crisis.

Household Accounting

One problem that has become apparent in the process comparing the Annual and Monthly data is the difficulty in directly comparing the two datasets. The different time intervals of the surveys turn out to only be a minor hindrance for the Monthly data can be easily aggregated up to the annual level. The bigger obstacles are the considerably different variables in the two datasets. For example, consumption in the Annual data is defined differently from that in the Monthly data, or farm income in the Annual data is inclusive of all agricultural activities, whereas the Monthly data break agricultural income into cultivation, livestock, livestock depreciation and livestock capital losses. This has meant that much time was spent manipulating variables so that they could be compared, in the end yielding only a few variables that were used for the comparison. A standardization of how household activities translate into income, costs, and profits is needed to bridge the two datasets. The accounting method provides a natural template for doing this. Mapping household and entrepreneurial activities from each dataset to financial account activities can help standardize the variables, simplifying the comparison of the two databases as well as their uses going forward.

The idea behind this comes from Samphantharak and Townsend (2009) [1], who treat households as corporate firms and apply the corporate accounting framework to create household financial statements from the Monthly data. Their work systematically maps Monthly household variables into balance sheet and income statement items, which has greatly simplified and enhanced the use of the Monthly data. Moreover, with the balance sheet and the income statement, household cash balances, which are not directly asked for in the questionnaires, can be backed out via the statement of cash flow methods.

With the Monthly financial statements on hand, the next step is to construct their annual analogues from the Annual Resurvey data. Initial work has shown that the coarser information available in the Annual data will not permit a construction of identical financial statements, and many challenges have surfaced which we discuss below.

Initial Challenges

The accounting methodology forces a more detailed look at the variables in the Annual data and how consumption, saving, and investment activities translate into their stock and flow over time. This closer examination has brought out some inconsistencies in certain variables that will need to be addressed prior to pushing ahead with the financial statements. This section summarizes the main obstacles that have come up in the process.

One of the first challenges is figuring out investment flows from the asset module in the Annual questionnaire. This module comprises three submodules for agricultural, household, and business

[1] Samphantharak, Krislert and Robert M. Townsend, (2009), "Households as Corporate Firms: An Analysis of Household Finance Using Integrated Household Surveys and Corporate Financial Accounting," Cambridge University Press.

assets. The agricultural and household asset submodules each gives respondents a list of specific assets and asks whether or not the households have them, and if they do, how much they are worth, how long they have had them, and how their acquisitions were financed. Finally respondents are also asked whether their households got rid of any assets in the past year and how they were disposed of (sold for cash, thrown away, gifted away, etc.). All this information can be used to compute the value of agricultural and household assets at a given point in time, the changes due to investment and divestment, as well as the cash flow associated with the transactions. Assets that are broken, lost, or thrown away are recorded as capital loss. With renovations, we record the values of the assets prior to renovation as capital loss because the values of the renovations are recorded as new investments. The agricultural and the household asset submodules, therefore, provide enough information for the financial statements.

A problem arises with when we move to the business asset submodule. Rather than giving respondents a list of assets as before, this submodule asks households to list their own business assets, how much they are worth, and how long the household has had them. Because the term "business" encompasses many different types of entrepreneurial activities, offering respondents the flexibility of listing their own assets has the obvious benefit of not missing out on unanticipated assets. The price of this flexibility is the inconsistency in reporting across households as well as within households over time. These inconsistencies will require a considerable amount of time to correct for.

Because there is no standardization for what goes into the business asset submodule, some households over-report what they consider to be business assets while others under-report. One of the more substantive consequences of this is that some households report inventory as business assets while others do not. Some households also report structures such as "house" or "1/4 of house", or "building" or "ponds" as business assets. In constructing the financial statements from the Annual data, reported inventory may have to be left out from asset calculations. Since there is no separate module for it in the Annual questionnaire, including inventory as business assets would underestimate the assets of households that fail to report it. Buildings and other structures attached to the land reported as business assets should also be re-categorized as "land improvement" in the household financial statement.

Incidence of double counting is also non trivial. Many households, for example, report livestock as their business assets. The problem is that there is a separate module for livestock where such assets should have already been reported. Mills, tractors, rice thrashing machines, etc., which should have already been reported in the agricultural asset submodule also frequently appear in the business asset submodule. Household assets such as motorcycles and cars also get reported as business assets. Lastly, many households also include land, which belong to the land module, as their business assets. To a large extent, such overlaps in asset reporting are likely due blurred lines between household and business assets in informal businesses which usually operate out of the home. Our concern is that these overlaps are causing double-counts of assets, and would lead to non-negligible measurement errors as many of these items are of significant values.

Correcting for potential double counts requires manually going through the asset entries to remove the miscategorized assets. We then cross check whether these miscategorized assets have been reported in their appropriate module– if so, the double counts are deleted, otherwise, they get attributed to their proper accounts. Of course recategorizing an entry in a given year requires that we look for that asset in the subsequent years and also duely recategorize it. This correction process has taken a lot of time not only because of the large amount of data in the panel, but also because of the spelling inconsistencies in the data. The same asset may be reported under different names across time as enumerators change, making it difficult to track a certain asset over time. Variations in spellings exarcerbate the problem. The inconsistency in asset names creates a further problem when we want to merge asset data across time to form an amortization schedule. For example, the "barber chair"

reported in 1998 might become "barber bench" in 1999 or "haircut bench" in 2000. Similarly, "50 chickens" which need to be taken out from business asset because they should be in the livestock module can change in the next year to "40 chicks" or "45 hens," etc. So after the data are cleaned of double-counts, we will have to manually match assets across time in order to amortize them.

While these corrections are time-consuming and quite tedious, they are not especially difficult to do. Once they are done, we can be more comfortable with our estimates of assetholding in a given year. However, a rather important problem remains. The biggest problem in the business asset submodule lies in the fact that there is no question that asks about how the assets are financed, and nothing about whether households got rid of any business assets in the past year. This turns out to be a major hindrance for constructing the financial statements. When a new asset shows up in the data, one cannot know how much to attribute its acquisition to credit, how much to cash, and how much to contributed capital. When previously reported assets disappear in the next year, it is difficult to determine whether they were gifted away, retired from use, or sold. The lack of information here will affect our estimates of cash, credit financing, and capital losses. This means that even when the aforementioned inconsistencies have been addressed, these errors will remain.

While the potentially lengthy correction process is underway, the data at hand remain the most detailed records available of household transactions. Much information can be gleaned from these data while keeping in mind the potential measurement errors. One variable of particular interest is households' cash holdings. Since households are not directly asked about the amounts of cash they have on hand, the Annual and the Monthly data can provide a rough estimate of these amounts. Without correcting for the aforementioned errors, cash estimates can be obtained rather quickly. The next section discusses the estimate of cash from the Annual data, and how these estimates compare to the available estimates obtained from the Monthly instrument. As we will see, the two sets of estimates do not quite line up.

Cash Estimates

Ignoring the errors in asset investment discussed above for now, the following equation expresses the deficit in household spending that must be financed with cash:

$$-\Delta Cash_t = C_t + I_t - NetIncome_t - Borrowings_t - SavingsWithdrawn_t \quad (1)$$

where C_t is weighted consumption, I_t is investment in asset and land.

The weighted consumption makes use of changwat-specific weights from Jeong (2008). Net income is household gross income net of operating (farm and business) expenses. Investments I_t are the net cash-financed investments in household assets, agricultural assets, business assets, as well as land. Cash-financed purchases of equipment and land are cash outflows while sales for cash are inflows. Note that, as discussed above, investments in business asset are subject to considerable measurement error due to the potential double-count issues as well as the fact that this submodule does not record asset disposals. Since we are not correcting for these issues at this time, the investment variable is quite noisy. Double counting cash-financed investments will depress estimates of cash balances since we may be overstating cash outflows. Not accounting for asset disposal will also bias downward cash estimates since we are not accounting for inflows from cash sales of assets. It should be re-emphasized therefore that results from this section are purely meant to provide a rough first guess at the level of cash holdings in the Annual data.

$Borrowings_t$ are those new borrowings (cash inflow) made in that year. We consider borrowings

net of any lending that households may have made in the year since the latter are cash outflows. The variable $SavingsWithdrawn_t$ considers savings withdrawn in year t net of deposits made by the households in that year.

To get estimates of cash holdings, we make the assumption that households' initial cash balances at time 0, $Cash_0$, are zero. Equation (1) gives us the annual change in cash which would get added to the beginning balance. The beginning balance at time t is the amount of cash the household has at the beginning of period t The ending balance is the beginning balance plus the change in cash in that year. This is used used as the following year's beginning balance. Formally,

$$\begin{aligned} BB_0 &= 0 \\ EB_t &= BB_t + \Delta Cash_t \quad \text{for } t \geq 0 \\ BB_{t+1} &= EB_t \end{aligned}$$

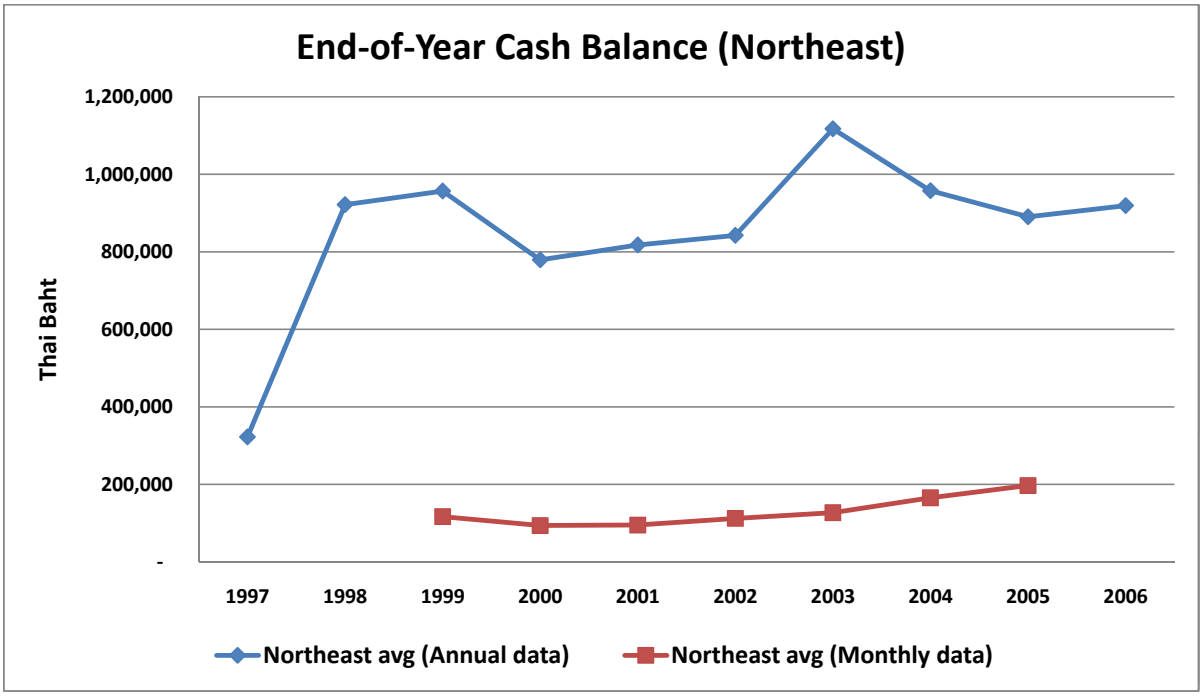
where BB_t and EB_t are beginning and ending balances in year t, respectively. Since cash balance must always be non-negative, each time the change in cash is added to the existing balance, we check that the change does not cause EB to fall below zero. If cash balance becomes negative, $Cash_0$ is adjusted upward by the absolute value of that negative amount. For example, if cash balance becomes $-\tau$ in a certain year, $Cash_0$ is adjusted up by τ since the household must have begun with at least that much in order for their cash balance to stay non-negative. The cash balance estimation in the Monthly data uses this same methodology, where initial cash holding is assumed to be zero until adjustments are needed.

This method of estimating cash has the shortcoming in that it may underestimate initial cash holdings since it assumes zero intial balances. In particular, it underestimates the initial cash holdings of households that have high operating profits, borrowings, or saving withdrawals. This is because these households are less likely to see negative cash balances which would require adjusting their initial balances upward.

Results of the estimation are shown in Figures 4*a* and 4*b*. Because the Annual survey is fielded in May of each year, we use the May cash balance from the Monthly data for comparisons. Note that the Monthly cash estimation begins in 1998. When estimating cash holding from the Annual data, we tried using both 1997 and 1998 as the initial period $t = 0$ but found little difference. The profile of cash estimates starting in 1998 is basically a parallel shift downward by what would have been the cash holding in 1997 had it been included. Because of these similarities, we report in Figures 4*a* and 4*b* only the estimates using 1997 as the starting point. These figures reveal that Annual cash estimates far exceed those of the Monthly. In a way, this is not surprising because in our methodology, cash is estimated as the residual amount needed to fulfill Equation (1). Unlike the Monthly survey which is fielded at a higher frequency and has the more detailed questions, the Annual survey likely misses quite a few transactions because of the longer recall period and the less detailed nature of the questionnaire. So data issues aside, it is likely that many transactions are left out of the high-frequency transaction items like C_t and I_t, causing the residual $\Delta Cash_t$ to be quite large and thereby pushing upward our estimate of cash in the Annual data.

Figure 4a. Comparison of Cash Balance Estimates

Northeast and Central data



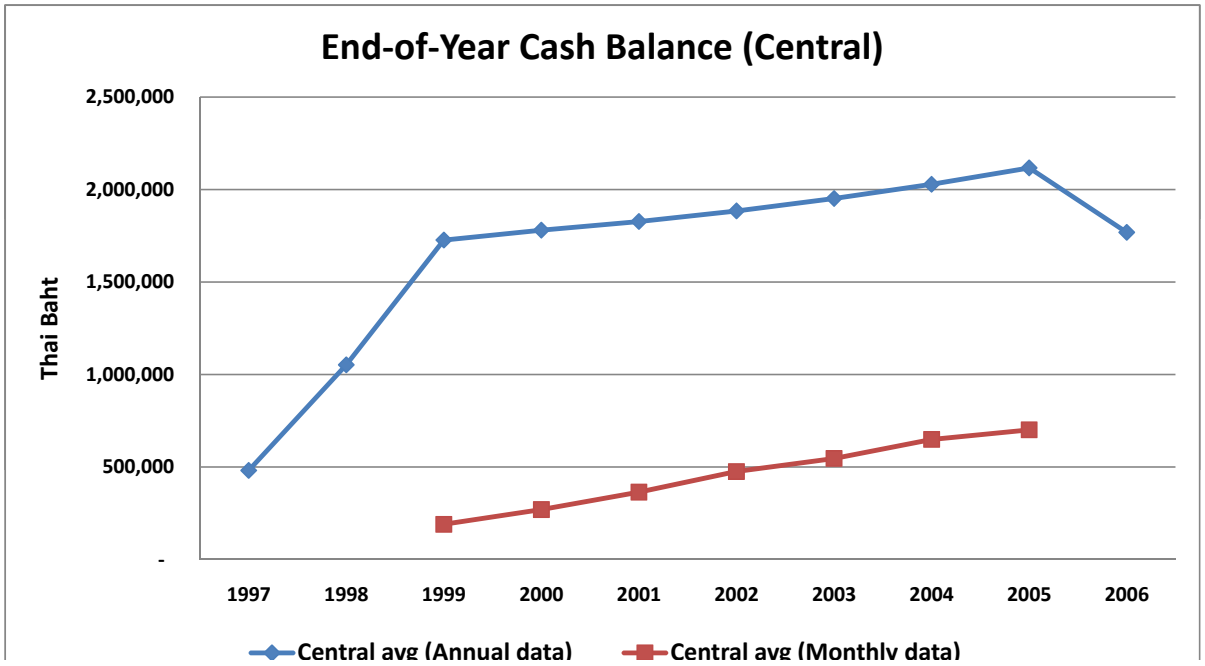
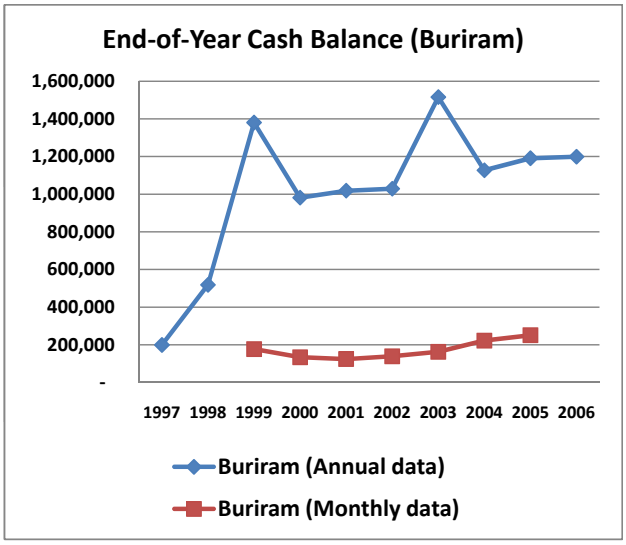
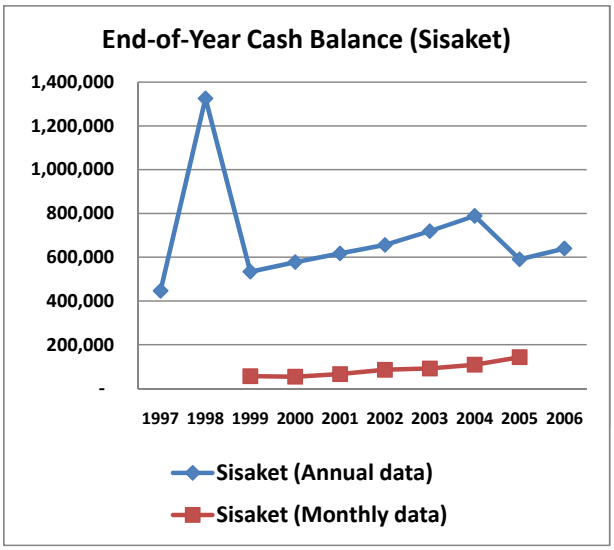
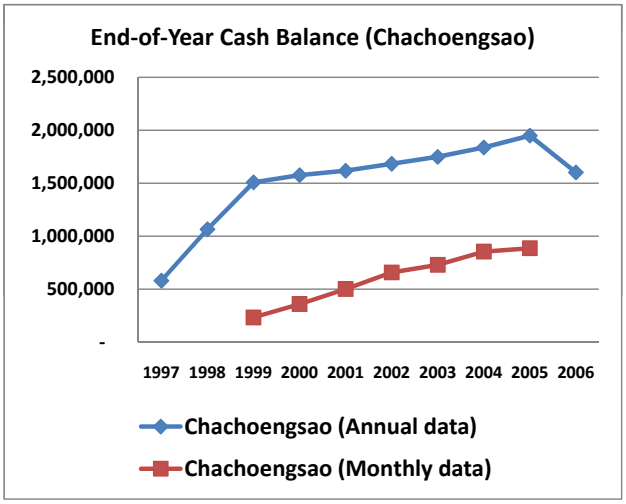


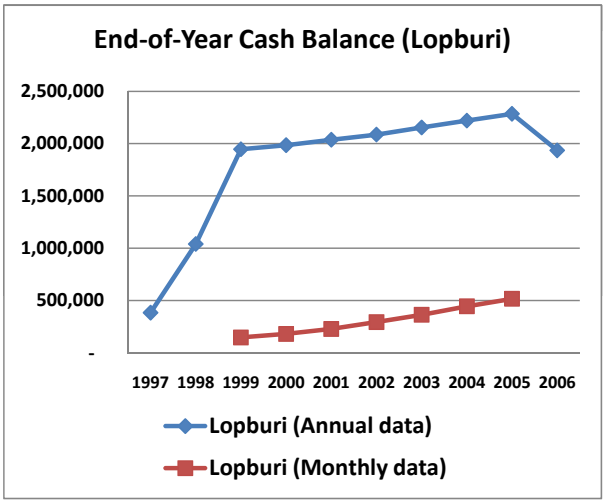
Figure 4b. Comparison of Cash Balance Estimates

Changwat-level data









Conclusion and Next Steps

The Annual and Monthly data comparisons have given some insights into the nature of the two datasets. Based on the evidence thus far, it seems unlikely that the two underlying populations are equivalent. A close look at the datasets' comparability, however, has familiarized us with the scope of each dataset, and forced us to revisit the design of the questionnaires and the construction of the variables. The evidence here reassures us of the validity of the the instruments and the variables that have been in use.

Graphical summaries and mean comparison tests have shown that visually the Monthly and the Annual data appear to be different but statistically we cannot conclusively reject that the two samples have the same means. Since few variables from the two datasets can be directly compared, we are working on standardizing the variables using methods in accounting to create balance sheets, income statements, and finally statements of cash flow. The last item will prove valuable because we do not directly ask for households' cash holdings in the surveys. In implementing the standardization, we follow Samphantharak and Townsend (2009) in the methods they use to create household financials from the Monthly data. We have since encountered a number of challenges and limitations in the datasets, particularly on the issues of double counting investments and underestimating asset disposals. Because the time intensity of the correction steps, this process has been somewhat prolonged.

While these issues are being addressed, we perform a rough estimate of the variable of interest– cash balances– ignoring potential measurement errors for the time being. This first pass at cash estimates show that estimates from the Annual data are significantly higher than those from the Monthly data. Not correcting for measurement errors in variables and the less detailed nature of the Annual questionnaire likely contribute to the high estimate. The remaining part of the project will be to finish the corrections of these variables and to come up with a way to extrapolate cashflows from business asset investment and disposals since in this submodule, there is no information on financing methods for acquisition or disposal methods for asset decreases.

Initial work has already shown that the coarser information in the Annual data will not permit a construction of financial statements that are identical to the Monthly statements. The standardization process however will yield many Annual variables that can be used to compare and contrast with the Monthly counterparts. Moreover, a careful revisit of the survey instruments will also help us document possible weaknesses in the current questionnaires as well as identify potential improvement. An updated Annual instrument may be a useful byproduct of the project..

APPENDIX

Table A. Bank of Thailand: Thailand's Macro Economic Indicators
http://www2.bot.or.th/statistics/ReportPage.aspx?reportID=409&language=eng
Last Updated : 30 Jan 2009 14:30
Retrieved date : 24 Feb 2009 06:55

		2008 p	2007 p	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
1	1. Population (Million persons)	63.04	63.04	62.83	62.42	61.97	63.08	62.80	62.31	61.88	61.80	61.20	60.50
2	2. GDP												
3	2.1 GDP at constant 1988 price (Billions of Baht)	....	4,259.6	4,059.6	3,858.0	3,688.1	3,468.1	3,237.0	3,073.6	3,008.4	2,871.9	2,749.6	3,072.6
4	(% change)	....	4.9	5.2	4.6	6.3	7.1	5.3	2.2	4.8	4.4	-10.5	-1.4
5	2.1.1 Agriculture (Billions of Baht) 1/	....	370.5	364.0	347.8	354.4	363.0	322.1	320.0	309.9	289.1	282.6	286.8
6	(% change)	....	1.8	4.6	-1.8	-2.4	12.7	0.7	3.2	7.2	2.3	-1.5	-0.7
7	2.1.2 Non-agriculture (Billions of Baht) 1/	....	3,889.0	3,695.6	3,510.1	3,333.7	3,105.1	2,914.8	2,753.5	2,698.4	2,582.8	2,467.0	2,785.7
8	(% change)	....	5.2	5.3	5.3	7.4	6.5	5.9	2.0	4.5	4.7	-11.4	-1.4
9	2.2 GDP at current price (Billions of Baht)	....	8,493.3	7,841.3	7,092.8	6,489.4	5,917.3	5,450.6	5,133.5	4,922.7	4,637.0	4,626.4	4,732.6
10	(% change)	....	8.3	10.6	9.3	9.7	8.6	6.2	4.3	6.2	0.2	-2.2	2.6
11	2.3 GNP per capita (Baht : Person)	....	123,673.4	114,748.0	103,667.8	96,049.2	88,688.0	82,975.2	79,571.6	77,860.1	72,980.6	72,979.2	76,057.4
12	3. Inflation												
13	3.1 Headline Consumer Price Index (2002=100)	123.4	117.0	114.4	109.3	104.6	101.8	100.0	99.4	97.8	96.2	96.0	88.8
14	(% change)	5.5	2.3	4.7	4.5	2.7	1.8	0.7	1.6	1.6	0.3	8.0	5.6
15	3.2 Core Consumer Price Index (2002=100) 2/	108.1	105.6	104.5	102.2	100.6	100.2	100.0	99.6	98.4	97.6	95.9	89.5
16	(% change)	2.4	1.1	2.3	1.6	0.4	0.2	0.4	1.3	0.7	1.8	7.1	4.6
17	4. External Account												
18	4.1 Export (Billions of USD)	175.3	150.0	127.9	109.3	94.9	78.1	66.0	63.0	67.9	56.8	52.8	56.7
19	(% change)	16.8	17.2	16.9	15.1	21.5	18.1	4.7	-7.1	19.5	7.4	-6.7	3.8
20	4.2 Import (Billions of USD)	175.0	138.4	126.9	117.6	93.4	74.3	63.3	60.5	62.4	47.5	40.7	61.3
21	(% change)	26.4	9.0	7.9	25.8	25.7	17.3	4.5	-2.9	31.3	16.9	-33.7	-13.4
22	4.3 Trade balance (Billions of USD)	0.2	11.5	0.9	-8.2	1.4	3.7	2.7	2.4	5.5	9.3	12.2	-4.6
23	4.4 Current account balance (Billions of USD)	-0.1	14.0	2.3	-7.6	2.7	4.7	4.6	5.1	9.3	12.5	14.3	-3.1
24	(as % of GDP)	....	5.7	1.1	-4.3	1.7	3.3	3.6	4.4	7.6	10.2	12.7	-2.0
25	4.5 Net capital movement (Billions of USD)	13.5	-2.4	6.8	11.0	3.6	-4.7	-1.8	-3.4	-10.3	-7.9	-9.8	-4.3
26	4.5.1 Private 3/	14.7	1.6	7.2	9.5	3.2	-5.5	-3.3	-2.7	-9.8	-13.5	-15.4	-7.6
27	4.5.2 Public	-1.2	-3.4	-0.9	1.3	-2.7	-1.9	-2.5	-0.3	-0.3	1.6	1.8	1.6
28	4.5.3 BOT	0.1	-0.6	0.4	0.2	3.0	2.6	4.0	-0.3	-0.2	4.0	3.9	1.7
29	4.6 Balance of payments (Billions of USD)	24.6	17.1	12.7	5.4	5.7	0.1	4.2	1.3	-1.6	4.6	1.7	-10.6
30	4.7 International reserves (Billions of USD)	111.0	87.4	67.0	52.1	49.8	42.1	38.9	33.0	32.7	34.8	29.5	27.0
31	4.8 Swap Obligation (Billions of USD)	-6.9	-19.0	-6.9	-3.8	-4.6	-5.2	0.5	2.1	2.1	4.8	6.5	18.0
32	4.9 Total debt outstanding (Billions of USD)	64.3	61.7	59.6	52.0	51.3	51.8	59.5	67.5	79.7	95.0	105.0	109.2
33	of which : Public debt 4/	12.2	12.0	13.1	13.5	14.9	16.9	23.3	28.3	33.9	36.2	31.6	24.1
34	4.10 Total debt service ratio (%)	6.7	11.0	11.3	10.8	8.5	16.0	19.6	20.8	15.4	19.4	21.4	15.7
35	of which : Public (included BOT since 1997)	0.6	1.1	1.2	1.1	1.9	7.6	7.9	8.1	4.0	4.0	3.3	2.7
36	5. Government Finance (fiscal year)												
37	5.1 Cash balance (Billions of Baht)	-147.6	-94.2	4.5	16.9	17.2	34.3	-118.7	-107.9	-116.6	-134.4	-115.3	-87.1
38	(as % of GDP)	....	-1.1	0.1	0.2	0.3	0.6	-2.2	-2.1	-2.4	-2.8	-2.4	-1.9
39	5.2 Total public debt outstanding (Billions of Baht) 5/	3,104.9	2,948.3	2,892.8	2,778.4	2,691.4	2,508.2	2,601.6	2,315.9	2,180.8	1,956.7	1,242.3	936.2
40	Domestic debt	2,663.0	2,482.9	2,331.2	2,127.3	1,989.9	1,770.1	1,735.5	1,337.2	1,200.0	1,012.6	524.9	316.6
41	6. Monetary Statistics 6/												
42	6.1 Narrow Money (Billions of Baht)	1,041.2	1,000.0	911.5	890.2	829.9	750.2	656.3	567.8	504.4	562.8	404.4	415.3
43	(% change)	4.1	9.7	2.4	7.3	10.6	14.3	15.6	11.5	-9.5	39.2	-2.6	n.a.
44	6.2 Broad Money (Billions of Baht)	9,942.3	9,109.0	8,573.4	7,926.9	7,471.4	7,062.3	6,488.1	6,404.1	6,056.3	5,828.7	5,742.4	5,266.8
45	(% change)	9.1	6.3	8.2	6.1	5.8	6.2	1.3	5.7	3.9	1.5	9.3	n.a.
46	6.3 Domestic Claims : Included investment (% change)	7.7	3.9	1.1	4.6	4.7	....	....	....	....	n.a.	n.a.	n.a.
47	Claims on Other Nonfinancial Corp., Other Resident Sector & Other financial Corp. (% cha	7.6	3.3	3.0	6.0	5.5	....	....	....	....	n.a.	n.a.	n.a.
48	6.4 Other Depository Corporations deposits (% change) 7/	8.4	2.3	7.3	5.8	5.1	....	....	....	....	n.a.	n.a.	n.a.
49	6.5 Interest rate (year end) 8/												
50	6.5.1 Prime rate : Min	6.75	6.85	7.50	6.50	5.50	5.50	6.50	7.00	7.50	8.25	11.50	15.25
51	Prime rate : Max	7.00	7.13	8.00	6.75	5.75	5.75	7.00	7.50	8.25	8.50	12.00	15.25
52	6.5.2 Fixed deposits (1 yr.) : Min	1.75	2.25	4.00	2.50	1.00	1.00	2.00	2.75	3.50	4.00	6.00	10.00
53	Fixed deposits (1 yr.) : Max	2.00	2.38	5.00	3.50	1.00	1.00	2.00	3.00	3.50	4.25	6.00	13.00
54	7. Exchange rate 9/												
55	Baht : US$ (Reference rate) average (Baht : 1 USD)	35.04	34.56	37.93	40.27	40.27	41.53	43.00	44.48	40.16	37.84	41.37	31.37

Remark:
1/ The NESDB has reclassified the GDP by industry to be followed the Thailand Standard Industrial Classification (TSIC) 2001 version since 1995. (Formerly used TSIC 1972 version)
2/ Exclude raw food and energy items from the consumer price index basket.
3/ Include Commercial bank and BIBF's.
4/ Include Bank of Thailand's debt.
5/ Exclude Bank of Thailand and Financial Institutions Development Fund's Debt.
6/ From 2003, the compilation method follows MFSM 2000.
7/ Excluding inter Other Depository Corporations.
8/ As quoted by the 5 largest banks.
9/ Since July 1997, the figures are represented by average inter-bank exchange rate.

APPENDIX

Table B. Ministry of Commerce - Bureau of Trade and Economic Indices*

http://www.price.moc.go.th/price/cpi/index_new_e.asp

Central (2002 = 100)

YEAR	DESCRIPTION.	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	Avg	(2005 = 100)
1997	ALL COMMODITIES	83.8	84.7	85.4	85.6	85.6	85.6	86.3	89.3	89.8	90.3	91.1	90.9	87.4	78.5
1998	ALL COMMODITIES	92.4	93.7	95.1	95.6	96.4	96.7	96.7	97	96.7	96.5	96.2	95.5	95.7	86.0
1999	ALL COMMODITIES	96.1	96.2	96.3	96.1	95.5	95.1	95	95.7	95.9	95.9	96	96.2	95.8	86.1
2000	ALL COMMODITIES	96.2	96.7	97	96.5	96.7	96.8	96.9	97.5	98	97.7	97.9	97.7	97.1	87.3
2001	ALL COMMODITIES	97.7	98.4	98.7	99.3	100	99.4	99.3	98.7	99.4	98.9	98.8	98.2	98.9	88.9
2002	ALL COMMODITIES	98.2	98.9	99.4	99.8	100.2	100.1	99.7	99.9	100.7	101.4	100.8	100.8	100.0	89.8
2003	ALL COMMODITIES	101.6	101.7	101.8	102.5	102.9	102.5	102.3	103.1	103	103	103.3	103.3	102.6	92.2
2004	ALL COMMODITIES	103.6	104.4	104.8	105.6	106.6	106.7	106.4	106.9	107.3	107.7	107.4	107.1	106.2	95.4
2005	ALL COMMODITIES	107.2	108	108.8	109.8	110.4	110.8	112.5	113.1	113.9	114.4	113.5	113.2	111.3	100.0
2006	ALL COMMODITIES	113.4	113.9	115.1	116.4	117.1	116.8	117.1	117.4	117.1	117.5	117.3	117.1	116.3	104.5
2007	ALL COMMODITIES	116.5	116.1	117.0	118.1	119.0	118.7	118.7	118.1	119.0	119.8	120.9	121.0	118.6	106.5
2008	ALL COMMODITIES	121.7	122.8	123.5	126.2	129.2	130.7	131.3	126.9	127.3	126.0	124.3	122.2	126.0	113.2

Northeast (2002 = 100)

YEAR	DESCRIPTION.	JAN.	FEB.	MAR.	APR.	MAY.	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	Avg	(2005 = 100)
1997	ALL COMMODITIES	85.5	85.8	86.4	86.7	87.5	88.5	89.2	90.9	92	92	92.5	92.4	89.1	80.7
1998	ALL COMMODITIES	93.8	94.5	95.4	96	97.2	97.3	97.6	97.9	97.7	97.3	97	96.7	96.5	87.4
1999	ALL COMMODITIES	96.7	96.6	96.4	96.3	96.3	96.3	96.3	96.7	96.7	96.8	96.5	97	96.6	87.4
2000	ALL COMMODITIES	97	97.3	97.4	97	97.3	97.6	97.8	98.5	98.8	98.7	98.6	98.2	97.9	88.6
2001	ALL COMMODITIES	98	98.5	98.4	99.1	100.1	99.7	99.6	99.1	99.6	99.1	98.7	98.3	99.0	89.7
2002	ALL COMMODITIES	98.2	98.4	98.8	99.6	99.8	100.2	100	101	101	101.7	100.8	100.5	100.0	90.6
2003	ALL COMMODITIES	101.5	101.4	101.4	102.1	102.3	101.8	101.9	102.7	103.2	102.8	102.8	102.8	102.2	92.6
2004	ALL COMMODITIES	102.9	103.8	104	104.8	105.7	106.1	106.5	106.9	106.8	106.8	106.4	106.2	105.6	95.6
2005	ALL COMMODITIES	106.3	106.8	107.9	109.3	109.6	109.8	111.3	112.1	113.1	113.8	112.4	112.6	110.4	100.0
2006	ALL COMMODITIES	113.0	113.1	114.6	116.2	116.9	116.3	117.1	117.1	116.6	118.0	118.1	117.8	116.2	105.3
2007	ALL COMMODITIES	117.5	116.3	117.7	119.2	119.5	120.1	120.1	119.8	120.7	121.5	121.9	121.4	119.6	108.3
2008	ALL COMMODITIES	122.6	123.4	124.0	127.0	131.0	132.5	133.2	129.0	129.0	127.2	125.8	123.5	127.4	115.3

*Cross checking the country-level CPI from this source with that from the BOT above shows that the statistics are consistent with each other

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