

# Village Economic Accounts: Real and Financial Intertwined

By ARCHAWA PAWEENAWAT AND ROBERT M. TOWNSEND\*

Using the household panel data from Townsend Thai data, we create the economic and balance of payments accounts for a set of villages in rural and semi-urban areas of Thailand. We then study these village economies as small open countries, as in international economics, exploring in particular the relationship between the real (production and trade) and financial (credit and financial flows) variables. We examine inter-village risk-sharing and the Feldstein-Horioka puzzle. Our results suggest that within-village consumption-against-income risk-sharing is better than across-village and, while there is smoothing in both, the mechanisms are different. We also find that, unlike countries, the cross-village capital markets, for investment, are highly integrated. In the conclusion, we touch on factor-price equalization, trade, and financial frictions.

## I. Survey Data and Background

This study uses the data from a monthly household-level survey, the Townsend Thai project. The monthly survey is being conducted in two provinces in the Central region, Chachoengsao and Lop Buri, and in two provinces in the Northeast, Buri Ram and Si Sa Ket. In each province, four villages are randomly picked. The survey began in August 1998, and the results re-

ported in this paper are drawn from 84-month, 7-year, period, spanning January 1999 through December 2005<sup>1</sup>. Notable below is the heterogeneity across the four provinces in real and financial variables, typically different in turn from those at the national level.

## II. Village Economic Accounts

Following Samphantharak and Townsend (2009), each household is treated as a business firm. We use, and modify where appropriate, the standards of corporate financial accounting to create household enterprise financial statements. Then, we apply the method of the Bureau of Economic Analysis (2007) to construct the national economic accounts.

### A. Production Account

We create the production account from the statement of income. The source of a village's output is its production revenues less production expenses. The uses of this output include depreciation of fixed assets, net interest expense, insurance premium, property tax, and profit.

We note first the difference in scale across the villages. Output per household in Chachoengsao, a peri-urban area near Bangkok, is roughly five times higher than output per household in Si Sa Ket, entirely rural, for example. We display in Figure 1, the annual, low-frequency movements of these village outputs. In Chachoengsao, production has been decreasing over time, while the outputs of the villages in the three other provinces have been increasing. Buri Ram shows a strong recovery pattern from

\* Paweenawat: School of Economics, University of the Thai Chamber of Commerce, 126/1 Vibhavadee-Rangsit Road, Dindaeng, Bangkok 10400, Thailand (e-mail: archawap@riped.utcc.ac.th); Townsend: Department of Economics, Massachusetts Institute of Technology, Room E52-252C, 50 Memorial Drive, Cambridge, MA 02142 (e-mail: rtownsen@mit.edu). We would like to thank Pol Antràs, Ricardo Caballero and Arnaud Costinot for helpful comments. Financial support from the NSF, NICHD, John Templeton Foundation, and the Bill & Melinda Gates Foundation through the Chicago Consortium on Financial Systems and Poverty are gratefully acknowledged. Paweenawat also gratefully acknowledge financial support from the University of the Thai Chamber of Commerce.

<sup>1</sup>During the long period covered in the survey, migration of village residents is nontrivial. For the purpose of constructing village economic accounts, we use the balanced panel data, households that have stayed for the entire period.

the early years post 1997 Asian crisis, in which the villages face losses from their businesses. Figure 2 displays the monthly, high frequency output of the representative villages in Lop Buri and Buri Ram. The apparent seasonality in the villages of Lop Buri and Si Sa Ket is due cultivation, the main source of outputs. To the contrary, the outputs of villages in Buri Ram come from labor and business activities, primarily, and show little or no seasonality.

### B. Income Account

The income account shows how a village distributes its profits. We create the income account from the statement of retained earnings. The village's net income before tax adjusting for financial items, i.e., less capital gains (net of capital losses) and less insurance indemnities, are on the "sources" side. Income tax, consumption, and undistributed profits are on the "uses" side.

### C. Saving-Investment Account

The saving-investment account<sup>2</sup> records the allocation of village saving. The sources of a village's saving are gifts and other contributed capital<sup>3</sup> plus retained earnings before depreciation. In Figures 3 and 4 below, the gifts coming in are plotted with a negative sign to distinguish them from the placement of savings. The uses of a village's saving are change in a village's current assets (inventories and livestock), financial assets (cash, bank deposit, account payable, account receivable, lending, and borrowing), and fixed assets (land, household assets, and other assets used for pro-

<sup>2</sup>When Bureau of Economic Analysis (2007) was published to replace its 1985 predecessor, the saving-investment account was renamed as the capital account. However, we keep the old label to distinguish from the capital account introduced in our balance of payments accounts.

<sup>3</sup>In the saving-investment account, we separate gifts from other contributed capital. Gifts represent the transfers from one household to another household. Contributed capital represents the situation when a member of a household moves in or out and takes some assets with him. However, in this presentation, they are grouped together.

duction activities) less the change in a village's liabilities.

Figures 3 and 4 display how each of the various representative villages allocates its saving (plus incoming gifts) at low and high frequencies, respectively. Annually, financial assets tend to move closely with a village's saving. Though the saving of the representative village in Chachoengsao has been decreasing over time, it has nevertheless positive saving in most months. For Lop Buri and Si Sa Ket, saving and financial assets are increasing. In the monthly data, current rather than financial assets move with saving. Financial assets increase instead when the inventory is sold. Cultivation and livestock activities are important in these two provinces, with heavy seasonality, and according to the way we construct the income statement, cultivation income is realized when the outputs are harvested (and valued as if sold). But many households keep these harvested outputs as inventory and sell later (contributing to profit or loss) from inventory. Buri Ram is an interesting exception to all of this. In the annual data, in early years, saving was negative. In the monthly data, the entire portfolio of assets is used, that is, there is no strong relationship between saving and any particular asset (graph is not shown, accordingly).

## III. Some Special Issues

In the accounts of the business sector, transactions between two business firms typically cancel out, as the output of one firm is used as the input of other. As a result, only the investments in the business sector and the transactions between the business sector and other sectors remain.

In the village economic accounts, however, not all intra-village transactions will cancel. The residual in intra-village transactions stems from three sources. First, households play two roles: producers and consumers. In the production account, only the transactions related to products sold by one household and used as inputs by other households in the same village would can-

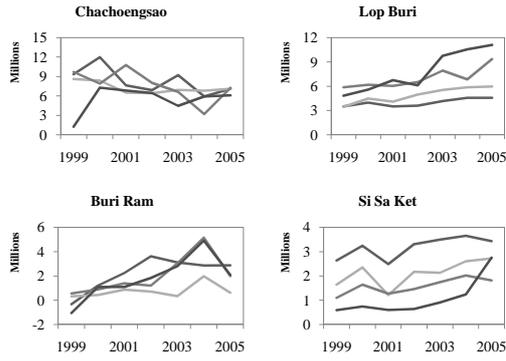


FIGURE 1. VILLAGE'S OUTPUT.

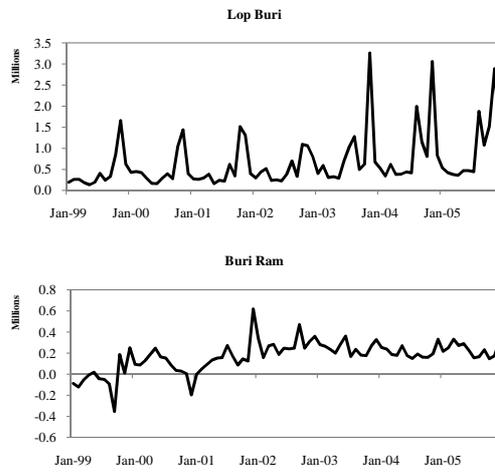


FIGURE 2. MONTHLY OUTPUT IN REPRESENTATIVE VILLAGES.

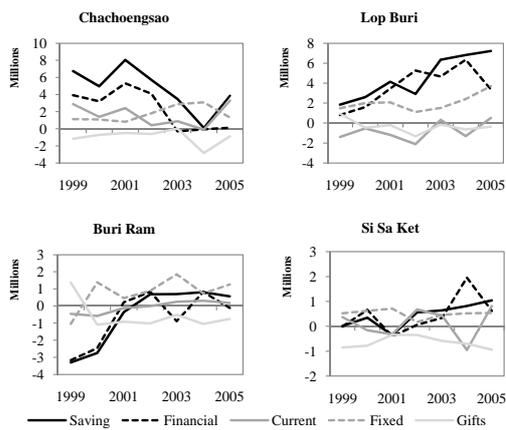


FIGURE 3. ANNUAL ALLOCATION OF VILLAGE'S SAVING.

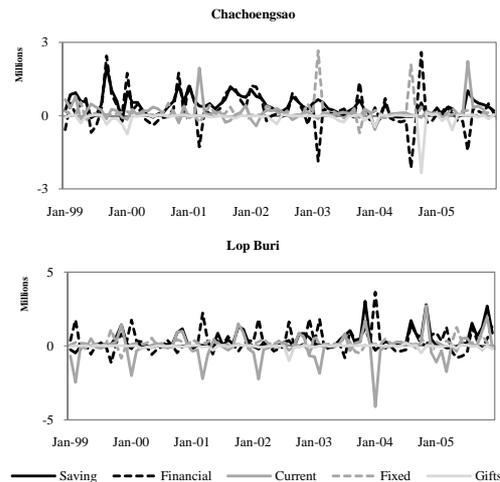


FIGURE 4. MONTHLY ALLOCATION OF VILLAGE'S SAVING.

cel, not if sold as consumption or investment goods. Second, sampling error can also create a residual in intra-village transaction. One might miss a pivotal or large household, e.g., one playing the role of intermediary or a role so substantial that its (unmeasured) transactions are a big part of the village average<sup>4</sup>. Finally, there is conventional measurement error, though if this is i.i.d. across households and the number of sampled households is large, this latter part would be small.

#### A. Issue Concerning Consumption

Even though we can categorize most transactions into intra-village and inter-village, this is not the case for consumption as, unfortunately, the survey does not ask about trading partners in consumption transactions, only what was purchased. However, consumption of village products, as distinct from consumption of imports, is inferred.

#### B. Issue Concerning Labor Income

In the national economic accounts, business firms are envisioned as the main producers in the economy, while households

<sup>4</sup>We searched for such households using the transactions data and a complete village census (i.e., who is transaction partner even if not in the month to month survey) and could not find any examples.

provide the factors of production. Therefore, the wages and compensation that households receive from business firms are counted as the outputs of business firms, part of the value added.

In Thai villages, most households also play the role of business firms and engage in production activity as single proprietors. The distinction between household and firm accounts is difficult to make even for the wage-earning households, depending on the activity in which the household, as laborer, is involved. Consequently we consider all labor incomes as the incomes from household production as if the household were a proprietor supplying labor services. Indeed, all households in the survey are regarded as business firms, and their products include labor services.

### IV. Inter-Village Risk Sharing

We believe that a village typically has its own importance, even as a small open economy. That is, a village is more than just a random cluster of households. Each village is a geo-political entity with its own formal and informal institutions. In this section, we test within-village risk sharing against cross-village risk sharing, and quantify risk sharing mechanisms, as our null hypothesis is that villages differ on these dimensions.

The low level of cross-country consumption correlations has been one of the major

puzzles in the international macroeconomic literature (Obstfeld and Rogoff, 2000). If the world markets were complete, then countries should be able to diversify and hedge country-specific shocks; consumption should be affected only by the aggregate shock. Assuming the CARA preference, we test this full risk-sharing assumption within a village by estimating the equation

$$(1) \quad C_{ivt} = \alpha_{iv} + \beta \bar{C}_{vt} + \delta Y_{ivt} + \epsilon_{ivt}$$

where  $C_{ivt}$  is the consumption of household  $i$  in village  $v$  in year  $t$ ,  $Y_{ivt}$  is the income of household  $i$  in year  $t$ <sup>5</sup>,  $\bar{C}_{vt}$  is the average consumption of households in village  $v$  in year  $t$ , and  $\alpha_{iv}$  is household  $i$ 's fixed effect. With full risk-sharing within a village, the  $\beta$  would be equal to 1 and the  $\delta$  would be equal to zero. However, Deaton (1990) shows that the OLS estimation of the  $\beta$  will be biased toward 1, even though there is no true relationship between  $C_{ivt}$  and  $\bar{C}_{vt}$ . Therefore, we use the contrast estimator specification developed in Suri (2011) to estimate the risk-sharing coefficient<sup>6</sup>.

The estimated  $\beta$  is significantly positive, but also significantly different from 1, suggesting that households within the village can share risk well, but not perfectly. Next, we aggregate the consumption and income data to village level and estimate the degree of risk sharing between villages in the same province (technically with the same sub-county of that province). The estimated  $\beta$  at village level is also significantly positive and again different from 1, though smaller than before. Thus risk-sharing coefficient seems lower at village level than at household level, as we had envisioned. Unfortunately, the low number of villages overall means wide standard errors. We do find complementary evidence using a mean squared metric, differences in consumption financing mechanisms within versus across villages. Within village, there is greater use of gifts but in a typical village's relationship with the rest of the economy, there is greater use of cash and formal borrowing.

<sup>5</sup>We try using both the output from production and the total income, and the results are similar.

<sup>6</sup>For details, see Paweenawat and Townsend (2011).

## V. Village Balance of Payments Account

We create the village balance of payments account from the village economic accounts. As discussed earlier, we are able to separate almost all transactions into two different groups; intra-village and inter-village. An intra-village transaction is a transaction between two village residents. An inter-village transaction is a transaction between a village resident and a nonresident<sup>7</sup>.

The balance of payments account consists, as is standard, of the trade balance, the current account (CA), the capital account (KA), and the financial account (FA). The trade balance records exports net of imports of goods and labor services between village residents and nonresidents. The current account balance equals the trade balance plus net (incoming) factor income (interest earned abroad) and net transfers (incoming) between village residents and nonresidents.

The capital account records the changes in ownerships of fixed assets between village residents and nonresidents. The financial account<sup>8</sup> records the transactions of financial assets between village residents and nonresidents.

The balance of payments identity is

$$(2) \quad CA + KA + FA = 0.$$

Note, again as is standard, that a current account surplus is associated with a deficit on the capital plus financial accounts, meaning that real and/or financial assets are being acquired.

Figure 5 displays the balance of payments for representative villages. Note first how much larger these numbers are than for a

<sup>7</sup>As discussed in Section III, we don't know about the residency status of trading partners in consumption transaction. However, we calculate the value of the imported consumption goods as the difference between the value of total consumption and the value of imputed consumption of village product.

<sup>8</sup>By current standards for national balance of payments accounts, the capital account includes both the former capital account and the former financial account. Viewing each has its own importance, however, so we decide to continue to separate the account for financial assets from the account for fixed assets here.

typical country. The chosen village in Cha-choengsao has a diminishing trade and current account surplus, consistent with the declining trend of village output and saving. Note, however, that toward the end of time frame, this village increases the rate at which it is accumulating capital, and borrows on the financial account. This could reflect the dynamic decision of its residents trying to expand their output in the future, shifting out of failing shrimp ponds into something else. Something similar is true for the initial years of Buri Ram, capital accumulation in the face of trade and current account deficits. On the other hand, the trade balances of villages in Lop Buri and in Si Sa Ket have been growing, as these villages have been expanding, with business and labor income increasing. Finally, note that the current account balances of villages in the Northeast noticeably exceed the trade balances in most years, indicating that these villages receive net interest payments plus net transfers from outside more than Central region villages do.

#### VI. Cross-Village Capital Market Integration: The Feldstein-Horioka Puzzle

If the international capital market were perfect, then capital should flow to the countries with the highest returns on investment and there should be no correlation between a country's saving rate and its investment rate. On the other hand, Feldstein and Horioka (1980) find that national saving rates and national investment rates are highly correlated among the OECD countries. To test whether a similar pattern exists in our village economies, we estimate the following equation

$$(3) \quad I_{vt} = \alpha + \beta S_{vt} + \delta_v$$

where  $I_{vt}$  is the investment level of village  $v$  at time  $t$ ,  $S_{vt}$  is the saving level of village  $v$  at time  $t$ , and  $\delta_v$  is village  $v$  fixed effect. We get an estimated value of  $\beta$  at 0.055 and insignificant. However, if we change from the saving level to the saving-plus-incoming-gifts, the estimated value of  $\beta$  is 0.277, and this is significant at the 5 percent

level.

The small values for the coefficients of saving levels suggest that the capital markets across village economies are highly integrated. Therefore, a village does not have to rely on its own saving, when an investment opportunity arises. On the other hand, when we include incoming gifts, the coefficients become larger and significant. This effect suggests that incoming financial gifts could be the method that the village residents use to finance these opportunities.

#### VII. Trade and Financial Intertwined: Future Research

Paweenawat and Townsend (2011) record the difference in factor prices across regions. The richer Central villages have lower interest rates and are involved in the capital-intensive sector, such as operating a fish or shrimp pond, while the labor-abundant Northeastern villages have lower wage rates and engage in the labor-intensive activities, such as cultivation or becoming a wage earner. This is consistent with the Heckscher-Ohlin (HO) model with trade costs. We also show that trade costs have been decreasing over time. As a result, the HO model predicts also that we should observe the convergence of factor price ratios. We do observe convergence in the levels of interest rates. Related perhaps, financial intermediation has increased. However, there is a divergence in the levels of wage rates, hence a divergence of the ratio of factor prices. More specifically, wage rates in the Central rise faster than those in the Northeast. To address this, we are working with an occupational choice model with two sectors and with changing/weakening borrowing constraints. With this particular linking in the model of real and financial variables, we can simulate well the observed increase in the wage rate in Central villages. Antràs and Caballero (2009) also consider an international trade model with financial frictions, though the movements of factor prices in their model are opposite to what observed in Thai data. However, their model was designed to address international, cross-country movements, as from

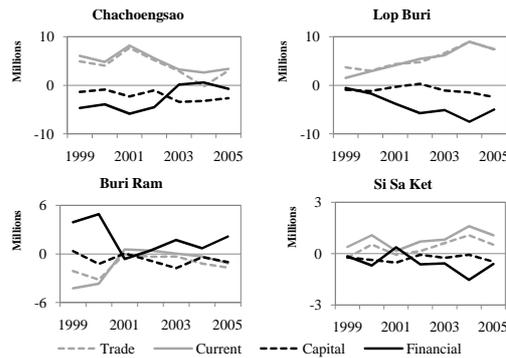


FIGURE 5. BALANCE OF PAYMENTS FOR REPRESENTATIVE VILLAGES.

North to South. That suggests for us the ultimate next step: a common framework with economic accounts for across village, within country and across country, international trade and capital flows.

#### REFERENCES

- Antràs, Pol, and Ricardo J. Caballero. 2009. "Trade and capital flows: A financial frictions perspective." *Journal of Political Economy*, 117(4): 701–744.
- Bureau of Economic Analysis. 2007. "An introduction to national income and product accounts." Methodology Paper: U.S. National Income and Product Accounts, United States Department of Commerce. Washington, DC: GPO.
- Deaton, Angus. 1990. "On risk, insurance, and intra-village consumption smoothing." <http://www.princeton.edu/~deaton/papers.html>.
- Feldstein, Martin, and Charles Horioka. 1980. "Domestic saving and international capital flows." *Economic Journal*, 90: 314–329.
- Obstfeld, Maurice, and Kenneth Rogoff. 2000. "The six major puzzles in international macroeconomics: Is there a common cause?" *NBER Macroeconomics Annual*, 15: 339–390.
- Paweenawat, Archawa, and Robert M. Townsend. 2011. "Villages as small open economies." [http://www.robertmtownsend.net/working\\_papers](http://www.robertmtownsend.net/working_papers).
- Samphantharak, Krislert, and Robert M. Townsend. 2009. *Households As Corporate Firms: An Analysis of Household Finance Using Integrated Household Surveys and Corporate Financial Accounting*. *Econometric Society Monographs*, Cambridge University Press.
- Suri, Tavneet. 2011. "Estimating the extent of local risk sharing between households." <http://www.mit.edu/~tavneet/research.html>.