International Food and Agribusiness Management Review, 2(3/4): 345–357
ISSN: 1096-7508

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The Cassava Starch Industry in Vietnam: Can Small Firms Survive and Prosper?

ABSTRACT: The paper focuses on the starch industry in Vietnam. That industry is mainly composed of small firms that adapted to rapid change over the past decade. There are also large firms and multinationals in the industry. Based on 1998 field survey data, an analysis of microefficiency and transaction costs suggests that small and medium firms can survive and prosper in the industry. A policy strategy that promotes small and medium firms increases rural incomes, important in a country that is still mainly rural and where the income gap between urban and rural areas is growing.

INTRODUCTION

Despite a decade of remarkable growth in the agricultural sector, rural areas in Vietnam are lagging behind urban areas (Nguyen Van Bich et al., 1998). The gap between rural and urban incomes has increased, and the prospects for strong and sustainable growth of nonfarm rural income are weak, given the limited growth prospects in rice cultivation. With 80% of the population living in rural areas,

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these trends, if they continue, risk raising social tensions. In response to these trends and the recent crisis in Asia, the government of Vietnam has recognized the key role of agriculture and the rural economy in promoting industrialization and modernization, and contributing to increased employment and income of the rural population (see Phan Van Khai, 1998).

This suggests the need to further pursue a strategy of rural diversification and industrialization, an example of which is the starch industry, producing mainly cassava-based but also cereal-based starch. Starch is a soft, white, tasteless powder that is insoluble in cold water, alcohol, or other solvents. In 1988, the starch industry used roughly 10% of Vietnam's cassava production. Starch production at that time typically served local markets for noodles and maltose. Liberalization and income growth over the past decade led to growth in demand for starch-based products, and thus in the domestic starch industry. New, large firms have emerged to produce specialty varieties of starch for industrial, food, and export. In the past few years, several large-scale foreign joint-ventures were formed, with significant potential to develop and modernize the starch industry. Small firms still dominate the industry, however. Over 90% of the starch processors in Vietnam have a production capacity of less than 10 tons per day.

Nevertheless, as the starch industry develops and modernizes, there will be an increasing emphasis on developing a large-scale, capital-intensive starch industry, following a pattern already pursued by more developed countries. This threatens to crowd out many small labor-intensive firms that do not have the resources to compete with larger, modern, capital-intensive firms. Although this may be desirable for efficiency's sake in the long run, a large-scale capital-intensive industry may not be the most efficient in the short or medium term. In an environment characterized by high transaction costs and poor infrastructure, market integration, and cassava farming productivity, there may be advantages in having an industry structure that includes both small and large firms.

The next section describes the Vietnamese starch industry, highlighting the growth experienced in the industry, the structure of firms and end-users, and the constraints facing the industry. The following section presents results of a simulation of alternative approaches to removing the credit constraints in the sector. The final section presents implications.

Description of the Starch Industry in Vietnam

Background on Starch

Starch uses are varied, and are diversifying further with continued global economic development. Starch is produced from local production of grain or root crops. Starches from different raw materials (i.e., maize and cassava) can be substitutable in end-use, but in practice there tends to be a relation between a specific raw material and a specific end-use of the starch. In Vietnam, root crops, especially cassava, have been the traditional sources of starch for use in food products.

Starches can be classified as unmodified or modified. Unmodified, or native, starches are produced through the separation of naturally occurring starch from either grain or root crops. Cassava is grated and then soaked in a sedimentation tank with a sieve to separate the starch from the cassava. This type of unmodified starch, also called wet starch, can be used directly in certain food uses such as noodles. Wet starch can also be further processed through drying and purifying to produce dry starch. Dry starch is used in value-added products such as textiles, paper, and MSG. Given the capital requirements needed to produce dry starch, it is usually manufactured by larger producers. Wet starch, by contrast, can be produced by small household operations, with little equipment required. Modified starches involve the addition of chemicals (depending on the final use) to dry starch and are significantly higher-value than unmodified starches.

Cassava starch is used in a range of foods, including noodles, crackers, and cakes. Cassava starch is also the main raw material for maltose production in northern Vietnam, which, in turn, is used by the confectionery industry. All of these traditional uses are found mainly in small, home-based firms.

Nonfood industrial uses of cassava are associated with larger scale (often government-run) firms in Vietnam. The textile industry, for example, uses cassava starch for sizing; the paper industry uses starch for coating high quality paper. As these industrial sectors develop, demand for starch is likely to increase. The recent arrival of several large-scale starch-producing firms interested in the production of high-value products has resulted in a much more diverse product offering than was found only a few years ago. The production of fermentation products (MSG and lysine) has started, for example. There is a potential for the Vietnamese industry to develop along the lines of the more developed Thai starch industry, which has put substantial effort and resources into the production of higher value modified starches from cassava. Cassava starch is considered the logical raw material for modified starches (which are used in the production of sweeteners, for instance) in SE Asia, much in the same way maize starch is used in North America, and potato starch is used in Europe. As starch-using industries develop in SE Asia, the range of starch-derived intermediate and end-products manufactured from cassava will also expand.

Profile of the Starch Industry of Vietnam

The data presented here come from a field survey undertaken in 1998 by the International Food Policy Research Institute (IFPRI) in collaboration with the Tropical Agricultural International Center (CIAT) and the Postharvest Technology Research Institute in Hanoi (PTRI). The survey sample included 339 starch

Table 1. Starch Production and Cassava Equivalent

Starch Type	*Starch Production ('000 tons)*	*Cassava Equivalent ('000 tons)*	*Share of Cassava Production (%)*
Wet Starch	42,307	105,767	5.3
Dry Starch	89,143	371,429	18.7
Total	131,450	477,196	24

Source: IFPRI/CIAT/PTRI Survey 1998.

processors, 115 traders, and 235 end-users across the country. While the survey sampled all starch-producing regions and nearly all medium and large firms, it likely modestly undersampled the micro and small firms. There are several salient results.

First, the share of the cassava crop going to starch has increased over time. Starch production used roughly 10% of cassava production in 1988. Since then, the number of participants involved in starch production has increased, including both rural households and large firms. Field survey results show that at least 24% of total cassava production is now used for starch (Table 1). This figure is somewhat higher than results obtained in a survey reported in Ha, Tru, and Henry (1992), that found that starch production used 20% of cassava production in 1991. Given that our 1998 survey undersampled small producers as well as some districts in the North East South of Vietnam, a more plausible estimate of starch production would be equal to 30% of cassava production (personal communication from PTRI). Total starch production in the survey was found to be 131,000 tons, corresponding to more than 477,000 tons of cassava. Most starch production is for dry starch (18.7% of the total).

Second, many starch processors cannot buy enough cassava to run at full capacity. In particular, there is a sizable gap between potential and utilized capacities, a gap that grows with firm size. Capacity utilization for micro firms is 66%, for small firms it is 41%, for medium firms 36%, and for large firms 25%.

Third, high cassava costs contribute to lowering the competitiveness of the industry, particularly of the larger firms. Survey results show that large firms pay the highest prices for raw materials procured from farmers (Dong 319 per kg), whereas the smallest firms pay the lowest prices (Dong 285 per kg). Moreover, small and medium firms travel shorter distances to procure cassava than do large processors. High costs are also related to the low productivity of cassava farming. Current yields only average 7.9 tons/ha in Vietnam, whereas in neighboring China and Thailand yields are nearly double that (Table 2).

Fourth, most of the starch firms are micro or small. Micro firms (with a production capacity of less than one ton per day) comprise almost 50% of the sample, with small firms (between 1 and 5 tons per day) making up about 26%, medium firms (between 5 and 10 tons per day) about 24%, and large firms (over 10 tons per day) only 10% of the sample. The largest enterprise, VEDAN, has a

Table 2. Yield of Cassava in 1999

Country	*Yield (Tons per hectare)*
Viet Nam	7.9
China	15.9
Thailand	15.5
Brazil	13.2

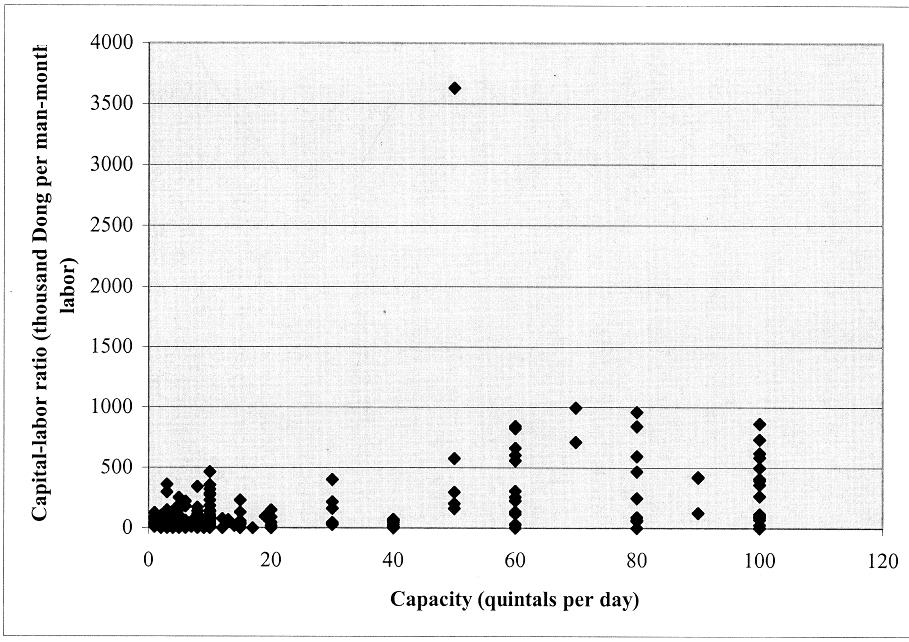
Source: AO Agrostat.

capacity of 800 tons per day. However, the average processing capacity of new entrants to the starch industry increased during 1988 through 1998—from less than 10 tons per day before 1994 to almost 60 and 80 tons per day in 1995 and 1997, respectively.

Small firms tend to predominate in the north, while large firms predominate in the south. Incomes are higher in the south, and thus so is demand for more diversified, starch-based products. There is also a more mature industrial structure and business-oriented environment in the south. Combined, these factors explain the greater presence of wet-starch processing units in the north (mainly oriented to noodles and maltose) that also happen to require less capital than dry starch units.

Fifth, as firm size increases, the capital/labor ratio increases, as shown in Figure 1, where firm capacity is plotted against the ratio of capital over labor for micro, small, and medium firms. Nearly all of the firms in the figure are labor-intensive, with capital use increasing only after an enterprise has reached a scale of at least three tons (thirty quintals) per day. Survey results show that the average value of equipment for micro, small, and large firms was \$70, \$117, and \$411,278, respectively (using the 1998 exchange rate of U.S.\$1 = Dong 11,500; see Table 3). Small firms also have poorer quality equipment. Most small processors manufacture starch with a bare minimum of equipment, using only graters and pumps in their operations. By contrast, large firms have access to sedimentation tanks, dryers, and complete starch systems. The majority of participants (both small and large) in the starch industry use locally manufactured equipment, or equipment from Russia and China, which is often of low quality and inappropriate for producing high quality starch.

However, small firms make more efficient use of capital equipment, given their output-capital ratio of 9.3 tons of starch per million Dong of capital equipment (compared to 0.6 tons of starch per million Dong for large firms). Differing cost structures for different firm sizes also partly explain the greater efficiency of smaller firms. For micro firms, for example, rental equipment comprises 35% of costs (excluding raw materials), while this is negligible for large firms. Small firms use rentals to partially overcome capital constraints to outright purchase. More than 68% of the costs of large firms (excluding raw materials) are for



Note: IFPRI/CIAT/PTRI Survey 1998

Figure 1. Relationship Between Enterprise Capacity And Capital-Labor Utilization For Micro, Small, And Medium Firms.

electricity and labor, while for medium firms these items comprise 47% of costs (excluding raw materials). A regression of average cost over firm size confirms the hypothesis of greater efficiency at smaller scale, as follows.

$$\ln(\text{firm average cost}) = 4.14 + 0.21*(\ln(\text{firm capacity}) \qquad \text{R-squared} = 0.13$$

In the above regression, the coefficient on capacity is significant at the 1% level ($t = 5.58$).

Table 3. Average Value of Equipment and Assets (Thousand Dong)

Enterprise Size	*Value of Equipment*	*Value of All Productive Assets*
Micro	808	6,760
Small	1,354	4,429
Medium	17,749	350,209
Large	4,729,007	5,979,160
Vietnam	491,512	671,398

Source: IFPRI/CIAT/PTRI Survey 1998. The value of US$1 = Dong 11,500.

Table 4. Access to Credit

Enterprise Size	*Credit (Million Dong)*	*Share of Credit from Bank (%)*	*Requirement Ratio**
Micro	5.1	78	2.5
Small	14.9	89	1.1
Medium	21.4	83	3.5
Large	108	94	6.9

Source: IFPRI/CIAT/PTRI Survey 1998. Note that the requirement ratio is the ratio between the credit deemed necessary to conduct operations smoothly and the actual credit obtained.

Small firms—and even some large firms—face credit constraints that makes it quite difficult for them to increase the quantity and quality of their equipment (Table 4). The survey revealed a higher incidence of borrowing by medium and large processors (68% and 76%, respectively) than micro and small processors (44% and 22%, respectively). While large firms have better access to bank credit, the survey reports a larger gap between obtained credit and credit requirements for these firms (the requirement-obtained credit ratio is almost 7). Problems with securing sufficient collateral and difficulties with banks were stated by firms in the sample as the main reasons for not being able to obtain additional credit.

Sixth, the starch production function regressions show that the starch industry is subject to decreasing returns to scale. The regression estimated is as follows:

$$ln(q) = a + b\ ln(K) + c\ ln(L)$$

where q represents total volume of production (wet starch and dry starch), K is the value of total capital equipment, and L is the total number of man-months worked by employees in a given starch factory. Regression results showed for the full sample, $b = 0.3$ ($t = 5.86$), $c = 0.417$ ($t = 2.94$), and $R^2 = 0.56$ which implies decreasing returns to scale since $b + c < 1$ for a Cobb–Douglas production equation. Decreasing returns to scale could be because of the problems faced by large firms discussed above (higher cost raw materials that reduce capacity use); other reasons might include problems with labor management and supervision among larger firms, which typically are state-owned, and likely have an excess supply of labor to begin with. Separate regression results were also obtained for micro-small-medium firms (in aggregate) and large firms. Subsample results show decreasing returns to scale for both groups, but are much more pronounced for larger firms. For micro-small-medium firms, $b = 0.26$ ($t = 4.8$), $c = 0.403$ ($t = 2.09$), and $R^2 = 0.35$, whereas for large firms, $b = 0.246$ ($t = 2.62$), $c = 0.144$ ($t = 0.68$), and $R^2 = 0.60$.

Seventh, there is a correlation between firm size and the type of starch produced and market targeted. Micro, small, and medium firms produce about 87% of the wet starch in our sample, but only produce 13% of the dry starch (Table 5)—smaller firms specialize in wet starch production, and large firms

Table 5. Small and Large Firms Contribution to Starch Production

	Wet Starch Production ('000 tons)	*Share of Wet Starch Production*	*Dry Starch Production ('000)*	*Share of Dry Starch Production*
Small Firms	36,961	87%	11,522	13%
Large Firms	5,346	13%	77,621	87%
Total	42,307	100%	89,143	100%

Source: IFPRI/CIAT/PTRI Survey 1998. Note that "small" firms in this table denote firms with a capacity of less than 10 tons per day, and "large" firms denote firms with a capacity of more than 10 tons per day.

specialize in dry starch production. This is to be expected, since dry starch is more capital intensive than the production of wet starch. Moreover, smaller, household starch firms mainly produce starch for the noodle industry, while only the most advanced household processors produce starch for Vietnam's maltose industry. By contrast, larger firms target their starch production toward a broader range of food and nonfood uses, including the paper industry, MSG, pharmaceuticals, and textiles. Interestingly, small firms have maintained their network of sales despite competition from large firms in traditional wet starch markets (i.e., noodles, maltose). This is partly because small firms target local markets that are relatively protected from large firms in urban areas because of high transaction costs, poor infrastructure, impediments in moving raw materials, and the difficulty of entering marketing channels established by small firms.

Eighth, increased demand for cassava starch in the local food industry and other nonfood areas has induced a dramatic increase of investment by small and large firms, with an average annual growth rate of 78% over the period 1988 to 1997 (IFPRI, 1998). Vietnamese starch is also exported: in 1998, more than 21,000 tons were exported to Singapore, Taiwan, Philippines, Indonesia, and Malaysia. This is significantly higher than the export levels (1,000 tons) reported by a previous survey just seven years earlier (Ha et al., 1992). The export prices of starch are much higher than domestic prices, partly reflecting the better quality of exported starch. On average, export prices were almost $300 per ton, compared with less than $200 per ton for domestic starch. This provides further incentives for investment among starch producers to take advantage of export markets.

Modeling the Optimal Allocation of Credit to Starch Firms

Previously we discussed various medium to long term constraints to starch industry development (such as low farm productivity and poor infrastructure). Resolving those problems requires major sustained investments in transport, research, and extension. However, in the short run, more credit could address small firms' credit constraints and thus their lack of enough equipment of sufficient quality. Next we analyze targeting options for a public injection of credit to the starch industry. Should the credit be targeted at small or large firms or both?

Starch Industry Model of Vietnam

To evaluate the effects of alternative credit targeting policies on prices, production, income, and trade we constructed a model of the starch industry. The model includes four products (food, feed, wet starch, and dry starch) and five types of agents (farmers, feed producers, wet starch processors, dry starch processors, and end-users). It is a national aggregate model. It incorporates international trade in feed and dry starch. Details of the model are found at http://www.ifpri.cgiar.org/themes/crossmp/vietnam/papers/starch.pdf or in IFPRI (1998).

The first block of equations describes the supply-demand relationships in the cassava market. Because cassava is consumed directly as food and used as feed, and as an input into the production of starch, we model each market separately. The quantities demanded of cassava as feed, wet starch, and dry starch are converted to root equivalents. Because a share of wet starch is used as an intermediate input in the production of dry starch, we must subtract intermediate uses to obtain net demand. The second block of equations models the feed market. Feed demand is a function of retail feed prices and exogenous changes in meat demand. Feed supply depends on the retail price of cassava and the producer price of feed. The third and fourth block of equations show supply-demand relationships for wet and dry starch, differentiated by the size of the processing unit (small or large, where small in this case refers to micro, small, and medium-sized processors).

The last two blocks summarize the trade, price, and income relationships within the cassava, feed, and starch markets. Cassava and wet starch are assumed to be nontradable, so that total supply equals total demand. Since there are exports of feed and dry starch, we model these markets such that supply equals demand plus net exports. Income for farmers, feed processors, and starch producers is the value of production at producer prices multiplied by the profit share for each group. Profit shares are currently set at 0.53 for farmers and 0.15 for feed processors. Small and large processors are assumed to have different profit shares (0.15 for small processors, 0.24 for large processors).

The simulation results depend on assumed demand and supply elasticities. Rough estimates of these elasticities are used here, so the results should be interpreted as rough approximations of the relative effects of policy options.

Policy Simulations

We conduct two simulations. In both cases, we consider a 10% increase in the total value of capital equipment as a proxy for the lump sum value of the credit

Table 6. Effects of Policy Options

	Option 1: 10% increase of industry capital targeted to both small and large processors			*Option 2: 10% increase of industry capital targeted only to small processors*		
	Amount	*Change*	*Percentage Change*	*Amount*	*Change*	*Percentage Change*
Income						
Total income (million U.S.$)	37.52	0.64	1.74	40.89	4.01	10.87
Farmers (million U.S.$)	26.17	0.36	1.41	28.42	2.62	10.16
Feed (million U.S.$)	4.21	−0.04	−0.86	3.99	−0.25	−5.91
Wet starch total (million U.S.$)	0.69	0	−0.33	0.57	−0.13	−18.59
Wet starch small processors (million U.S.$)	0.4	0	−0.63	0.44	0.04	8.94
Wet starch large processors (million U.S.$)	0.29	0	−0.25	0.13	−0.17	−57.15
Dry starch total (million U.S.$)	6.49	0.32	5.16	7.91	1.77	28.8
Dry starch small processors (million U.S.$)	0.37	0.02	4.89	0.95	0.6	167.3
Dry starch large processors (million U.S.$)	6.08	0.3	5.19	6.95	1.17	20.27
Producers prices						
Cassava (Dong/kg)	282.76	2.81	1	299.98	20.03	7.15
Wet starch (Dong/kg)	1086.82	−18.08	1.64	712.27	−392.63	−35.54
Dry starch (Dong/kg)	1990	0	0	1990	0	0
Export of starch ('000 tons)	26.59	4.57	20.73	52.15	30.12	136.79

Source: Computed by authors based on model simulation.

injection. The simulations differ in terms of how capital is distributed among firms. In the first simulation, the credit injection goes to both small and large firms. In the second, it is targeted only to the small. To illustrate what the simulations do, for simplicity, assume that the aggregate of small firms' capital = 1, and the aggregate of large firm's capital = 100, so total capital = 101. The simulations increase total capital by 10% or 10.1. Simulation 1 increases the capital of each set of firms by 10%, implying the new value of capital of the small firms is 1.1, and that of the large, 110. Simulation 2 increases total capital by 10% and distributes the total (10.1) to the small firms only; that is, small firms' capital is now = 1 + 10.1 = 11.1, while the large firms' capital stays at 100. Now, in practice, the total value of capital equipment in the starch sector (with the exception of the largest starch firm in Vietnam, VEDAN) is roughly $21 million. Thus, a 10% increase in capital equipment implies a lump sum of $2.1 million to be distributed. For small firms, we assume the credit will be used partly to augment existing firms' equipment and partly to form new small firms. The former, given the level of credit, is not enough to convert a small firm to a large one because of the large gap in size (1 to 100) between the average size of a small and a large firm. The results are shown in Table 6. In the first simulation (credit to small and large), total industry income increases $640,000, or 1.7%. Wet starch income is reduced slightly, as prices fall. Dry starch income is buoyed by higher production and exports. Since dry starch has an export outlet, prices do not fall; rather, excess production is channeled into 4,500 tons of exports. Cassava farmers' income rises slightly (1.4%), supported by higher retail prices because of more demand for starch. As expected, higher cassava prices reduce feed income marginally (−0.9%). Overall, despite the growth in export markets, the effects on the sector are not large. Should the government want to pursue this option, it would need to compare the weak benefits with the costs of loan administration and recovery. The second simulation (targeting the credit entirely to the small firms) provides sharply different results. Total income rises by nearly 11% (or $4 million). The injection of credit boosts the income of small starch processors for both wet and dry starch. Wet starch income for small processors increases by almost 9%, whereas dry starch income for this group rises 167%. The capital injection causes a substantial increase in wet starch production by small processors. This in turn causes an increase in overall wet starch production and a significant fall in prices (−33%). Overall wet starch income declines as a result, mainly because large processors suffer from higher input prices and low wet starch prices. In the dry starch industry, there is significant expansion, as small processors expand production. Although the model does not dynamically capture a change in capacity for starch firms, expanding into dry starch production would necessarily imply a need to increase enterprise size, given the technology needed to enter this market. Exports rise by 137% to 52,000 tons. Farm income rises considerably (10%), as demand for cassava boosts production and prices. This in turn reduces feed income (6%). Given that the benefit to the sector is a rise in income of $4 million, a credit injection packaged as a $2.1 million loan (or 10% of the value of capital equipment) would imply easy repayment over a short period of time.

How does the structure of the starch industry, as reflected in the model, account for the different results of the simulations? Note that the lump sum of credit went to all firms in simulation 1, but only small firms in simulation 2. Given that large firms own 99% of the capital in the industry, this means targeting a large sum of credit at the (numerous) holders of only 1% of the industry's capital. (Total small firm capital is 1,107,532,000 Dong, and aggregate capital for the large firms is 165,515,256,000 Dong.) Moreover, note that the elasticity of supply of starch (wet and dry) is a function of prices and capital, and the elasticity of supply with respect to capital is about the same for both groups. It is 0.336 for small firms and 0.382 for large. These facts set the stage for seeing why targeting the small firms led to such a percentage increase in incomes. Assume that the ratio of capital of the large firms to that of the small firms is 100 to 1. Focusing on an increase in capital and the supply response to it (dq/dk), we have 0.336*q/k for small firms and 0.382*q/k for large firms. However, because there is a 100 to 1 difference in the level of K, and letting the K for small firms be the numeraire (i.e., K(small) =

1, so K(large) = 100), we have dq/dk (small) = 0.336q (small) and dq/dk (large) = 0.382q/100 = 0.00382q (large). The proportionate impact on supply is much higher for the smaller firms.

The above results are comparative statistics, and do not show the path taken by the firms to go from receiving credit to increasing production. In the business context of Vietnam, several obstacles could lie on that path. The transition of smaller firms into the dry starch market requires much more than simply an infusion of capital. In particular, the development of a market for dry starch requires the close coordination of product specifications between processors and end-users. Infrastructure and location constraints, which protect the market for wet starch among small processors, may inhibit small processors from selling to dry starch users, who are typically located in urban areas. Moreover, to meet the demand of dry starch users, a sufficient scale of production is required, suggesting that an increase in capital may need to be combined with significant consolidation among small starch processors to reach the scale necessary to be competitive in the dry starch market.

A final note of caution relates to the distributional assumptions of the model. As noted, the sample distribution is likely biased against micro and small firms. If data for an unbiased sample were available, the simulation results would differ somewhat, but not in their basic lines. The addition of currently undersampled micro and small firms would increase total industry capital as measured by the survey data, but the distribution of that capital between small and large firms would not be altered significantly given the enormous disparity that now exists. The growth benefit of targeted credit to small firms would still have a much stronger impact than the same credit targeted to the industry as a whole, but the income and production effects in such a scenario would be modestly mitigated relative to the results of the model with the current sample.

Conclusions

This article highlights the importance of capital in the starch industry in Vietnam and demonstrates the need for policies that promote credit access for small- and medium-sized firms. This is especially important for firms to take advantage of growth opportunities in growing starch-using industries, such as those producing paper, MSG, and textiles. Those industries require higher-quality starch. Hence, the managers of small- and medium-sized firms wanting to compete in these markets will be faced with the challenge of obtaining more capital to develop their presence in these markets and remain competitive with larger enterprises. Some firms will not be able to make the requisite investments, and this implies eventual consolidation of the industry. The most-inclusive (in participation of small and medium firms) and fastest growth of the industry will also require better infrastructure and cassava productivity, and the concomitant public investments to make those improvements.

However, increased capital to smaller firms has the advantage of improving the profitability and competitiveness of small firms in the markets they are currently serving –mainly wet-starch markets in general and niche markets in particular. The small firms, even with an injection of capital, will find it rough going to compete in dry starch markets (which require very high capital investments); yet the dry starch industry is where the main export growth opportunities are. Hence, we point to prospects for small firms that range from survival to growth in the local wet-starch markets, and attendant rural income growth, but all premised on significant public investments in infrastructure, technology generation for farms, and credit availability, and premised on savvy decisions of small-firm managers to go after and defend niche markets in wet-starch products.

Acknowledgments: The opinions expressed herein are those of the author and not those of the U.S. International Trade Commission or any of its Commissioners.

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