

# Prosperity Initiative Technical Note on Gross Margins for Industrial and Perennial Crops in Vietnam

Nguyen Bui Linh and Bob Baulch  
Prosperity Initiative, Hanoi

30 March 2009

This note describes the gross margins prevailing for the major industrial and perennial crops in Vietnam based on the 'large' sample of the Vietnam Household Living Standards Survey of 2006 (VHLSS06). Gross margins are a simple tool used by agricultural economists to describe the returns to different crops, and are calculated using the formula:

$$\text{Gross Margin} = \text{Sales Revenue} - \text{Variable Production Costs}$$

Gross margins are usually expressed as returns to either a unit of land or a unit of labour. Gross margins treat fixed assets (such as farm buildings or machinery) as 'sunk costs' and therefore avoid the complicated issues that often arise about the pricing and depreciation these assets. They are also typically based on annual estimates of the revenues and variable costs associated with crops, and so ignore the yield profiles associated with most perennial crops. Despite these simplifying assumptions, gross margins provide a useful way of assessing the relative attractiveness of different crops to farmers.<sup>1</sup>

Gross margins have not, to our knowledge, been previously calculated using the VHLSS because it is difficult to determine the variable costs associated with the production of individual industrial and perennial crops from the agricultural module of the VHLSS questionnaire (specifically Section 4B1). To separate out these costs, we investigated how many households in the VHLSS only grew one of the industrial and perennial crops,

---

<sup>1</sup> For an overview of how gross margins are calculated and used see *Agricultural Marketing Fact Sheet 10; Gross Margin Analysis* (<http://naads.or.ug/manage/publications/127docmktfact%2010.pdf>) or Upton, M. *The Economics of Tropical Farming Systems* (Cambridge University Press, 1996). Barnard, B. and Nix, J., *Farm Planning and Control* (Cambridge University Press, 1979) discuss the calculation of gross margins in greater detail.

and then focused on these households in our subsequent analysis.<sup>2</sup> This means that it was essential to use the ‘large’ (income plus income and expenditure) sample of the VHLSS (comprising 33,711 farm households) rather than the ‘small’ sample of household, for whom both incomes and expenditures were collected (6,875 farm households).

Table 1: Gross Margins (VND per hectare) for Industrial and Perennial Crops, 2006

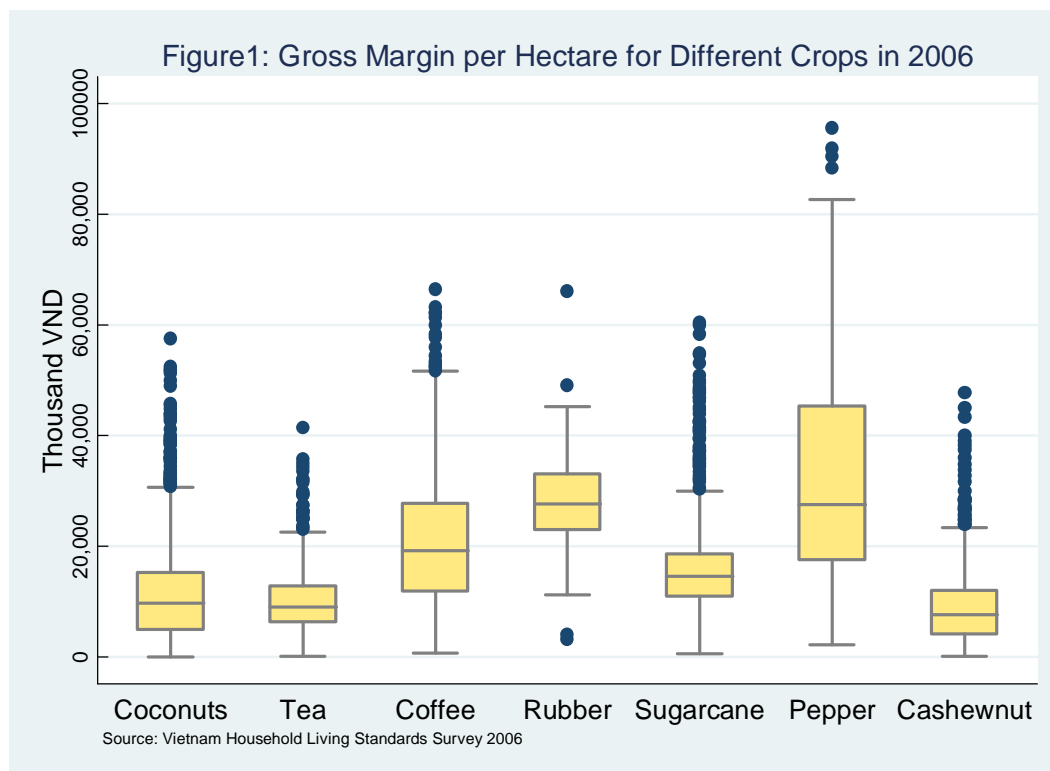
	Median	Mean	95 <sup>th</sup> percentile	5 <sup>th</sup> percentile	Number of Farm Households
Cashew	7,683	9,384	24,720	818	500
Coconuts	9,696	11,193	26,720	1,600	2,021
Coffee	19,250	20,750	43,740	4,650	758
Pepper	27,540	32,450	73,667	7,534	235
Sugar cane	14,620	16,585	37,500	6,000	553
Rubber	27,684	27,994	39,900	12,975	93
Tea	9,028	10,369	22,500	2,833	654

**Source:** Own calculations using the VHLSS06

Table 1 presents our estimates of the median, mean, maximum and minimum gross margins for the major industrial and perennial crops grown in Vietnam, together with the number of observations on which the estimate for crops is based. In using this table, we suggest that readers focus on the median rather than mean returns to different crops, as the mean gross margins are often inflated by the presence of large positive outliers. To give an idea of the returns under the best and worst prevailing practices, we also report the gross margins at the 95<sup>th</sup> and 5<sup>th</sup> percentiles of the distributions for each crop. We do not report the maximum and minimum gross margins because of concerns about the effect of outliers.

Figure 1 present these gross margin graphically using box-and-whisker plots. In these plots, the box represents the inter-quartile range (IQR), which is the distance between the 25<sup>th</sup> and 75<sup>th</sup> percentile. The horizontal line which dissects it shows the median. The ‘whiskers’ above and below the box are defined by the plus or minus 1.5 times the IQR, and the dots above this show outliers. The positive outliers may be farmers who production methods are particular profitable, but could also be due to misreported data or unit conversion errors. Similarly, the negative outliers (which are very rare and have been removed from the box plots) may be farmers who have experienced severe crop losses that year (e.g., because of crop diseases, drought, floods or pests) but could also be data errors.

<sup>2</sup> Coconut: 2,153 households; Tea: 760 households; Coffee: 837 households ; Rubber: 99 households ; Sugarcane: 632 households; Pepper: 301 households; Cashewnut: 519 households; Soybean: 1,366 households.



As can be seen from Table 1 and Figure 1, the industrial and perennial crops with the highest returns in Vietnam during 2006 were pepper and rubber, followed by coffee and then sugarcane. The median returns for pepper and rubber are each around VND 27.5 million (\$1,740) per hectare, although the best pepper producers earn almost twice as much from their land as the best rubber producers. Note that rubber prices were spiked sharply in June 2006 and were relatively high throughout the year. The median return for coffee at VND 19.25 million per hectare in 2006 is about the 70% of that for pepper and rubber, although the best coffee (presumably *Arabica*) producers earn more than the best rubber producers. Sugarcane follows next with a median gross margin of VND 14.6 million per hectare. Note that the returns to sugarcane, which tends to grown as be a midland crop in Vietnam, are highly variable and may be depressed by the involvement of provincial governments in the sugar processing industry in some case. Despite being grown at very different altitudes and soils, the gross margins for coconuts, whose prices were relatively low, and tea were quite similar in 2006, though the best coconut producers earned considerably more than the best tea producers from a hectare of land. At the bottom of the table come cashew, with a median return of VND 7.7 per hectare.

With further work, it would be possible to calculate gross margins per hectare of land for rice and other food staples and annual crops. However, this is a fairly time consuming task, as it involves processing data from other sub-sections of the VHLSS agricultural module. Thought also needs to be given to which annual crops (or combinations of annual crops) compete with the industrial and perennial crops. At the present time, it is not possible to calculate gross margins per labour day for any of the crops, as the VHLSS data does not contain sufficient data on the family labour used to

produce different crops. However, this could be done if reliable labour input data can be obtained from other sources.

To conclude, of the caveats and interpretational issues associated with gross margins presented here should be mentioned.

First, and probably most importantly, in Vietnam’s increasing open economy, the prices of agricultural export crops (together with the cost of inputs) are variable both within and between years. It is therefore important to remember that the estimates presented in this note are for the year 2006, and both their levels and relativities can change from year to year. As can be seen from Table 2, international export prices for rubber were relatively high in 2006 while those for coconuts were relatively low. The nominal annual prices for these and the other industrial and perennial crops have generally been trending upwards, with the exception of sugar.

Table 2: International Export Prices for the Industrial and Perennial Crops (US\$/lb)

	2004	2005	2006	2007	2008	Proxy
Cashew	2.100	2.250	2.150	2.200	2.550	W-320 India exports
Coconuts	0.210	0.170	0.160	0.240	0.280	PCA copra
Coffee	0.550	0.650	0.750	0.900	1.050	Index Mundi robusta
Pepper	0.746	0.666	0.933	1.384	1.396	Econstat India futures
Rubber	0.560	0.750	1.050	0.900	1.250	NR SS # 1 Singapore
Sugar	0.073	0.076	0.070	0.064	0.061	NY #11 spot
Tea	0.810	0.830	0.860	1.140	1.280	Sri Lanka auction

Sources: <http://indexmundi.com/commodities/> and [http://www.econstats.com/fut/xi\\_nmc\\_em19.htm](http://www.econstats.com/fut/xi_nmc_em19.htm), accessed 31 March 2009

Second, as mentioned in the introduction, gross margins abstract from many complicated issues concerning the depreciation of tools, machinery and other fixed assets. While, it would be possible to use some of the cost data for agricultural tools, machinery and other assets in the VHLSS to estimate the net profit of different crops, we do not believe that the quality of the VHLSS data is complete or robust enough to make this advisable.

Finally, the analysis reported here ignores the yield profile associated with most perennial crops (i.e., the fact that it take three to four years after a coffee bush is planted before it starts to produce, and longer still for coconuts, rubber, and tea. Again, it is possible to refine our estimates of the returns to perennial crop production using conventional discounted cash flow analysis. However, it is difficult to combine such discounting with the cross-sectional nature of the VHLSS data.

Despite these data and interpretation issues, we nevertheless believe that the gross margins presented in this note are a useful way to assess the comparative returns to the industrial and perennial crops grown and exported from Vietnam.

## Detailed Notes

1. Coconuts: a planting density of 200 trees per hectare has been assumed. Note that the VHLSS06 respondents typically reported their coconut holdings in terms of the number of trees they own, not the number of hectares planted to coconut.
2. Pepper: a planting density of 2,000 trees per hectare has been assumed
3. Cashew: a planting density of 300 trees per hectare has been assumed
4. The analysis does not include households with small cultivation areas for each crop. For example household with only 1 coconut tree or less than 50m<sup>2</sup> of land for tea crop have been excluded.