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**Comparing estimated and self-reported mark-
ups for formal and informal firms in an
emerging market context**

John Rand*

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Abstract: Using a 10-year panel survey covering Vietnamese manufacturing firms, we consistently obtain firm-specific mark-up estimates and relate these to firm-level formality. The average firm-specific mark-up using a trans-log revenue production function specification is estimated to be 1,445, with substantial underlying variation across firm size, location, sector, and ownership form. Zooming in on firm-level registration, we find a formality premium of 16 per cent, even when controlling for selection into formality. Moreover, a firm size threshold exists, confirming that smaller informal firms are less likely to reap eventual benefits of formalization. Finally, we find remarkable similarity between average self-reported and estimated mark-ups, but dynamic aspects of the two estimates along key firm dimensions differ substantially.

Keywords: firm productivity and mark-ups, formality, Viet Nam

JEL classification: D22, L25, O14, O53

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* University of Copenhagen, Denmark, john.rand@econ.ku.dk

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Information and requests: publications@wider.unu.edu

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

Since Robert E. Hall published his seminal paper in 1988 entitled ‘The Relation between Price and Marginal Cost in US Industry’ (Hall 1988), a large number of studies have tried to consistently estimate mark-ups. Although Hall found several industries to exhibit features of excessive market power, he also found evidence of highly competitive industries. In addition, his results showed that cyclical variations in labour inputs are often relatively small compared with the variations in output (Hall 1986, 1988, 1990).

As a point of departure, Hall’s basic idea followed from the insights of Robert Solow. Under perfect competition, the Solow residual provides an unbiased estimate of productivity and exhibits the so-called ‘invariance property’ where the growth rate of the capital–labour ratio is equal to the rate of technical progress. Under perfect competition, the share of the labour cost in revenue is equal to the labour elasticity of the production function, which again is determining for the growth rate of the capital–labour ratio. However, given market power, the share of the labour cost in revenue does not represent the true labour elasticity of the production function because profits due to market power are included in the revenue. To obtain unbiased estimates of the coefficient on the capital–labour ratio (and subsequently pull out estimated mark-ups), Hall suggested using instruments, noting that the covariance between an instrumental variable and the Solow residual will be close to zero under competition and positive under market power.

Hall’s approach has been subject to critique, including its reliance on the constant returns to scale assumption. Klette (1999), however, shows that Hall’s approach can be extended to account for scale economies, but highlights that micro-level data are necessary for simultaneously analysing mark-ups and scale economies, while also taking into account the observed firm-level heterogeneity in productivity.

In this paper, we estimate mark-ups using two different approaches. First, we apply the approach of Klette (1999) to estimate industry differences in mark-ups and economies of scale parameters, using Vietnamese firm-level data on small and medium enterprises (SME) for the 2005–15 period. Second, we adapt the recent approach by De Loecker and Warzynski (2012) and utilize methods outlined in Akerberg et al. (2015) to obtain unbiased estimates of output elasticities, which are then used to obtain consistent estimates of firm-specific mark-ups. Finally, we analyse the relationship between these firm-specific mark-ups and firm formality, as the dataset contains information on both registered (formal) firms and unregistered businesses (informal).

We find that both industry- and firm-specific mark-ups are on average relatively high compared to estimates otherwise obtained in the literature, with median mark-ups ranging between 10 per cent (industry-level estimates) and 45 per cent (firm-specific estimates). Interestingly, we show that formal enterprises on average have between 6 and 19 per cent higher mark-ups than their informal counterparts. Taking into account selection into formality, we note that this difference is driven by both incumbent formal firms and new switchers into formality. However, we find a minimum firm size threshold for obtaining the formality mark-up premium, meaning that micro firms switching into formality do not reap the formality mark-up premiums that switchers further up the firm size distribution seem to benefit from. Finally, we show that self-reported and estimated mark-ups are not generally comparable, but that the fit between the two is better for smaller firms.

The paper is structured as follows. In Section 2 we go through the basics of the empirical approaches pursued. Section 3 describes the data, with a special emphasis on how firm formality

is defined in the context of Viet Nam. Section 4 presents the results and relates the estimated mark-ups to self-reported mark-ups. Section 5 offers concluding remarks.

2 Empirical approach

2.1 The ‘standard’ approach

Consider the following simplified production function:

$$Q_{it} = A_{it} F(K_{it}, L_{it}, M_{it}) \quad (1)$$

where Q is output, K represents dynamic inputs (capital), and variable inputs are denoted L and M (labour and intermediates). Traditionally, mark-ups are defined as the output price P over the marginal cost MC :

$$\mu_{it} = \frac{P_{it}}{MC_{it}} \quad (2)$$

An identity links the mark-up to returns to scale (γ):

$$\gamma_{it} = \frac{AC_{it}}{MC_{it}} = \frac{P_{it}}{MC_{it}} \frac{AC_{it}}{P_{it}} = \mu_{it} \frac{AC_{it}}{P_{it}} \quad (3)$$

where average cost is defined as:

$$AC_{it} = \frac{P^L L_{it} + P^K K_{it} + P^M M_{it}}{Q_{it}} \quad (4)$$

where P^L , P^K , and P^M represent the prices of the different types of inputs in production. Allowing firms to have some degree of market power, but assuming that they are price takers in factor markets, profit maximization will imply that the elasticity of output with respect to the variable input factors will equal the mark-up multiplied by the share of that input in total value

added ($F_i = \mu \frac{P^i}{P} \Rightarrow \frac{F_i I}{Q} = \mu \frac{P^i I}{PQ}$, $i, I = L, M$). By use of equations (2), (3), and (4), and noting

that returns to scale ($\gamma = e_L + e_K + e_M$) is the sum of output elasticities, we get:

$$\frac{\mu_{it}}{\gamma_{it}} = \frac{P_{it} Q_{it}}{P^L L_{it} + P^K K_{it} + P^M M_{it}} \Rightarrow e_L + e_K + e_M = \mu_{it} \left(\frac{P^L L}{PQ} + \frac{P^K K}{PQ} + \frac{P^M M}{PQ} \right) \quad (5)$$

Moreover, in logarithms this translates equation (1) into:

$$q_{it} = a_{it} + \frac{F_K K}{Q} k_{it} + \frac{F_L L}{Q} l_{it} + \frac{F_M M}{Q} m_{it} = a_{it} + \mu_{it} (\gamma_{it} - e_L - e_M) k_{it} + \mu_{it} e_L l_{it} + \mu_{it} e_M m_{it} \quad (6)$$

where $e_L = \frac{P^L L}{PQ}$ and $e_M = \frac{P^M M}{PQ}$ are the share of input costs in total output. Rearranging equation (6) yields:

$$q_{it} = a_{it} + \mu_{it} [e_L(l_{it} - k_{it}) + e_M(m_{it} - k_{it})] + \gamma_{it} k_{it} \quad (7)$$

which is a version of the standard equation forming the basis of most recent empirical studies used for identifying mark-ups (see Klette 1999 for the GMM exposition of the approach followed in this paper).

2.2 The De Loecker and Warzynski approach

As noted in De Loecker and Warzynski (2012) (hereafter DLW (2012)), cost minimization of a variable input free of adjustment costs (assumed to be labour) yields the following expression (as also alluded to in equation (5)):

$$P^L - MC \frac{\partial Q}{\partial L} = 0 \Rightarrow \frac{\partial Q}{\partial L} \frac{L}{Q} = \frac{1}{MC} \frac{P^L L}{Q} \Rightarrow \frac{\partial Q}{\partial L} \frac{L}{Q} = \mu \frac{P^L L}{PQ} \Rightarrow e_L = \mu \frac{P^L L}{PQ} \quad (8)$$

where e_L is the output elasticity of the variable input. DLW (2012) highlight that the output elasticity with respect to variable inputs can be obtained consistently using proxy methods suggested by Akerberg et al. (2015) and, in combination with adjusted estimates on the expenditure shares, estimates of firm-specific mark-ups can be obtained. Moreover, it is important to highlight that under the traditional assumption of Hicks-neutral productivity and common technology producers, output elasticities are constant using a Cobb-Douglas specification. As emphasized in DLW (2012), it is therefore important to assume a non-Cobb-Douglas production function specification if one wants to allow for differences in mark-ups across firms. In the following, we estimate mark-ups using the standard approach (in the spirit of Klette 1999) and the DLW (2012) approach yielding firm-specific mark-up estimates as described above, and we test whether differences in these mark-ups exist along the firm formality dimension.

3 Defining informality and data description

In the context of Viet Nam, Cling et al. (2010) Cling et al. (2012), and Demenet et al. (2016) provide a detailed description of the problems faced when trying to measure levels of firm registration and, in turn, the relationship between firm profitability (mark-ups) and informality. Informal businesses can often be labelled ‘own-account’ workers (Maloney 2004) and are generally very small subsistence-level units with limited ability to expand. As such, it may be difficult to obtain baseline data where informal and formal firms share the same attributes. Moreover, many informal businesses are found to operate without fixed premises, making it difficult to capture the dynamics of such entities over time. This makes it challenging to apply traditional panel data methods to address possible informality selection biases. As highlighted in Maloney (2004), informality may be the result of a voluntary decision of firms based on their preferences and abilities. Lower-productivity firms may therefore choose to be informal, and low mark-ups may therefore not necessarily be a consequence of informality. If selection into formality is based partly on unobserved characteristics (e.g. owner ability), such biases would lead to an overestimation of the impact of formalization on mark-ups.

Recent studies that have taken this selection effect into account have revealed differences in the impact of formalization depending on the definition of firm-level formality. One of the more cited papers within this literature is based on firm-level data from Bolivia, and shows that tax registration leads to lower profits for smaller firms, whereas there is a positive association between formalization and profits for mid-sized firms (McKenzie and Sakho 2010). Another study, based on experimental evidence from Sri Lanka, also finds higher average profits post registration, but that this mean increase in mark-ups is driven by a few rapidly growing firms. The majority of micro firms do not benefit from formalization (de Mel et al. 2013). In the context of Viet Nam, this is in accordance with Demenet et al. (2016). Using a representative sample of household businesses they found that more established household firms (with fixed premises) are the ones benefitting from formalization with an impact of registration of almost 20 per cent. This effect is comparable to the formality effect found in Rand and Torm (2012) who studied two rounds of small and medium enterprise data. Overall, research carried out to date suggests that when factors that determine selection into formality are accounted for, the profitability effect of formalization is rather heterogeneous depending on the ‘degree’ of informality of the transitioning firm. However, none of the above studies have consistently estimated profitability using the approach outlined in Section 2.

Data to consistently analyse the relationship between informality and firm-level mark-ups come from the Viet Nam Small and Medium Enterprise tracer panel survey carried out biannually between 2005 and 2015 in the following nine provinces in Viet Nam: Ha Noi (including Ha Tay), Hai Phong, Ho Chi Minh City, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong, and Long An (CIEM 2006, 2008, 2010, 2012, 2014, and 2016).¹ The data are based on face-to-face interviews with owners/managers of businesses and are collected over the months of June to August. The sampling frame of the tracer survey was established in 2005, when the population of listed non-state manufacturing enterprises in the selected provinces was established, based on two data sources from the General Statistics Office of Vietnam (GSO): the Establishment Census from 2002 and the 2002–04 Industrial Survey.² Based on these data sources, the population of the listed enterprises in the nine selected provinces was 164,468, of which the majority (156,697) were labelled ‘household businesses’.³ To ensure representativeness of listed businesses at the province level, the sample size for the smallest group was established using approaches for multi-purpose surveys, and the sample sizes for the remaining provinces were subsequently determined proportionally. For reasons of implementation, the survey had to be limited to a select number of districts within each province, where districts were selected using probability proportional to size sampling. Finally, listed firms within the selected districts were randomly selected from the population list.

The abovementioned selection of businesses only covers administratively listed firms, and does not consider the significant amount of non-listed household businesses operating alongside the

¹ Provinces were not chosen randomly. It was decided that the surveys should cover the main urban cities as well as selected rural areas. The choice of rural provinces was driven by funding-related issues (each selected province was either a Danida- or Sida-focused province at the time).

² The population of individual business establishments that do not satisfy the conditions stated in the Law on Enterprises of Vietnam (also referred to as ‘household enterprises’) is obtained from the Establishment Census. This information is combined with data on enterprises formally registered under the Law on Enterprises from the Industrial Survey. See CIEM (2006) for details.

³ It should be noted that joint ventures have been excluded from the sampling frame due to the often unclear nature of government and foreign involvement in such ownership structures.

more ‘formal’ entities in Viet Nam.⁴ As part of the SME tracer survey, data from non-listed household businesses within each survey district were obtained through ‘on-site identification’ by the enumerator. The on-site identification means that all of the non-listed firms included in the SME tracer survey have fixed business premises and operate alongside officially listed enterprises. This could lead to bias if specific types of non-listed businesses operate in areas with many listed firms, whereas non-listed firms with other characteristics cluster in areas with no or very few listed firms. Thus, while the group of listed firms well represents the ‘formal’ manufacturing sector, our sample of non-listed firms may not be representative of ‘informal’ manufacturing firms in Viet Nam, as they may represent the more established and productive informal entities.

The structure panel data structure of the data will, to some extent, capture legal structural changes over time as incumbent firms graduate to become formal entities. Moreover, exiting firms are replaced using the following two criteria: (i) maintaining a constant level of household firms based on the information in the Establishment Census and (ii) including the new population of firms registered under the Enterprise Law obtained from the GSO statistics. Although proportionality applies for listed firms in the 2005 data, survey weights had to be introduced in subsequent survey years as the number of listed enterprises rose dramatically during the study period, changing the relative share of listed household businesses to listed non-household businesses. In the present study, we only included firms observed at least twice during the 2005–15 period. This criterion was selected due to the estimation approach chosen in this paper and to enable checking of the consistency of time-invariant characteristics and financial data. It should be noted that although the survey focuses on SMEs, the tracer dimension of the data allows firms with more than 300 employees that have been previously interviewed to be tracked and interviewed.

Table 1: Structure of the data

Year	Firms	Exit rate	Entry rate	Share formal firms
2005	1,861	0.0	..	55.7
2007	2,101	18.6	11.4	57.9
2009	2,064	19.8	17.1	62.2
2011	1,939	16.0	14.6	67.8
2013	1,952	15.0	16.6	68.8
2015	1,659	..	0.0	97.0
Total	11,576			67.4

Note: A total of 3,061 different businesses represent the 11,576 observations. Some 756 businesses were surveyed in all years (2005–15), whereas only 906 firms enter the data twice.

Source: Author’s calculations.

The structure of the data is shown in Table 1. Biannual exit rates range between 15 and 19.8 per cent, while biannual entry rates are somewhat lower at between 11.4 and 17.1 per cent. These figures correspond to annual exit rates of between 7.2 and 9.5 per cent.

Summary statistics on variables relevant for estimating mark-ups and analysing heterogeneity in these along the formality dimension are documented in Table 2, which shows that all informal firms are found among household enterprises, and that informal firms on average employ four employees compared to 14 employees in formal enterprises. Moreover, since the effect of formalization is identified based on switchers out of informality, it is important to note that 12 per

⁴ See Cling et al. (2010) and Cling et al. (2012) for more detail.

cent of the sample are switchers (corresponding to 18 per cent of formal firms and 37 per cent of informal firms).

Table 2: Summary statistics

	All		Formal		Informal	
	Mean	SD	Mean	SD	Mean	SD
Revenue (log)	13.430	1.482	13.940	1.353	12.375	1.140
Value added (log)	12.254	1.446	12.777	1.287	11.172	1.120
Intermediates (log)	12.975	1.564	13.477	1.455	11.936	1.235
Wage bill (log)	11.529	1.331	11.964	1.268	10.629	0.951
Gross profits (log)	11.740	1.303	12.162	1.241	10.867	0.947
Capital (log)	13.599	1.681	14.143	1.521	12.472	1.417
Labour compensation per employee (log)	9.805	0.643	9.921	0.575	9.566	0.707
Number of employees	10.989	20.579	14.383	24.158	3.965	4.361
Return on assets (ROA)	0.316	0.637	0.284	0.606	0.383	0.693
Capital–output ratio (KY)	2.397	4.419	2.381	4.005	2.431	5.171
Household business (Yes=1, No=0)	0.704	0.456	0.562	0.496	1.000	0.000
Formal business (Yes=1, No=0)	0.674	0.469	1.000	0.000	0.000	0.000
Observations	11,576		7,804		3,772	

Note: Monetary values in real (2010=100) 1,000VND. Mean revenue (all firms) corresponds to an annual real revenue of approximately US\$34,000. Some 1,389 switchers (informal to formal) registered over the 10-year period.

Source: Author's calculations.

4 Results

4.1 Estimated mark-ups

Tables 3 and 4 provide the mean and median mark-ups following the different approaches outlined in Section 2. As in DLW (2012), we find that application of the Klette (1999) approach (Table 3) leads to a fairly small average mark-up of 1.100 (median 1.122), with limited variation as well. Average mark-ups are found to be slightly higher in sectors with more informal firms (but with the same medians).

Table 3: Estimated sector-specific mark-ups

Methodology		Mean	Median	Returns to Scale (RTS)
Klette (1999)		1.100	1.122	0.996
Formality				
Klette (1999)	Formal	1.117	1.100	0.969
Klette (1999)	Informal	1.131	1.100	0.982
4 largest sectors				
Klette (1999)	Food processing	1.178	..	1.087
Klette (1999)	Wood	1.076	..	0.935
Klette (1999)	Basic metals	1.100	..	0.969
Klette (1999)	Furniture	1.089	..	0.982

Note: Median estimates using Hall (1986, 1988, and 1990) are 1.568 and 1.756 (by sector), respectively.

Source: Author's calculations.

However, this approach is known to exacerbate measurement error and will result in downward biased estimates (DLW 2012). Following the DLW (2012) approach in Table 4, we find that Cobb-Douglas specifications will result in relatively high average mark-up estimates in the range of 2.007–2.415 (median 1.532–2.065), depending on whether a value added- (VA) or a revenue- (OUT) based production function is used. These estimates are significantly higher than the ones reported in DLW (2012) and may be an artefact of focusing on a sample of manufacturing SMEs, rather than on a census of establishments. Applying a trans-log specification increases the dispersion between the obtained estimates, but using the revenue-based trans-log specification (row 4) brings our estimates closer to the median estimates reported in DLW (2012) for Slovenia. Tables 3 and 4 both show significant mark-up differences between sectors, signalling, as expected, that substantial variation in mark-ups across firms and sectors exist.

Table 4: Estimated firm-specific mark-ups

Methodology		Mean	Median
1 DLW (VA)	Cobb-Douglas	2.415	2.065
2 DLW (OUT)	Cobb-Douglas	2.007	1.532
3 DLW (VA)	Trans-log	3.159	2.703
4 DLW (OUT)	Trans-log	1.445	1.226
Formality			
DLW (OUT) – Trans-log	Formal	1.451	1.254
DLW (OUT) – Trans-log	Informal	1.431	1.158
4 largest sectors			
DLW (OUT) – Trans-log	Food processing	1.320	1.058
DLW (OUT) – Trans-log	Wood	1.088	0.916
DLW (OUT) – Trans-log	Basic metals	1.569	1.345
DLW (OUT) – Trans-log	Furniture	1.429	1.238

Note: Returns to scale (RTS) is 1.072 and average productivity level is 2.319 (0.618) for the full sample using the DLW (OUT-Cobb-Douglas) specification. This is comparable to the figures reported in Asker et al. (2014) using similar firm-level surveys.

Source: Author's calculations.

4.2 Formality and mark-ups

Turning to our main focus—whether formal firms on average have higher mark-ups than informal firms—we follow the basic idea in DLW (2012) (where they are just testing the differences between exporters and non-exporters instead of formal versus informal firms), and we estimate the following specifications:

$$\ln \mu_{it} = \beta_0 + \beta_1 f_{it} + x'_{it} \sigma + \varepsilon_{it} \quad (9)$$

where f_{it} is an indicator variable taking the value one if the firm is formal and zero otherwise, meaning that β_1 measures the percentage mark-up premium for formal firms. Additional controls are captured in x'_{it} . Using estimates for both mark-ups and productivity reported above, the results from estimating equation (9) with and without a control for firm-level productivity are reported in Table 5. Column 1 shows that there is a significant mark-up premium for formal firms of 6 to 16 per cent depending on the choice specification. Controlling for firm-specific productivity in column 2 does not change the point estimate of β_1 and in the revenue-based trans-log specification the formality premium increases a bit. This means that allowing for differences in

productivity across firms (which indirectly controls for differences in marginal costs) does not change the mark-up premium noticeably. But, by controlling for productivity differences, the coefficient estimate in column 2 on the formality indicator is more likely to capture variations in average prices between formal and informal firms only. The fact that the formality dummy explains around 100 per cent of the mark-up difference, while controlling for productivity, implies there are factors leading to price differences between formal and informal producers that are important. These factors are likely to be differences in product and input quality.

In column 3, we report the mark-up premium focusing on micro and small firms only. We see that the mark-up premium increases slightly in the revenue specification, while staying at a similar level utilizing revenue-based mark-up estimates.

Table 5: Formal versus informal firm mark-ups

<i>Trans-log Value-Added Specification</i>			
	1 No omega	2 Incl. omega	3 Only household firms
	All	All	All
Formality premium	0.062***	0.063***	0.103***
	(0.016)	(0.016)	(0.018)
Observations	10,536	10,536	7,439
<i>Trans-log Revenue Specification</i>			
	4 No omega	5 Incl. omega	6 Only household Firms
	All	All	All
Formality premium	0.163***	0.186***	0.163***
	(0.019)	(0.019)	(0.022)
Observations	10,483	10,483	7,426

Note: Formality mark-up premium when running equation (9). All regressions include year, province, and sector dummies. Standard errors (in parentheses) clustered at the firm level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Source: Author's calculations.

To further test whether mark-ups differ significantly between newly formalized firms and firms being formal throughout their existence, we reformulate (9) as follows:

$$\ln \mu_{it} = \gamma_0 + \gamma_1 \text{switch}_{it} + \gamma_2 \text{always}_{it} + x'_{it} \sigma + \varepsilon_{it} \quad (10)$$

where $\text{switch} = 1$ if a firm becomes formal and zero otherwise, and $\text{always} = 1$ if the firm is formal throughout the 2005–15 period. The coefficient on γ_1 measures the mark-up percentage difference for switchers as compared to firms remaining informal throughout the period under study. The coefficient γ_2 measures a similar mark-up premium for firms who are registered formally throughout the 2005–15 period.

Table 6 provides the results of estimating equation (10). We do find that switching formality status from informal to formal is associated with higher mark-ups, as the coefficient on switch is between 0.12 and 0.18 depending on specification (full sample). This suggests that changing formality status does immediately lead to changes in demand conditions and quality requirements. Although

differences in quality and demand conditions exist between formal and informal firms on average, newly formalized micro firms operate under demand conditions and requirements mirrored by firms in the informal sector. This is concluded based on the results reported in columns 3 and 6, including firm size interactions with the switch indicator variable. These results are in accordance with Demenet et al. (2016) and Rand and Torm (2012), finding in the case of Viet Nam that formalization generally brings benefits in terms of improved operational conditions, such as easier access to new and more up-to-date machinery and equipment and/or increased market opportunities through eligibility to bid for contracts offered by the public sector/government. Moreover, Demenet et al. (2016) find that results are strongly differentiated along the firm size dimension, suggesting that formalization of smaller own-account businesses in particular did not significantly improve their operating conditions or profitability post registration. Only informal entrepreneurs with managerial capabilities to expand beyond micro-level status were able to reap the benefits of formalization. From the results in Table 6, coefficient estimates indicate that the mark-up premium of switchers is zero for very small firms. However, when reaching approximately three full-time employees, the coefficient estimate for ‘switchers’ becomes at the level of entrepreneurs who were ‘always’ registered throughout the 2005–15 period.

Table 6: Formal versus informal firm mark-ups

	Value-added specification			Revenue specification		
	1 Incl. omega All	2 Incl. omega Only household Firms	3 Firm size Interaction	4 Incl. omega All	5 Incl. omega Only household Firms	6 Firm size Interaction
Always	0.064*** (0.021)	0.141*** (0.027)	0.094*** (0.027)	0.244*** (0.025)	0.233*** (0.031)	0.073*** (.027)
Switch	0.122*** (0.022)	0.131*** (0.024)	-0.077* (0.041)	0.183*** (0.026)	0.178*** (0.029)	-0.111** (.046)
Firm size			0.023** (0.009)			0.205*** (0.012)
Switch*Firm size			0.157*** (0.025)			0.183*** (0.029)
Observations	9,559	6,542	9,559	9,222	6,246	9,222

Note: Formality mark-up premium when running equation (10) for both the value-added and revenue trans-log specification. All regressions include year, province, and sector dummies. Standard errors (in parentheses) clustered at the firm level. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.

Source: Author’s calculations.

To sum up, we find that: (i) consistent with the findings in Rand and Torm (2012), formal firms do charge higher mark-ups than informal firms (controlling for industry and proximity) utilizing only the 2007 and 2009 SME data waves; and (ii) also consistent with previous results in Rand and Torm (2012), the observed mark-up difference between formal and informal firms is driven both by incumbent formal firms and by (non-micro) switchers into formality. Contrary to the abovementioned studies on Viet Nam, we show that the estimated formality mark-up premium is not (only) driven by differences in productivity but that other factors are leading to price differences between formal and informal producers. These factors are likely to be changes in demand conditions and/or the quality requirements of products. However, it is beyond the scope of this paper to dig deeper into these likely mechanisms.

4.3 Self-reported versus estimated mark-ups and pass-through of costs to prices

Finally, for each firm we try to tease out average mark-ups by asking firm owners/managers to state the average sales price of one unit of their main product and the total average cost of producing that one unit. It should be noted that over 85 per cent of the firms in the sample are single product firms, and in the following we therefore do not reflect on the potential biases related to issues of measurement problems in multi-product firms. We use equation (3) to obtain the firm-specific self-reported mark-up using returns to scale estimates obtained from the DLW (2012) estimation approach. Mean mark-ups by formality status are provided in Table 7, both uncorrected (no omega) and corrected for sector differences in economies of scale (omega corrected).

Table 7: Self-reported mark-ups

		Obs.	Self-reported No omega	Self-reported Omega corrected	Estimated
All		9,206	1.250	1.348	1.567
Formal		6,388	1.222	1.321	1.694
Informal		2,818	1.290	1.404	1.311
Formal	Small HH firms only	3,664	1.250	1.353	1.694
Informal	Small HH firms only	2,818	1.290	1.404	1.311

Note: Median estimates—data from 2005 are excluded as no data on self-reported mark-ups were available.

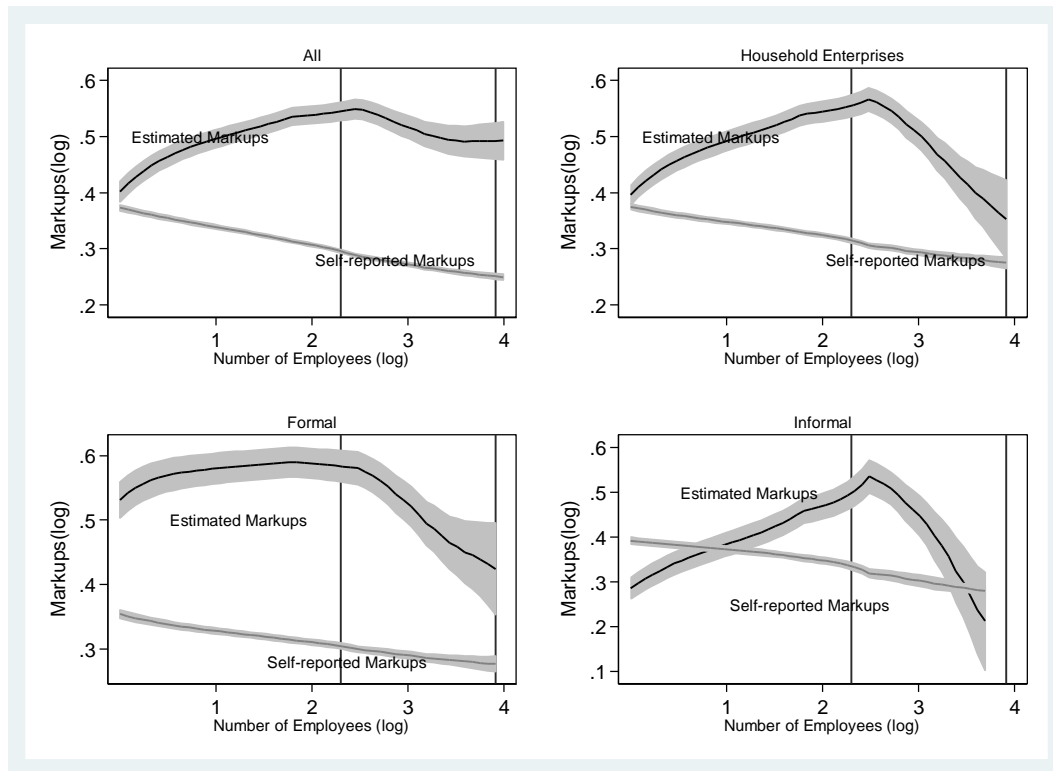
Source: Author's calculations.

From Table 7, we see that median self-reported mark-ups are lower than those estimated. This is not entirely surprising since self-reported mark-ups are based on after-profit tax observations whereas estimated P/MC should be considered at the gross profit level. Noting that the statutory profit tax in the period under consideration was between 22 and 25 per cent, there is a remarkable consistency between the two estimates (especially when correcting for economies of scale differences across sectors). We also observe that most of the dissimilarity is driven by differences between self-reported and estimated mark-ups for formal firms, i.e. among those firms who pay taxes. There is, in fact, a striking similarity between self-reported and estimated mark-ups for informal firms. Although not directly comparable to the estimates of under-reported profits in de Mel et al. (2009), our estimates could signal that the conception of the true level of profitability is better captured from direct questions on profitability among smaller informal firms than similar direct questions in larger companies. As such, for informal firms (with, on average, few employees and relatively low accounting values of capital stock), carefully asking about mark-ups provides a relatively consistent picture of average firm-level profitability (at least in terms of consistence with firm-level specific estimates of mark-ups using a more data-demanding production function approach).

However, looking in Figure 1 at the association between firm size (number of employees) and mark-ups, split by formality, shows that the above-stated coherence in medians between estimated and self-reported mark-ups is not generalizable. The black curve is the estimated mark-ups using the DLW (2012) approach, while the grey curve is the self-reported mark-ups. The shaded areas show the point-wise 95 per cent confidence intervals. The two vertical lines in the plots indicate the upper limits on the size of micro and small enterprises using the standard World Bank definition. Figure 1 shows that there is a remarkable size variation in the differences between self-reported and estimated mark-ups. Self-reported mark-ups are clearly declining in firm size (number of employees), whereas estimated mark-ups exhibit a reverse U-shape in the firm size domain (especially in the case of informal household firms). In general, we therefore conclude that one should be careful about stating that there is a relatively high coherence between estimated and self-reported mark-ups in the case of Vietnamese manufacturing SMEs. Results using self-reported

versus estimated profits may therefore differ quite substantially, although not necessarily for micro-household informal firms (for which no significant mark-up premium of switching formality status can be found).

Figure 1: Self-reported versus estimated mark-ups



Note: Kernel weighed local mean smoothing using the Epanechnikov kernel and a bandwidth of 0.8. The black curve represents estimated mark-ups; the grey curve represents self-reported mark-ups. Shaded areas are point-wise 95% confidence intervals. Vertical lines are at 2.30 and 3.91, indicating 10 and 50 employees, respectively.

Source: Author's calculations.

5 Conclusion

In this paper, we try to answer the following two questions utilizing a 10-year panel data set on Vietnamese manufacturing firms covering both formal and informal enterprises: (i) Is there a mark-up premium to formality?; and (ii) Is there coherence between estimated and self-reported mark-ups?

Using a recent approach suggested by De Loecker and Warzynski (2012), we obtain unbiased estimates of output elasticities and use these to get consistent estimates of firm-specific mark-ups, which we then relate to firm-level formality. Average mark-ups range from between 10 per cent (industry-level estimates) and 49 per cent (firm-specific estimates using a trans-log output level specification), but with underlying substantial variation across firm size, sector, location, and level of formality. Focusing on the latter dimension, formal enterprises are found to have 16 per cent higher mark-ups than their informal counterparts, and the difference is found to be driven by both incumbent formal firms and new switchers into formality. However, a minimum firm size threshold for obtaining the formality mark-up premium is present. This confirms previous results showing that micro firms are less likely to reap the benefits of formalization. Finally, we show that

although averages of self-reported and estimated mark-ups are consistent, the dynamics of the two and their relation to indicators of core firm dynamics are not generally comparable.

References

- Akerberg, D.A., K. Caves, and G. Frazer (2015). 'Identification Properties of Recent Production Function Estimators'. *Econometrica*, 83(6): 2411–51.
- Asker, J., A. Collard Wexler, and J. de Loecker (2014). 'Dynamic Inputs and (Mis)Allocation'. *Journal of Political Economy*, 122(5): 1013–63.
- CIEM (2006–2016). Characteristics of the Vietnamese Business Environment: Evidence from a Survey from 2005, 2007, 2009, 2011, 2013, 2015. Latest report available at: <https://www.wider.unu.edu/publication/characteristics-vietnamese-business-environment> (accessed on 17 August 2017).
- Cling, J.P., N.T.T. Huyen, H.C. Nguyen, P.T.N. Tram, M. Razafindrakoto, and F. Roubaud (2010). *The Informal Sector in Vietnam: A Focus on Hanoi and HCMC*. Hanoi: The Gioi Editions.
- Cling, J.P., M. Razafindrakoto, and F. Roubaud (2012). 'To Be or Not to Be Registered? Explanatory Factors behind Formalizing Non-farm Household Businesses in Vietnam'. *Journal of the Asia Pacific Economy*, 17(4): 632–52.
- De Loecker, J., and F. Warzynski (2012). 'Mark-ups and Firm-level Export Status'. *The American Economic Review*, 102(6): 2437–71.
- De Mel, S., D.J. McKenzie, and C. Woodruff (2009). 'Measuring Microenterprise Profits: Must We Ask How the Sausage is Made?'. *Journal of Development Economics*, 88: 19–31.
- De Mel, S., D.J. McKenzie, and C. Woodruff (2013). 'The Demand for, and Consequences of, Formalization among Informal Firms in Sri Lanka'. *American Economic Journal: Applied Economics*, 5(2): 122–50.
- Demenet, A., M. Razafindrakoto, and F. Roubaud (2016). 'Do Informal Businesses Gain from Registration, and How?'. *World Development*, 84: 326–41.
- Hall, R.E. (1986). Market Structure and Macroeconomic Fluctuations. *Brookings Papers on Economic Activity*, 2, 285–322.
- Hall, R.E. (1988). 'The Relation between Price and Marginal Cost in US Industry'. *Journal of Political Economy*, 96(5): 921–47.
- Hall, R.E. (1990). 'Invariance Properties of Solow's Productivity Residual. In P. Diamond (ed.), *Growth-Productivity-Unemployment: Essays to Celebrate Bob Solow's Birthday*. Cambridge, MA: MIT Press.
- Klette, T.J. (1999). 'Market Power, Scale Economies and Productivity: Estimates from a Panel of Establishment Data'. *The Journal of Industrial Economics*, 47(4): 451–76.
- Maloney, W.F. (2004). 'Informality Revisited'. *World Development*, 32(7): 1159–78.
- McKenzie, D., and Y.S. Sakho (2010). 'Does it Pay Firms to Register for Taxes? The Impact of Formality on Firm Profitability'. *Journal of Development Economics*, 91(1): 15–24.
- Rand, J., and N. Torm (2012). 'The Benefits of Formalization: Evidence from Vietnamese Manufacturing SMEs'. *World Development*, 40(5): 983–98.