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Formal and Informal Labor Demand in Egyptian Manufacturing Firms

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Abstract

This paper investigates the determinants and dynamics of labour demand and specifically informal labour in Egypt's manufacturing sector, using nationally representative firm-level data from the 2020/21 Egyptian Industrial Firm Behavior Survey. Applying ordinary least squares and fractional logit models, we analyse total employment, the share of informal labour, and its average annual change over the firm life cycle. Three key findings emerge. First, employment is positively associated with capital, exporting, innovation, industrial zones, worker training, and managerial education, and negatively associated with sole proprietorships, wages, and total factor productivity. Second, informal employment is more common among private sector firms, sole proprietorships, and firms using more part-time workers, and less prevalent among firms adopting technology or led by more educated managers. Third, changes in informality over time are modest: most formal firms exhibit no change in the share of informal workers. Notably, formal firms that did not initially employ informal labour tend to increase their informal share, while firms that formalised continue to rely heavily on informal employment. Together, these findings underscore the persistence of informality and limited transitions toward full formalisation within Egypt's formal manufacturing sector.

JEL classification

J23, L6, L11, O17

Keywords

manufacturing, labour demand, informality, Egypt

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1 Introduction

There is a global trend of ‘premature deindustrialization’, where the share of manufacturing in employment and GDP has declined at lower levels of income than was historically the case in advanced economies (Rodrik, 2016). This shift reflects both technological change and globalization, which have reduced the labour intensity of manufacturing. This trend has contributed to the displacement of labour in Egypt from formal manufacturing into informal and low-productivity service sectors (El-Haddad, Forthcoming). This pattern is in contrast to countries such as the U.S., where deindustrialization has shifted labour to knowledge-intensive services with sustained productivity (Rodrik, 2016).

The Egyptian economy has undergone a process of deindustrialization since 1996 (Assaad et al., 2019a, 2020, 2022). For example, manufacturing’s value added declined from 22.5% of GDP in 2012 to 15.8% by 2017 (Assaad & Marouani, 2021). Although manufacturing value added increased from approximately US\$34 billion in 2009 to US\$48 billion in 2019, employment growth has not kept pace (IFC, 2020). The share of manufacturing in total employment has been stagnant at 11-13% during the decade 2013-2023 (Assaad et al., 2019a). This stagnation persists despite the manufacturing sector historically being one of the most employment-intensive industries from the 1980s to the mid-2000s (El-Ehwany & El-Megharbel, 2009) and a crucial source of high-quality formal jobs (Amer et al., 2021).

Domestically, stagnation in manufacturing employment is linked to macroeconomic, investment policies and monetary policies, as well as labour market, institutional and regulatory constraints (Amer & Selwaness, 2022; Assaad et al., 2019a; Fakhri & Ghazalian, 2015). For instance, Egypt’s investment policies are mostly directed towards sectors where rents are created, such as non-traded services including the construction sector and real estate, rather than sectors with tradeable goods, including manufacturing and agriculture (Assaad et al., 2020, 2022). Monetary policy that maintained an overvalued exchange rate had long-term adverse effects on Egypt’s trade and manufacturing exports (Alnashar et al., 2022; Assaad et al., 2020; Zaki, 2024). Other challenges within the economic environment have been shown to impede private sector business dynamism and job creation in Egypt (Assaad et al., 2019a; OECD, 2024). Examples include the burden of administrative requirements (Zaki, 2024), the costs associated with trade - often exacerbated by politically motivated tariff and non-tariff barriers - and the pervasive effects of crony capitalism (Chekir & Diwan, 2014; Schiffbauer et al., 2015). In addition, access to capital has been a key challenge, especially for micro, small and medium enterprises (Amer & Selwaness, 2022; El-Haddad & Zaki, 2025). These factors have contributed to persistently weak labour demand in Egypt’s manufacturing sector, alongside declining job quality and rising informality (Amer et al., 2021; Assaad et al., 2019a; El-Haddad, 2020).

There is a large body of literature on labour markets in the Middle East and North Africa (MENA), including Egypt, that relies on individual and household-level survey data (Assaad, 2009, 2014; Assaad et al., 2020, 2022; Assaad & Arntz, 2005; Assaad & Krafft, 2015a; Krafft & Assaad, 2021; Wahba, 2009; Wahba & Assaad, 2017). This literature has greatly contributed to our understanding of patterns of labour force participation, gender disparities, and informality from the supply side. However, demand-side analyses of the factors shaping formal and informal employment, especially those using firm-level data, remain scarce. The absence of nationally representative

firm-level data in the region has long constrained such research.⁵ Recent World Bank Enterprise Survey studies have begun to address this gap (Berg et al., 2022; Fakhri & Ghazalian, 2015), along with samples from the Economic Census (Assaad et al., 2020; Krafft & Assaad, 2018; Mohamed & Abd El-Kader, 2014; OAMDI, 2022). There are also nationally representative household surveys that capture household-held (almost exclusively micro) enterprises (El-Haddad & Zaki, 2025; Krafft, 2024; Krafft et al., 2024). Yet, firm-level evidence from Egypt remains limited, especially on the drivers of manufacturing employment and the dynamics of how employment informality within manufacturing evolves over time.

This paper contributes to the nascent literature by drawing on the 2020/21 Egyptian Industrial Firm Behaviour Survey (EIFBS)⁶ a novel and nationally representative dataset on manufacturing firms of five or more workers. It estimates the firm-level determinants of both formal and informal labour demand and traces the evolution of informality over the firm life cycle, offering new empirical insights into the dynamics of Egypt's segmented labour market. Anchored in the traditional labour demand framework (Hamermesh, 1996), the analysis systematically incorporates additional factors tailored to the Egyptian context.

In doing so, the paper contributes to broader debates on employment generation, informality, and the structural barriers to formalization in Egypt's manufacturing sector and comparable middle-income economies across the MENA region. It addresses three core research questions. First, what are the key determinants of labour demand in Egypt's manufacturing sector? Second, what distinguishes firms that employ informal labour? And third, how does the demand for informal labour evolve over the firm's life cycle?

By addressing these questions, the paper highlights the sector's potential to generate employment, identifies key constraints, and assesses policy implications. The findings show that employment is strongly and positively associated with firm characteristics such as capital, innovation, training, exporting, and managerial education, while sole proprietorships, firms located outside industrial zones, and more productive firms (per total factor productivity [TFP]) tend to employ fewer workers. Informal employment is concentrated in private sector firms, sole proprietorships, and firms employing part time workers. Informal employment declines only marginally over the firm life cycle. Among formal firms employing informal labour, the share of informal workers remains largely unchanged. Reductions in informality are modest and largely limited to firms that began informally or employed informal labour at founding.

The paper is structured as follows. Following this introduction, Section 2 presents recent trends in global and Egyptian labour demand in manufacturing. Section 3 outlines the data sources and methodology. Sections 4 to 6 present our main descriptive and multivariate findings, organized around the three core research questions. Section 7 concludes.

⁵ Data availability and economics research output are below average in MENA (Das et al., 2013; Ekhtor-Mobayode & Hoogeveen, 2022).

⁶ OAMDI, 2023. Egyptian Industrial Firm Behavior Survey (EIFBS), [Egypt, Arab Rep. - Egyptian Industrial Firm Behavior Survey, EIFBS 2020/21 \(erfdataportal.com\)](#) Version 1.0 of Licensed Data Files; EIFBS 2020/2021-German Institute of Development and Sustainability (IDOS); Amirah El-Haddad. Egypt: Economic Research Forum (ERF).

2 Background: Trends in Global and Egyptian Labour Demand in Manufacturing

Both advanced and emerging economies have witnessed a trend of ‘premature deindustrialization’, whereby manufacturing employment declines and the service sector dominates. This trend is driven by technological advances, automation, and changes in global consumption patterns (International Labour Organization, 2021; Rodrik, 2016). In the MENA region, this shift has been particularly disruptive due to weak industrial foundations and limited adaptability in service sector productivity (UNIDO, 2020). In Egypt, manufacturing has struggled to maintain its historical role as a major source of formal employment (Assaad et al., 2019b). Additionally, manufacturing jobs in Egypt are concentrated in low-productivity, low-innovation microenterprises (El-Haddad & Zaki, 2025).

Egypt’s industrial policy has largely failed for a variety of reasons (El-Haddad, Forthcoming), often due to overregulation (OECD, 2024). As the sector stagnated, much of the labour displaced from manufacturing has been absorbed into informal, low-productivity services, reinforcing patterns of underemployment and labour market segmentation (Assaad & Krafft, 2015b, 2015c). This pattern contributes to a dual economy where the informal sector dominates job creation but undermines labour protections and productivity (Wahba & Assaad, 2017). Egypt’s manufacturing sector, despite its potential, has not integrated meaningfully into global value chains (GVCs) (El-Haddad, Forthcoming). As a result, the sector has failed to expand labour demand or drive the creation of formal, export-oriented jobs, leaving much of the workforce confined to domestic, informal markets (Ben Barka et al., 2023; Berg et al., 2022).

The deindustrialization trend has meant that in many economies labour demand has grown at the top and bottom of the skills distribution spectrum, while mid-level routine jobs - often in manufacturing - have declined (Autor, 2015). In MENA and Egypt, this polarization is compounded by demographic pressures and limited job creation in high-skill sectors (Assaad & Krafft, 2015b, 2015c; Krafft, 2023). Egypt’s labour market illustrates a dual challenge: a surplus of low-skilled workers competing for informal jobs, and a cohort of educated youth facing limited opportunities in both manufacturing and modern services (Assaad et al., 2022, 2023; Assaad & Krafft, 2015c, 2021; Assaad & Mahmoud, 2024).

3 Data and Methods

In this paper, we use firm-level manufacturing sector data from the EIFBS, which is nationally representative of industrial establishments with 5 or more employees. The EIFBS thus represents small, medium, and large but not micro firms (OAMDI, 2023). The 2017 Economic Census was used as a sampling frame, with a stratified random sample by firm size, region, and economic activity (see introductory paper for sampling details). Economic activity classification to identify manufacturing firms is based on the two-digit level International Standard Industrial Classification (ISIC) Revision 4. Sample weights, which account for the sample strategy and non-response, are used throughout the analyses.

3.1 Outcomes

We address three linked research questions. First, we identify the determinants of labour demand among manufacturing firms (RQ1). Second, we examine what factors account for the use of informal employment within otherwise formal firms (RQ2). Third, we trace how the demand for informal labour evolves over the firm life cycle, from establishment through 2019, the final pre-COVID-19 year (RQ3). Taken together, these questions move from levels to composition to dynamics: RQ1 pinpoints what drives overall labour demand; RQ2 asks, conditional on employment, which factors predict hiring informally; and RQ3 follows the same firms over time to assess whether those patterns persist, intensify, or diminish as firms age and grow. This sequencing links the determinants of labour demand to the incidence and persistence of labour informality.

Our three main research questions (RQ) are:

RQ1: What are the determinants of the labour demand function of manufacturing firms?

Our outcome for this research question is the logarithm⁷ of total employment in the last completed financial year (2019), prior to the pandemic. We estimate models for this outcome using ordinary least squares (OLS) regression. Coefficients can be interpreted as percentage changes.⁸ The analysis for this question focuses on the full sample of 2,383 firms in the EIFBS.

The analysis is grounded in a standard framework in which a profit-maximizing firm operates under a Cobb-Douglas production function (Hamermesh, 1996). Output is produced using capital and labour as inputs with constant returns to scale. The firm chooses the quantity of labour to hire by equating the marginal product of labour to the real wage, ensuring that the revenue it generates offsets the cost of hiring an additional worker. In this setting, the demand for labour depends on factors such as the output level, the real wage, capital stock, and productivity. This framework allows for empirical analysis of how changes in wages, capital, and other variables affect firms' hiring decisions. The wage rate is expected to reduce labour demand because of increased cost of hiring labour. If capital and labour are complements than more capital increases the marginal productivity of labour which in turn increases the labour demand. If they are substitutes, then more capital reduces the need for labour, and we should expect a negative relationship. In manufacturing in general, a positive sign is expected as more equipment increases labour needs (Berndt & Christensen, 1973; Hamermesh, 1991).

RQ2: What are key factors explaining informal employment in formal manufacturing firms?

Our outcome for this research question is the share of informal employment, defined as the ratio of informal employment to total employment, in the last completed financial year before the pandemic (2019). Informal employment refers to workers who lack a work contract and/or are

⁷ For all logged variables, we replace the value of the underlying variable to be one if it is zero or less in order to avoid missing values and losing sample.

⁸ For continuous covariates, the percentage change interpretation is precise. The approximation as a percentage change for dummy variables is close for small coefficients, but diverges as coefficients increase (Halvorsen & Palmquist, 1980).

not covered by social insurance. We estimate the models for this outcome using a fractional logistic regression.^{9,10} Unlike in RQ1, the universe for this question – and the next – is limited to formal firms, as informal firms are, by definition, composed entirely of informal workers. Formal firms are defined as those with commercial registration, an operating license, and a tax record. This criterion retains 98% of the full sample (N=2,332 out of 2,383 observations).

RQ3: How does the demand for informal labour evolve over the firm’s life cycle? That is, from the time of establishment until 2019 (the latest year prior to COVID-19).

Our outcome is the firm’s average annual percentage-point change in informal employment from founding to 2019. This outcome is calculated as:

$$\frac{\left(\frac{\text{Informal employment in 2019}}{\text{Total employment in 2019}} - \frac{\text{Informal employment at founding}}{\text{Total employment at founding}} \right)}{\text{Firm age}} \times 100.$$

This measure captures the trajectory of informality over the firm's lifespan, expressed as an average yearly change in percentage points.

3.2 Covariates

We undertake stepwise model building for all our outcomes. For RQ1, the first specification includes log of issued capital at founding,¹¹ the log of the annual average wage per worker, measuring the price of labour and its quality, and productivity, namely TFP, a standardized residual from the Cobb-Douglas production function.¹² These represent the main inputs in the production function from which labour demand is derived.

In the second specification, we control for covariates that are relatively fixed since founding to avoid issues of endogeneity. These include the location of the firm at the governorate level, whether the firm is in an industrial zone, whether the firm is private (versus public), firm age (winsorized at the 95th percentile to preclude the influence of outliers) and its square (to account for potentially quadratic relationships), the legal status of the firm¹³, and whether owners include women. We also include industry controls (fixed effects).

In the third specification, we add endogenous covariates that reflect behavioural characteristics. These include the use of technology,¹⁴ investing in research and development (R&D),¹⁵

⁹ We present descriptives as percentages (*100) but the outcome in the multivariate model is fractional (0-1).

¹⁰ We have also estimated this outcome of share of informal employment using a generalized Tobit to account for the cases where there are no informal workers (zero observations), and we found similar results. We thus opted to present the fractional logit model results.

¹¹ Current capital was not available.

¹² The production function uses the same log of issued capital and log of employment to predict log output and calculate the residual; thus output cannot be included in the models with labour, capital, and TFP.

¹³ A dummy that takes the value of 1 if the firm is a sole proprietorship.

¹⁴ Computers, internet, internal networks, distributed machine control systems, quality control systems

¹⁵ A unit, department, or person who works in R&D.

exporting, good management practices,¹⁶ providing worker training, the education level of the top manager, whether there are any women in top management, and whether the firm was informal at founding.¹⁷ These covariates capture the extent to which good managerial practices, innovation, the adoption of advanced technologies and worker training influence labour demand in manufacturing.

For RQ2, we adopt the same sequential specification structure as in RQ1, with a few differences. Specifically, specification 1 also includes the log of total employment. Specification 3 extends the model by including workforce composition, specifically the percentage of production workers (vs. non-production), part-time workers (vs. full time), and female workers.

For RQ3, since most of our covariates are measured only in 2019 (i.e., contemporaneously, e.g., current exporting), we limit the set of control variables to those that are relatively fixed at founding (added in specification 2 in other models). We also include log employment at establishment (in specification 1 for this outcome).¹⁸ An additional specification controls for firm formality status at founding and its use of informal labour (categories: informal at founding, formal using informal workers at founding, formal not using informal workers at founding), as well as the average annual change in firm employment (winsorized at the 1st and 99th percentiles).

4 Labour demand

4.1 *Patterns of labour demand*

Most manufacturing firms (63%) are relatively small enterprises of less than 20 workers (Figure 1). Relatively few are micro, with only 6% of firms having 1-4 workers; the sample frame was based on firms having 5 or more workers in 2017 so this is to be expected. The median size of manufacturing firms is 12 workers, the 25th percentile of firm size is 7 workers, the 75th percentile 35 workers, and the mean is 62 workers (see Table 1 for means of employment by firm characteristics). Nearly all firms have some formal workers, consistent with both the EIFBS sample being almost entirely formal firms and the higher likelihood of employment formality in the manufacturing sector (Amer et al., 2021). The 25th percentile for formal employment is 4 formal workers, the median 8, the 75th percentile is 25, and the mean 54 formal workers. Most firms report no informal workers; the median is 0, the 75th percentile is 6, and the mean is 8 informal workers.

¹⁶ Establishing or monitoring performance indicators or production targets.

¹⁷ Using the same definition of formality as concurrently.

¹⁸ We undertook analyses with categories of employment and results were substantively similar.

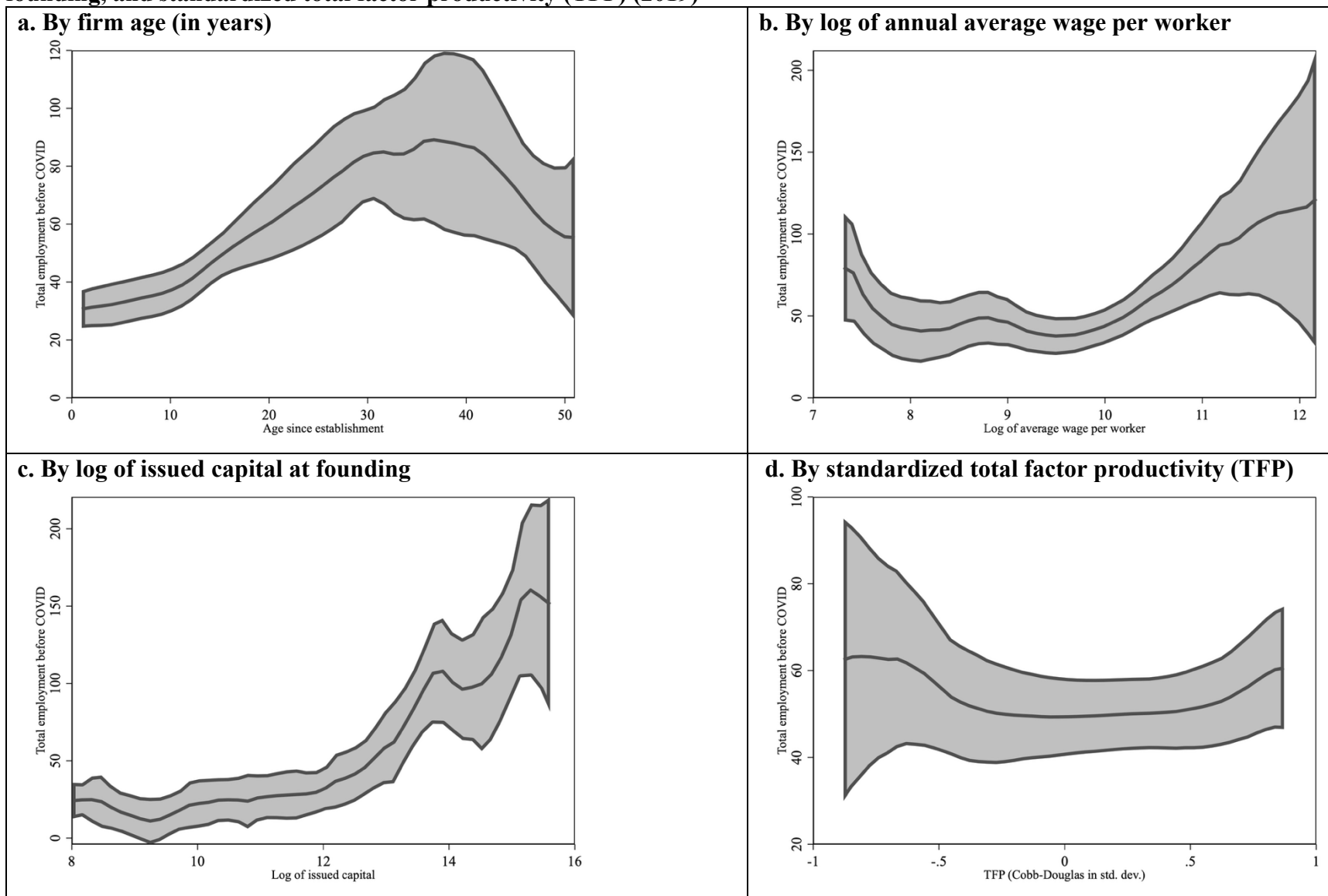
Figure 1. Distribution of the number of workers, number of formal workers, and number of informal workers in 2019



Source: Authors’ construction based on EIFBS 2020/21

The remainder of this section focuses on overall labour demand (total number of workers). Employment increases steadily with firm age until around 30 years, plateauing thereafter (Figure 2), panel a. While new firms employ slightly more than 30 workers on average, this rises to around 60 workers by age 20, then to around 80 workers at 30 years. Beyond that, the relationship is flat, and confidence intervals suggest no significant differences from 30 to 50 years of age.

Figure 2. Number of workers in 2019 by firm age (in years), log of annual average wage per worker, log of issued capital at founding, and standardized total factor productivity (TFP) (2019)



Source: Authors' construction based on EIFBS 2020/21

Notes: Grey shading represents 95% confidence interval. Visualizing through 95th percentile for firm age with Epanechnikov kernel with bandwidth 5. Visualizing 5th through 95th percentile for log average wage per worker with Epanechnikov kernel with bandwidth 0.3. Visualizing 5th through 95th percentile for log of issued capital at founding with Epanechnikov kernel with bandwidth 0.3. Visualizing 5th through 95th percentile for TFP with Epanechnikov kernel with bandwidth 0.3. TFP based on Cobb-Douglas production function.

As shown in Figure 2, panel b, employment is higher at both the lowest and highest wage levels, but lower and stagnant across mid-wage levels.¹⁹ There are thus two modalities of large firms: ones that pay low wages and ones that pay high wages. Employment tends to rise with capital, measured by log issued capital at establishment (Figure 2, panel c). This pattern is as expected given that labour and capital are generally complements.

Figure 2, panel d shows that the number of workers is negatively associated with TFP at low productivity levels (when TFP is below -0.5), suggesting that less productive firms use more workers.

Table 1 explores the mean number of workers by firm characteristics. Urban governorates have the largest firms (71 workers on average), Upper Egypt is close behind (68), followed by lower Egypt (53). Public sector firms are much larger (149) than private sector firms (55). Sole proprietorship firms are much smaller (21) compared to other ownership structures (159). Firms with at least a woman among their owners are larger (89 versus 58); this might however just represent a larger ownership team and a larger firm as a result. Firms in industrial zones, those investing in R&D, exporters, and those adopting technology or offering training are all larger. The number of workers increases markedly with the top manager's education level: from 11 workers for a manager with less than secondary education, to 22 with secondary education, 115 with post-secondary or university education, and 326 with a postgraduate degree. Firms with at least one woman in top management are larger (152) compared to those without (51), although this could be purely a size effect – firms with more top managers are more likely by chance to have a woman.

Table 1. Average number of workers in 2019 by firm characteristics and percentage of firms with each characteristic

	Mean total employment	Percentage of firms with characteristic	N (Observations)
Region			
Lower Egypt	53	46	1,098
Upper Egypt	68	28	659
Urban Govs.	71	26	626
Sector ownership			
Public	149	9	211
Private	55	91	2,172
Sole proprietorship			
No	159	63	1,497
Yes	21	37	885
Female among owners			
No female owners	58	82	1,946

¹⁹ The 25th percentile of log annual wage per worker is around 9.0, the median 9.8, and 75th percentile 10.5 (equivalent to annual wages of roughly 8000 EGP, 18,000 EGP, and 35,500 EGP).

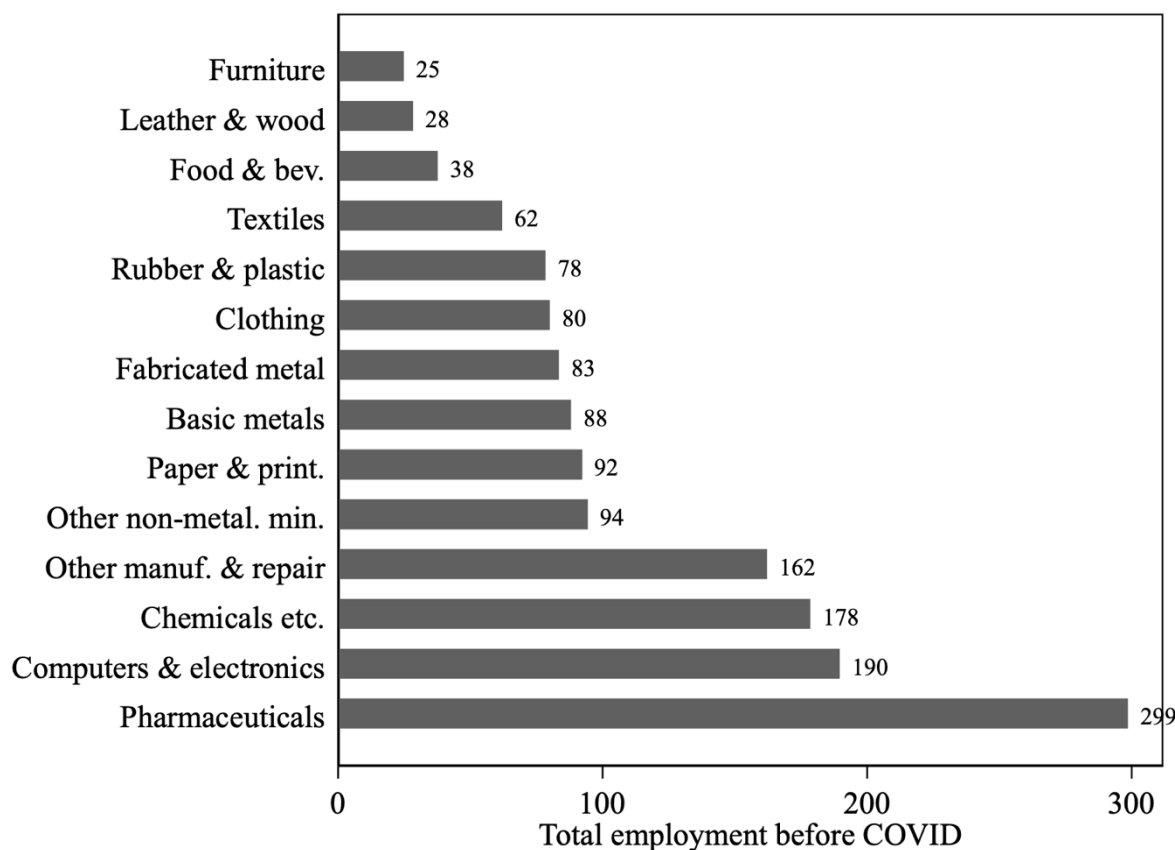
	Mean total employment	Percentage of firms with characteristic	N (Observations)
Female among owners	89	18	435
Location in an industrial zone			
Not ind. zone	41	51	1,216
Industrial zone	129	49	1,166
R and D undertaking			
No R&D	39	73	1,733
R&D	304	27	648
Exporting status before Corona			
No exports	53	73	1,748
Exports	544	26	627
Management good practices			
No good management practices	23	39	929
Good management practices	130	61	1,452
Use of technology			
No technology	28	54	1,279
Uses technology	186	46	1,101
Providing training to workers			
No training	22	26	630
Training	96	73	1,750
Ed. attain. top manager			
Below sec.	11	5	109
Secondary	22	24	567
Post-sec. or univ.	115	66	1,570
Post-graduate	326	6	135
Female in top management			
No female man.	51	80	1,900
Female man.	152	20	481
Total	62	100	2,383

Source: Authors' construction based on EIFBS 2020/21

The number of workers varies widely by industrial sector (Figure 3). The largest firms in terms of number of workers are in pharmaceuticals (average of 299 workers, representing 1% of all firms), computers and electronics (190 workers, representing 2% of all firms), chemicals (178 workers, representing 2% of all firms), and other manufacturing and repairing (162 workers, representing 2% of all firms). In contrast, the smallest firms in terms of employment are in furniture (25 workers, representing 4% of all firms), leather and wood (28 workers, representing 9% of all firms), food and beverages (38 workers, a substantial share of all firms, 44.3%). The textiles industry averages 62 workers and accounts for 7% of all firms. The remaining industries

(rubber & plastic; clothing; fabricated metal; basic metals; paper & print; other non-metals) average between 78-94 workers, with clothing standing out with a relatively larger share (10%) of total firms.

Figure 3. Mean number of workers in 2019 by industrial sector



Source: Authors' construction based on EIFBS 2020/21

4.2 Models of labour demand

Tuning to our multivariate results (

Table 2), log of issued capital is consistently positive and significantly correlated with total employment (labour demand) in all specifications. The log average wage per worker was insignificant in spec. 1 but took the expected negative sign and became significant when we controlled for fixed-since-founding characteristics (spec. 2), and its magnitude increased further in spec. 3 when we additionally controlled for behavioural and endogenous variables. In spec. 3, a 1% increase in the average wage is associated with a 0.06% decrease in employment. In the basic model (spec. 1), TFP is not significantly related to labour demand, but develops a significant negative relationship in latter models, whereby a one SD increase in TFP leads to 5.3% less labour demand in spec. 3.

As for the fixed-since-founding covariates, firm age shows a positive and significant relation with employment (spec. 2 only), suggesting the age-firm size relationship may be mediated by endogenous characteristics. Each additional year since firm founding increased employment by around 1.8% (spec. 2). There is no support for a quadratic relationship since the coefficient on the squared age variable is insignificant. There are no significant differences between public and private sector firms in labour demand.

Employment in sole proprietorship firms is significantly lower - by 62% compared to non-sole proprietorship firms (spec. 3).²⁰ Moreover, employment in firms located in industrial zones is 22% higher than their non-zone counterparts (spec. 3). Female owned firms show no significant differences in spec. 2, but significantly lower employment in spec. 3. Firms that were informal at establishment do not have significantly different overall labour demand. Our multivariate results support the descriptive findings for firm behaviour: firms that export, train workers, adopt technology, and invest in R&D exhibit significantly higher employment.

There are not significant differences in employment by good management practices or with a female manager. Employment increases significantly with the manager's education level. Industries with significantly higher employment relative to the reference category (food, beverages, and tobacco) include clothing; wood; paper and printing (in spec. 2 only); pharmaceuticals (in spec. 2 only); rubber and plastic (in spec. 2 only); other non-metallic minerals; electrical equipment; machinery and equipment (in spec. 2 only); and motor vehicles. Leather is the only industry with significantly lower employment compared to food in both models, although basic metals are significantly lower in spec. 2.

Table 2. OLS regression estimation of log of total employment in 2019

	Spec. 1	Spec. 2	Spec. 3
	b/se	b/se	b/se
Log of issued capital	0.290*** (0.010)	0.219*** (0.010)	0.134*** (0.010)
Log of average wage per worker	-0.017 (0.016)	-0.039** (0.014)	-0.063*** (0.012)
TFP (Cobb-Douglas in std. dev.)	0.002 (0.022)	-0.036* (0.018)	-0.053** (0.016)
Age of establishment (winsorized)		0.018*** (0.004)	0.008 (0.004)
Age of establishment squared		0.000 (0.000)	0.000 (0.000)
Private sector (Public omit.)			
Private		-0.034 (0.076)	-0.052 (0.069)
Sole proprietorship (no omit.)			

²⁰ This is calculated as the exponentiated coefficient, e.g., $\exp(-0.813)-1$ multiplied by 100.

	Spec. 1	Spec. 2	Spec. 3
Yes		-0.809*** (0.048)	-0.624*** (0.045)
Firm is in industrial zone (no omit.)			
Industrial zone		0.354*** (0.053)	0.224*** (0.048)
Females among owners (no omit.)			
Female among owners		0.023 (0.055)	-0.132* (0.058)
Exporter firm (no omit.)			
Exports			0.736*** (0.120)
Firm informal at establishment (no omit.)			
Yes			0.062 (0.042)
Providing training (no omit.)			
Training			0.175*** (0.041)
Use of technology (no omit.)			
Uses technology			0.479*** (0.054)
R&D (no omit.)			
R&D			0.568*** (0.067)
Good management practices (no omit.)			
Good management practices			0.061 (0.044)
Manager's education (below secondary omit.)			
Secondary			0.450*** (0.055)
Post-sec. or univ.			0.634*** (0.061)
Post-graduate			1.182*** (0.139)
Female manager (no omit.)			
Female man.			0.104 (0.065)
Industry (Food beverage & tobacco omit.)			
Textiles		0.022	0.096

	Spec. 1	Spec. 2	Spec. 3
		(0.077)	(0.071)
Clothing		0.753***	0.579***
		(0.066)	(0.063)
Leather		-0.203*	-0.202*
		(0.087)	(0.081)
Wood		0.518***	0.798***
		(0.112)	(0.137)
Paper & printing		0.262**	0.026
		(0.097)	(0.089)
Coke & refined petroleum		-0.338	-0.544
		(0.379)	(0.338)
Chemicals		0.204	-0.009
		(0.130)	(0.117)
Pharmaceuticals		0.683**	0.139
		(0.238)	(0.220)
Rubber & plastic		0.206*	0.131
		(0.098)	(0.089)
Other non-metallic minerals		0.723***	0.767***
		(0.085)	(0.081)
Basic metals		-0.341**	-0.038
		(0.124)	(0.133)
Fabricated metal		-0.026	-0.135
		(0.104)	(0.098)
Computers & electronics		0.499	-0.012
		(0.402)	(0.356)
Electrical equipment		0.640***	0.403***
		(0.136)	(0.122)
Machinery & equipment		0.564*	0.188
		(0.237)	(0.211)
Motor vehicles & other transport equipment		1.198***	0.929***
		(0.297)	(0.263)
Furniture		-0.025	-0.152
		(0.093)	(0.085)
Other manufacturing & repair		-0.022	-0.012
		(0.234)	(0.207)
Constant	-0.348*	0.545**	0.918***
	(0.167)	(0.195)	(0.185)
Governorate fixed effects	No	Yes	Yes

	Spec. 1	Spec. 2	Spec. 3
N(obs.)	2250	2262	2197
R-squared	.2944129	.5731867	.6637113
Adj. R-squared	0.293	0.566	0.656

Source: Authors' calculations based on EIFBS 2020/21

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Standard errors in parentheses.

5 Informal labour demand

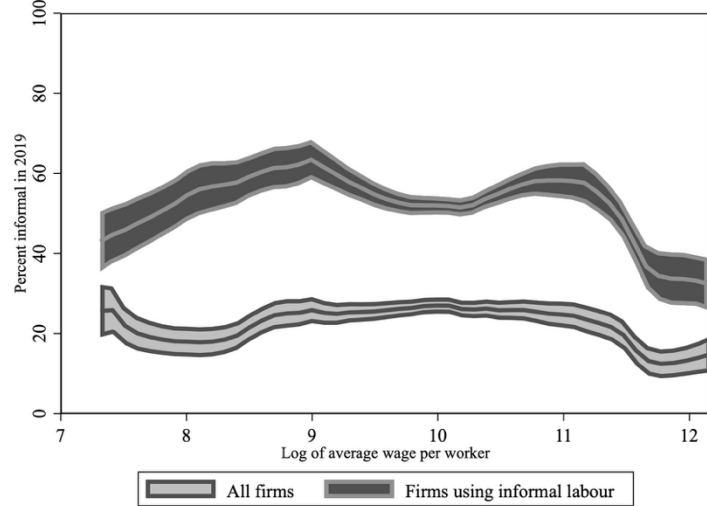
5.1 *Patterns of informal labour demand*

In what follows, we focus on informal labour demand within formal firms, measured as the percentage of employment that is informal. On average, just under a quarter of workers in formal firms are informal (23%), though the distribution is skewed: the median is 0%, and the 75th percentile 45%. Among firms employing informal workers, the average share rises to 55%, ranging from 33% at the 25th percentile to 78% at the 75th. Figure 4, panel a, shows a modest decline in informal employment as firm size increases, though confidence intervals widen beyond 50 workers, limiting precision.

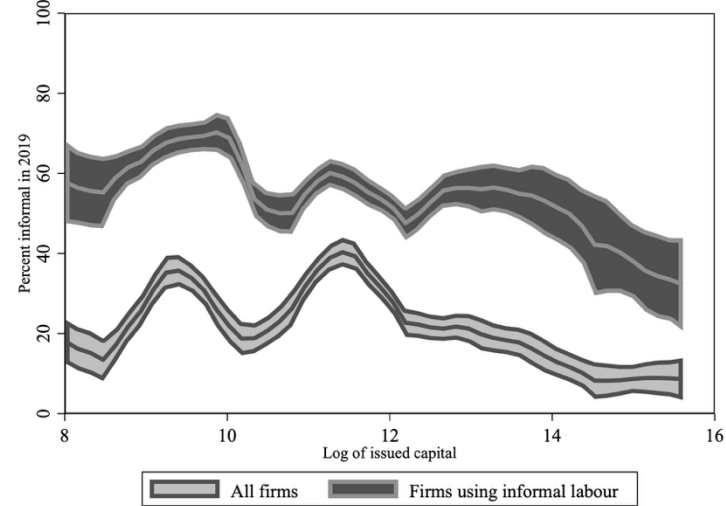
Figure 4. Percentage of workers informal (in 2019) by firm size, firm age, log annual average wage, log capital issued at founding, and standardized TFP, percentage of workers female, percentage of workers engaged in production, all formal firms and formal firms using informal labour



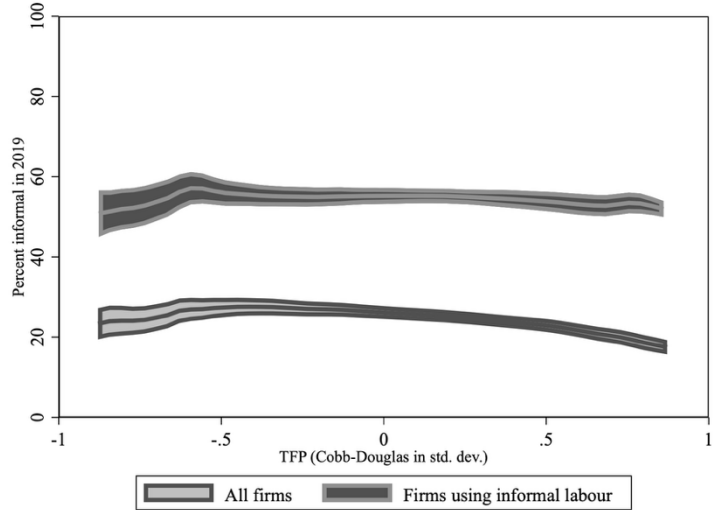
c. By log annual average wage



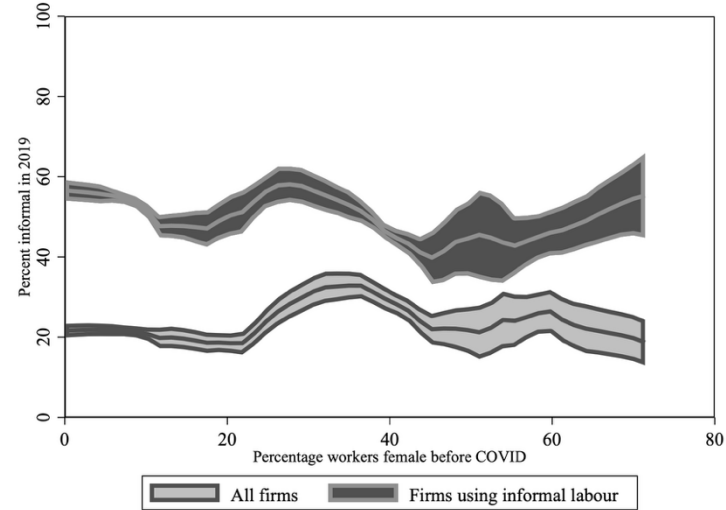
d. By log capital issued at founding



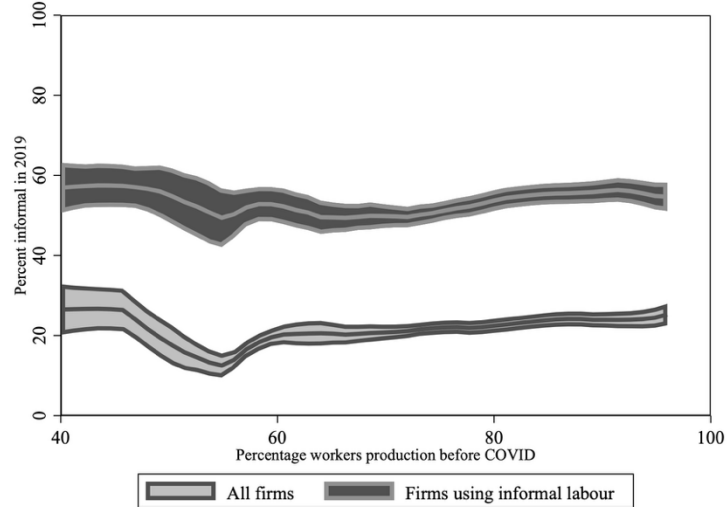
e. By standardized TFP



f. By percentage of workers female



g. By percentage of workers engaged in production



Source: Authors' construction based on EIFBS 2020/21

Notes: Grey shading represents 95% confidence interval. Visualizing through 95th percentile for number of workers with Epanechnikov kernel with bandwidth 25. Visualizing through 95th percentile for firm age with Epanechnikov kernel with bandwidth 5. Visualizing 5th through 95th percentile for TFP or log average wage per worker or log of issued capital with Epanechnikov kernel with bandwidth 0.3. TFP based on Cobb-Douglas production function. Visualizing 5th through 95th percentile for percentage female or production with Epanechnikov kernel with bandwidth 5. We do not show by part-time since few firms use part time workers.

Figure 4, panel b shows a slightly negative relationship between informal employment and firm age, with informality more common among younger firms. There is not a clear relationship between informality and average wage when considering all firms (Figure 4, panel c). Among firms that hire informal workers, the share of employment that is informal rises with wages at low levels, dips at mid-levels, rises again and eventually falls at the highest wage levels. There is thus not the expected relationship where low-wage firms are using informal workers; however, we have only average wages, and the mix of workers within firms could vary substantially (e.g., firms could have either a large number of moderately paid workers who are mostly formal or a bimodal distribution of highly paid formal workers and poorly paid informal workers). Figure 4, panel d shows that firms with more capital are generally less likely to use informal labour. Figure 4, panel e, shows that informality is flat or slightly increasing below average TFP, but then declines. Among firms using informal labour, the relationship is slightly weaker, suggesting that these firms tend to use a similar proportion of informal workers regardless of productivity. There is not a clear relationship between informality and the share of female workers (Figure 4, panel f). Figure 4, panel g shows that informality drops when the share of production workers increases from 40% to 60%, then stabilises.

Table 3 shows that the share of informal employment is highest in Upper Egypt (35% overall), followed by Lower Egypt (22%) and urban governorates (16%). While Upper Egypt has a higher overall average share, among firms employing informal labour, the intensity of use is similar across regions (53% - 59%). Thus, regional variation stems mainly from whether firms use informal labour at all (extensive margin), not how much they use it. Both public and private firms use informal labour, though private firms do so to a greater extent (24% of workers informal in private firms vs. 18% in public firms overall, 57% private vs. 36% public among firms using informal labour). Sole proprietorships are more likely to employ informal labour (27% of workers vs. 14% of workers for other structures) and at a higher intensity (58% of workers vs. 43% among firms using informal labour).

The proportion of employment that is informal is also lower in firms located in industrial zones (18% vs. 25% elsewhere), conducting R&D (9% vs. 25%), exporting (8% vs. 24%), practicing good management (15% vs. 28%), adopting technology (8% vs. 28%), providing training (18% vs. 30%), and in firms with more highly educated managers (e.g., 16% for post-graduates vs. 35% for less than secondary). No appreciable differences are observed by owner or manager sex.

Table 3. Percentage of workers informal (in 2019) by firm characteristics, all formal firms and formal firms using informal labour

	<u>Percentage of workers informal</u>		<u>N (Observations)</u>	
	<u>All firms</u>	<u>Firms using informal labour</u>	<u>All firms</u>	<u>Firms using informal labour</u>
Region				
Lower Egypt	21.5	54.5	1081	378
Upper Egypt	34.7	53.1	629	323

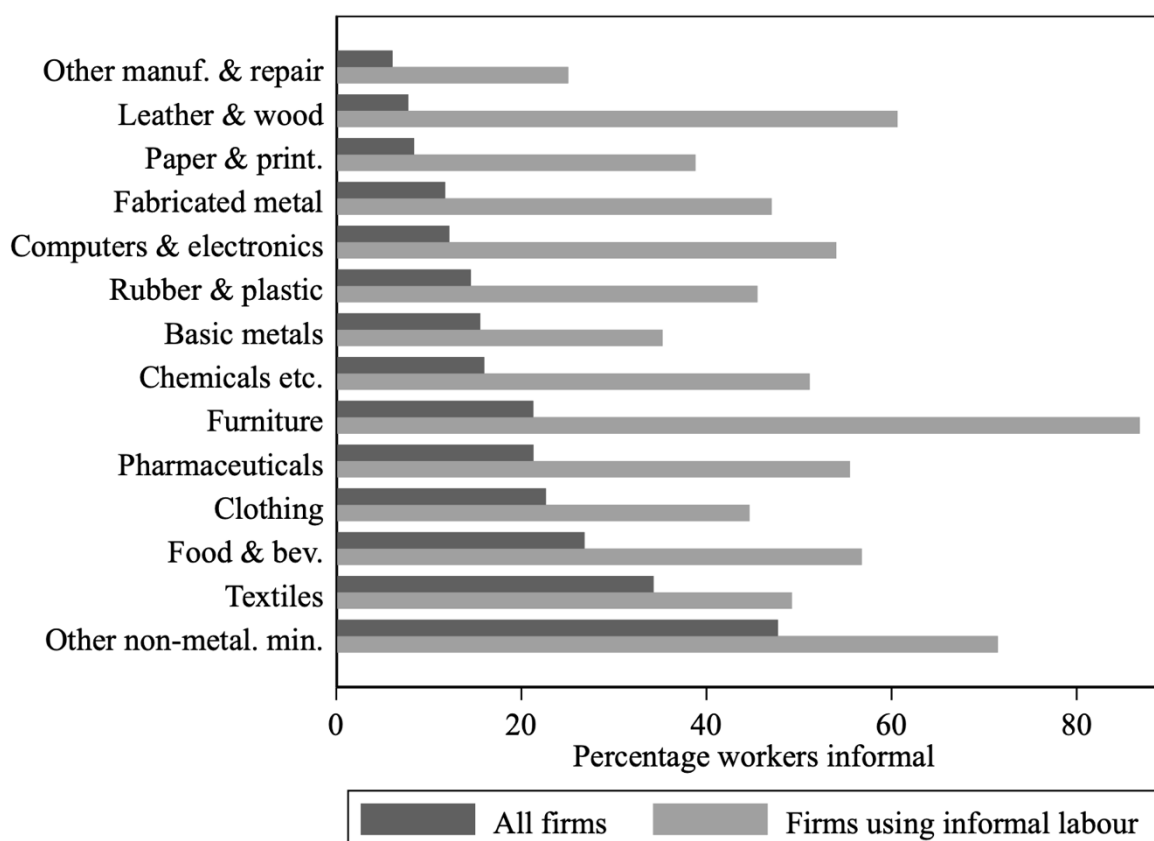
	<u>Percentage of workers</u>		<u>N (Observations)</u>	
	<u>informal</u>	<u>Firms using informal labour</u>	<u>All firms</u>	<u>Firms using informal labour</u>
	<u>All firms</u>		<u>All firms</u>	
Urban Govs.	15.9	59.4	622	154
Sector ownership				
Public	18.1	36.0	211	60
Private	23.8	56.9	2121	795
Sole proprietorship				
No	13.8	43.0	1486	422
Yes	27.4	58.3	846	433
Female among owners				
No female owners	23.4	55.8	1898	726
Female among owners	22.8	48.7	433	129
Location in an industrial zone				
Not ind. zone	25.1	55.9	1168	522
Industrial zone	18.2	50.7	1164	333
R and D undertaking				
No R&D	24.9	56.5	1683	694
R&D	8.7	30.0	648	161
Exporting status before Corona				
No exports	23.6	55.1	1698	697
Exports	8.2	32.9	627	156
Management good practices				
No good management practices	28.3	56.0	893	446
Good management practices	15.4	51.5	1438	409
Use of technology				
No technology	28.0	56.9	1229	589
Uses technology	7.8	38.0	1101	266
Providing training to workers				
No training	30.2	56.4	592	326
Training	18.1	52.9	1738	529
Ed. attain. top manager				
Below sec.	34.5	70.5	100	65
Secondary	27.7	59.8	539	270
Post-sec. or univ.	15.6	42.1	1557	488
Post-graduate	16.2	44.5	135	32

	<u>Percentage of workers informal</u>		<u>N (Observations)</u>	
	All firms	Firms using informal labour	All firms	Firms using informal labour
Female in top management				
No female man.	23.7	55.5	1853	738
Female man.	20.5	48.7	478	117
Total	23.3	54.8	2332	855

Source: Authors' construction based on EIFBS 2020/21

Firms' industrial sector also plays an important role in shaping the extent of employment informality (Figure 5). Traditional labour-intensive sectors such as textiles tend to hire informally (34%), along with clothing (23%) and food (27%). Pharmaceuticals also report a relatively high share of informal employment (21%) along with other non-metal minerals (48%).

Figure 5. Percentage of workers informal (in 2019) by industrial sector, all formal firms and formal firms using informal labour



Source: Authors' construction based on EIFBS 2020/21

Notes: Smaller sample sizes for industries among those using informal labour (N<30) for: Leather & wood (N=23); Pharmaceuticals (N=17); Basic metals (N=28); Fabricated metals (N=15); Computers and electronics (N=16); Furniture (N=8); Other manufacturing and repair (N=14).

5.2 *Models of informal labour demand*

The multivariate results (Table 4) show no significant relationship between the share of employment that is informal and firm size, capital, average wages per worker, TFP, or firm age. The odds of informal employment in the private sector are nearly three times that of the public sector (and statistically significant). Firms with a sole proprietorship ownership structure have significantly higher odds of informal employment than their counterparts. This may reflect the important role that a firm's institutional and legal structure plays in shaping its workforce formality.

Use of technology and manager education are significantly associated with lower informality, both of which may reflect the overall firm sophistication and its workforce. However, there is no significant relationship between informality and firm location in an industrial zone, female ownership or management, exporting, reinvesting and retaining behaviours (such as training, R&D, good management practices), or firm informality at founding. The share of part-time workers is the only labour composition variable significantly associated with informality; this may reflect weaker enforcement of social insurance laws for part-time workers who are not regularly present at the workplace, or because their monthly earnings fall below the minimum insurable monthly wage threshold (which is fixed regardless of working hours) used to calculate social security contributions (Selwaness & Barsoum, 2023).

Table 4. Fractional logit odds ratios for the share of informal employment in total employment in 2019, formal firms

	Spec. 1	Spec. 2	Spec. 3
Log of employment in 2019	0.883 (0.091)	0.812 (0.106)	0.994 (0.106)
Log of issued capital	0.954 (0.052)	0.974 (0.055)	1.051 (0.063)
Log of average wage per worker	0.972 (0.069)	0.913 (0.062)	0.935 (0.062)
TFP (Cobb-Douglas in std. dev.)	1.045 (0.080)	1.072 (0.080)	1.079 (0.078)
Age of establishment (winsorized)		0.989 (0.024)	1.007 (0.026)
Age of establishment squared		1.000 (0.000)	1.000 (0.000)
Private sector (public omit.)			
Private		2.928*	2.855**

	Spec. 1	Spec. 2	Spec. 3
		(1.289)	(1.159)
Sole proprietorship (No omit.)			
Yes		1.882***	1.816**
		(0.336)	(0.364)
Firm is in industrial zone (no omit.)			
Industrial zone		1.212	1.406
		(0.289)	(0.345)
Females among owners (no omit.)			
Female among owners		1.037	1.206
		(0.222)	(0.276)
Exporter firm (no omit.)			
Exports			0.844
			(0.160)
Providing training (no omit.)			
Training			0.847
			(0.278)
Use of technology (no omit.)			
Uses technology			0.474**
			(0.112)
R&D (no omit.)			
R&D			0.877
			(0.217)
Good management practices (no omit.)			
Good management practices			0.773
			(0.245)
Manager's education (preparatory and below omit.)			
Secondary			0.886
			(0.314)
Post-sec. or univ.			0.431*
			(0.155)
Post-graduate			0.376*
			(0.186)
Female manager (no omit.)			
Female man.			1.110
			(0.300)
Firm informal at establishment (no omit.)			
Yes			1.215
			(0.281)
Percentage workers female before COVID			0.998

	Spec. 1	Spec. 2	Spec. 3
Percentage workers production before COVID			(0.005) 0.993
Percentage workers part-time before COVID			(0.006) 1.019***
Industry effects	No	Yes	Yes
Governorate effects	No	Yes	Yes
N(obs.)	2203	2199	2195

Source: Authors' calculations based on EIFBS 2020/21

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Standard errors in parentheses.

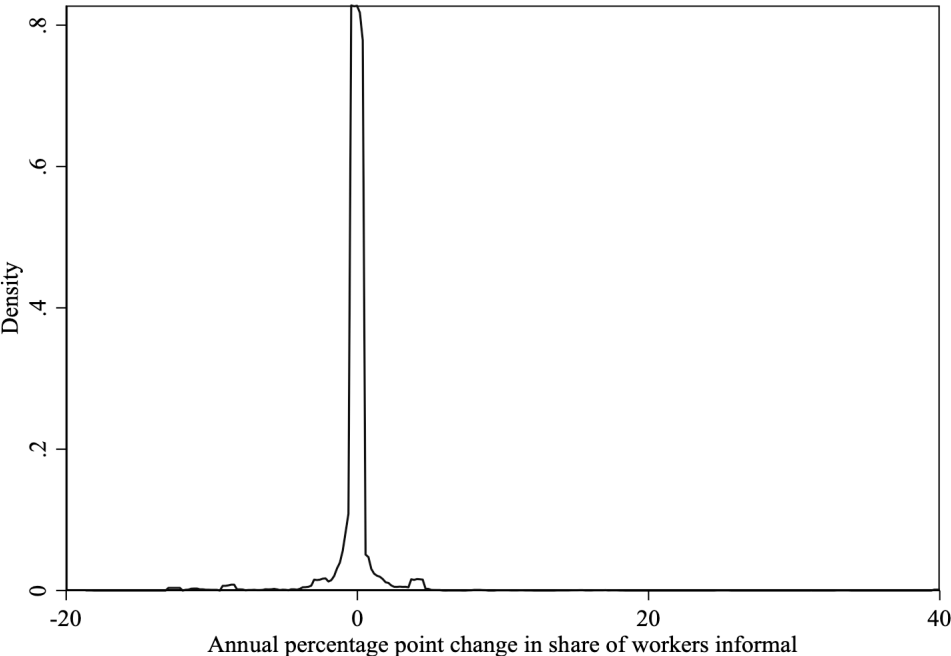
6 Evolution of informal labour demand over the firm life cycle

6.1 *Patterns of evolution in informal labour demand over the firm life cycle*

We now examine how informal labour demand evolves over the firm life cycle, focusing on firms that were formal in 2019. It is important to note that these patterns may reflect survivorship bias: since we observe only firms that survived to 2019, these results do not capture the dynamics of firms that existed earlier but did not survive. Overall, changes in informal labour demand over the lifecycle are negligible. On average, the share of informal employment declined by 2.1 percentage points (p.p.), from 25.4% at a firm's year of founding to 23.3% in 2019. On an annual basis, this amounts to an average decline of only 0.08 p.p.

Figure 6 shows the distribution of these annual changes. Most firms (73%) report no change in informality. At the tails, the 5th percentile experienced a decline of 1.5 p.p. per year in the share of workers informal, and the 95th percentile an increase of 1.1 p.p. per year.

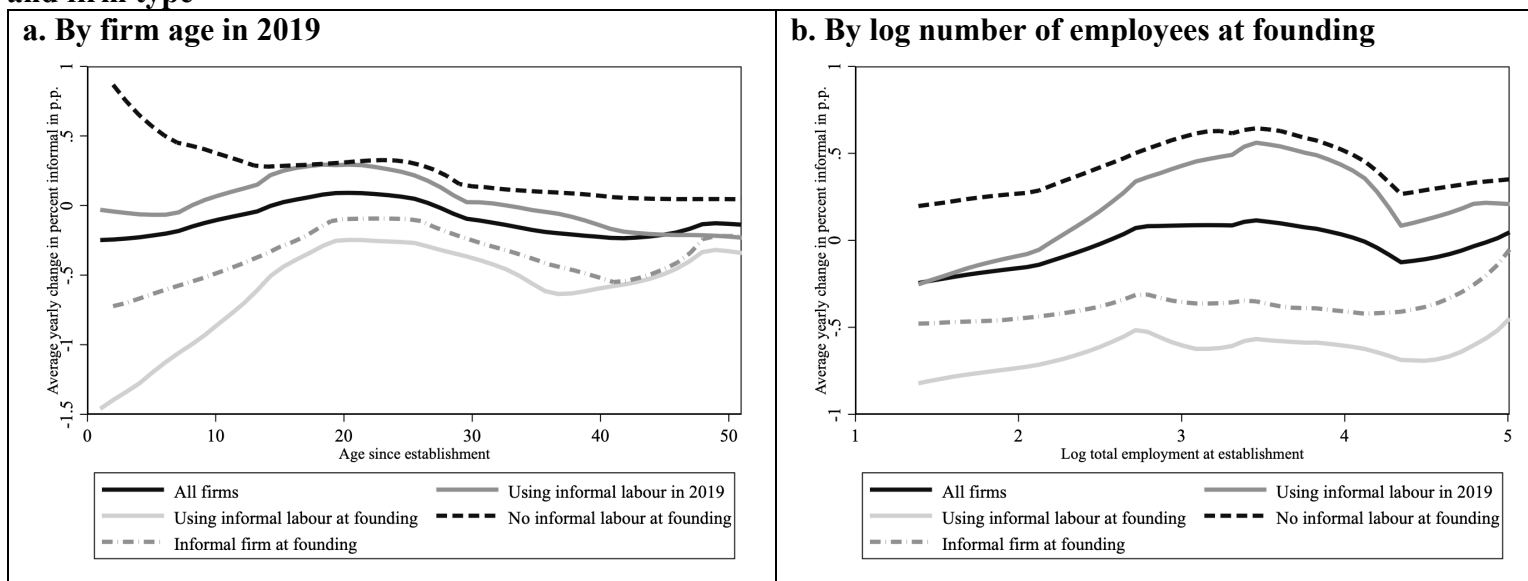
Figure 6. Distribution of annual percentage point change in share of workers informal

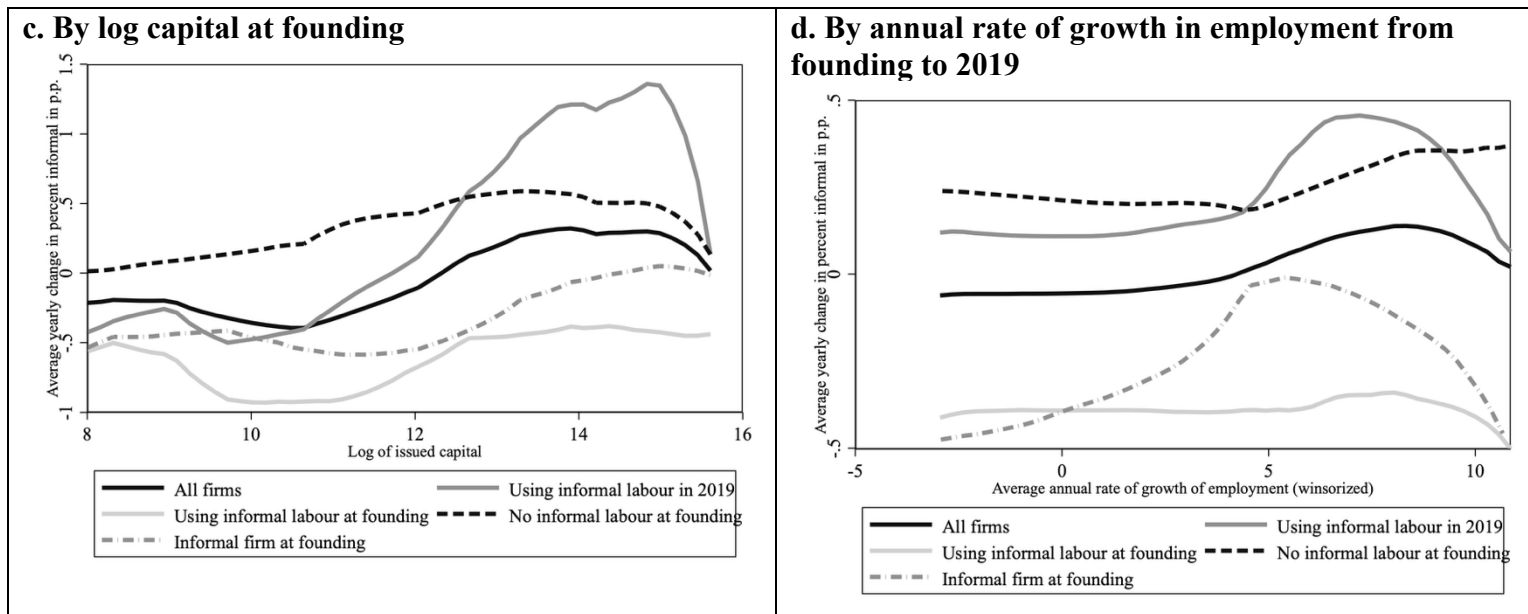


Source: Authors’ construction based on EIFBS 2020/21
Notes: Rectangular kernel with bandwidth 0.5.

Figure 7, panel a explores changes in informal employment by firm age and type (specifically whether firms started informal, started formal but without informal labour at founding, started formal but with informal labour, and whether using informal labour in 2019, as well as all firms – note only the first three are mutually exclusive). Among all formal firms (in 2019), younger and oldest firms tend to reduce informal labour slightly, while firms aged 20-30 years showed little change. Reductions are, as expected, most prominent in firms that were informal or used informal labour at founding, particularly among the youngest firms.

Figure 7. Annual percentage point change in share of workers informal ((% 2019 - % at founding)/age) by firm age in 2019, log number of employees at founding, log capital at founding, annual rate of growth in employment from founding to 2019, and firm type





Source: Authors' construction based on EIFBS 2020/21

Notes: Firm types are not mutually exclusive. Restricted to firms formal in 2019. Visualizing through 95th percentile for firm age with Epanechnikov kernel with bandwidth 5. Visualizing through 95th percentile for firm age with Epanechnikov kernel with bandwidth 0.5. Visualizing through 95th percentile for log capital with Epanechnikov kernel with bandwidth 0.8. Visualizing through 5th through 95th percentile for percentage change in firm size with Epanechnikov kernel with bandwidth 2.

Figure 7, panel b shows that smaller firms at founding were more likely to decrease their share of informal workers over time, but this decrease diminishes as founding size increases, levelling off for firms with about 15 workers at establishment, where the share of informal workers remains relatively unchanged. Figure 7, panel c shows that firms with less issued capital at founding tend to decrease their share of informal employment over time, while firms with more capital tend to increase their share of informal employment over time. There are complex relationships between employment growth and changes in informal employment (Figure 7, panel d). Firms that have shrunk or grown slightly have slightly reduced their informal employment, while those that have experienced moderate to rapid growth (5%-10%) have not reduced informal workers as much, instead increasing them slightly. This suggests that rapid expansion may in part rely on informal workers.

Table 5 explores annual changes in the share of informal workers by firm characteristics (those likely fixed at founding). We primarily discuss the results for all formal (in 2019) firms, but the table presents subsets of the dynamics. Firms in Upper Egypt reduced informal employment more than other regions (-0.5 percentage points per annum [p.p.p.a.]), compared to a slight increase of +0.1 p.p.p.a in Lower Egypt and no change in the Urban Governorates). Public sector firms and those outside industrial zones also experienced modest declines. Informality declined slightly more in firms with female owners and in those with non-sole proprietorship structures. By contrast, firms in industrial zones and sole proprietorships showed either no change or slight increases.

Table 5. Mean annual percentage point change in share of workers informal ((% currently - % at founding)/age) by firm characteristics and firm type

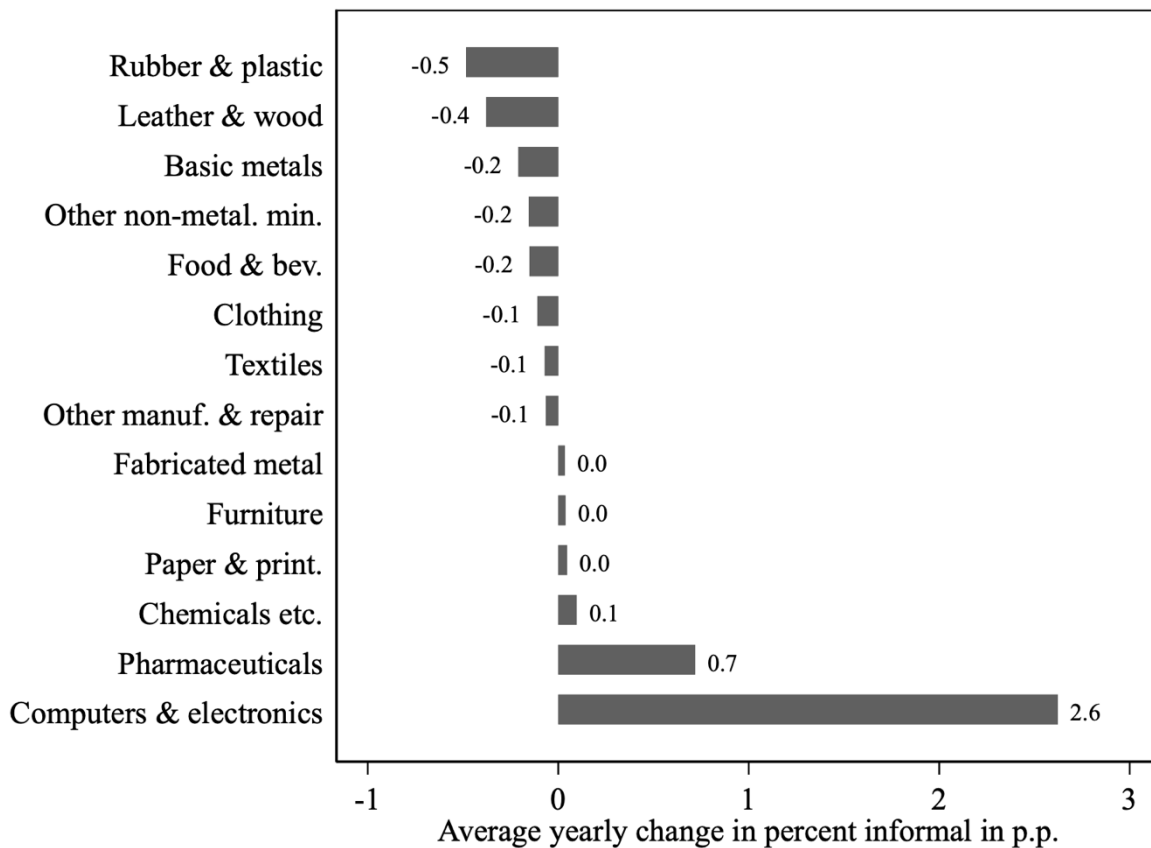
	<u>Mean annual percentage point change in share of workers informal</u>					<u>N (Observations)</u>				
	All firms	Firms with informal labour in 2019	Firms using informal labour at founding	Firms not using informal labour in founding	Formal firms in informal at founding	All firms	Firms with informal labour in 2019	Firms using informal labour at founding	Firms not using informal labour in founding	Formal firms in informal at founding
Region										
Lower Egypt	0.1	0.4	-0.6	0.5	-0.4	1081	378	330	750	338
Upper Egypt	-0.5	-0.3	-0.9	0.4	-1.8	629	323	291	331	99
Urban Govs.	0.0	0.1	-0.3	0.1	0.0	622	154	137	482	241
Sector ownership										
Public	-0.2	-0.3	-0.4	0.0	-0.1	211	60	52	155	53
Private	-0.1	0.1	-0.7	0.4	-0.4	2121	795	706	1408	625
Sole proprietorship										
No	-0.2	-0.4	-1.2	0.2	-0.1	1486	422	363	1117	411
Yes	0.0	0.2	-0.5	0.4	-0.5	846	433	395	446	267
Female among owners										
No female owners	0.0	0.3	-0.6	0.4	-0.5	1898	726	650	1238	529
Female among owners	-0.4	-0.8	-1.2	0.2	0.1	433	129	108	324	149
Location in an industrial zone										
Not ind. zone	-0.3	-0.3	-0.7	0.1	-0.5	1168	522	492	670	388
Industrial zone	0.5	1.7	-0.4	0.9	-0.1	1164	333	266	893	290
Total	-0.1	0.1	-0.7	0.3	-0.4	2332	855	758	1563	678

Source: Authors' construction based on EIFBS 2020/21

Notes: Firm types are not mutually exclusive.

Sectoral variation in informality dynamics over the life course is substantial (Figure 8). Only two sectors - pharmaceuticals (+0.7 p.p.p.a.) and computers and electronics (+2.6 p.p.p.a.) - have increased informal employment appreciably, both of which are relatively more sophisticated sectors. Fabricated metal, furniture, paper & print, and chemicals averaged small increases (0.0-0.1 p.p.p.a). All others have reduced informal employment to varying degrees. The rubber and plastics and leather and wood sectors show the largest declines (of 0.4–0.5 p.p.p.a.), while the remaining sectors report smaller reductions (of 0.1–0.2 p.p.p.a.).

Figure 8. Annual percentage point change in share of workers informal ((% currently - % at founding)/age) by industry



Source: Authors' construction based on EIFBS 2020/21

6.2 Models of evolution in informal labour demand over the firm life cycle

Our multivariate results (Table 6) indicate that there are no differences in the evolution of informal labour by founding size or firm age. Those firms with greater issued capital at founding significantly increase their use of informal workers over the life cycle. There are not significant differences between public and private sector firms. The firm's legal structure is however

significant: sole proprietorships show an increase of 0.5 p.p.p.a. in informal employment. By contrast, firms with female ownership exhibit a significant decline in informality, though only in specification 1. In addition, specification 2 reveals that faster-growing firms tend to reduce their reliance on informal labour slightly (by 0.02 p.p.p.a. per 1 p.p. increase in employment growth). Firms located in industrial zones experienced an annual increase in the share of informal employment from founding to 2019 of 0.9 percentage points per annum (p.p.p.a.) in specification 2 and 0.8 p.p.p.a. in specification 3 - an unexpected finding that merits further investigation.

Faster growing firms do use significantly more informal employment over time. As expected, formal firms that did not employ informal workers at founding show substantial increases in informal employment over time (0.7 p.p.p.a.); increases are unsurprising when starting from an initial level of zero. However, firms that transitioned from informal to formal status continue to exhibit relatively high levels of informal employment (an insignificant coefficient indicating no reduction).

Table 6. OLS regression estimation for the annual percentage change in share of workers informal ((% currently - % at founding)/age)

	Spec. 1	Spec. 2	Spec. 3
	b/se	b/se	b/se
Log total employment at establishment	-0.034 (0.053)	-0.030 (0.064)	-0.049 (0.065)
Log of issued capital	0.098*** (0.025)	0.082** (0.030)	0.080** (0.029)
Age of establishment (winsorized)		0.015 (0.012)	0.007 (0.013)
Age of establishment squared		-0.000 (0.000)	-0.000 (0.000)
Private sector (public omit.)			
Private		-0.017 (0.208)	0.099 (0.206)
Sole proprietorship (yes omit.)			
Yes		0.475*** (0.136)	0.503*** (0.138)
Firm is in industrial zone (no omit.)			
Industrial zone		0.882*** (0.144)	0.767*** (0.144)
Females among owners (no omit.)			
Female among owners		-0.336* (0.151)	-0.253 (0.150)

	Spec. 1	Spec. 2	Spec. 3
Average annual rate of growth of employment (winsorized)			-0.023* (0.011)
Type of firm (Formal using informal workers at founding omit.)			
Informal at founding			-0.135 (0.150)
Formal firms not using informal workers at founding			0.667*** (0.141)
Constant	-1.128*** (0.244)	-1.528*** (0.463)	-1.906*** (0.478)
Industry effects	No	Yes	Yes
Governorate effects	No	Yes	Yes
N(obs.)	2260	2259	2258
R-squared	.0085137	.0840443	.1043711
Adj. R-squared	0.008	0.068	0.087

Source: Authors' calculations based on EIFBS 2020/21

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Standard errors in parentheses.

7 Discussion and conclusions

Premature deindustrialisation has limited the potential of the manufacturing sector to contribute to economic development and decent job creation globally (Rodrik, 2016). This paper examined the determinants of labour demand and informal employment in Egypt's manufacturing sector, using novel firm-level data from the 2020/21 EIFBS. The analyses were grounded in a Cobb-Douglas production model and traditional labour demand framework (Hamermesh, 1996). Further specifications explored fixed at founding and behavioural characteristics.

Our findings show that labour demand is positively associated with capital, firm-level founding characteristics, and managerial behaviour, particularly innovation, management practices, and the educational attainment of top managers. As expected, higher average wages tend to be associated with lower employment. Firms in industrial zones, those that export, use technology, conduct R&D, or train workers, employ significantly more workers. It is important to keep in mind that our results are just associations and should not be interpreted causally. Omitted variable bias and reverse causality are likely. For instance, larger firms may choose to move into industrial zones (reverse causality) or firms with more educated managers may be producing more complex products that require more workers (complexity would be an omitted variable). Furthermore, although our results are representative of all firms with five or more workers (as of 2017), they do not generalize to microenterprises, which may have different behaviours and dynamics (El-Haddad & Zaki, 2025; Krafft, 2024; Krafft et al., 2024).

What are the implications of our findings for efforts to address Egypt's "jobless" economic growth and premature deindustrialization (Assaad et al., 2019b, 2020, 2022)? Other research has demonstrated that, despite trade liberalization, exporters are a small share of Egyptian firms and

firms have not appreciably increased employment (Berg et al., 2022). Better integration into GVCs is needed (Berg et al., 2022; El-Haddad, Forthcoming). Job creation is also depressed by non-competitive environments that favour politically connected firms (Chekir & Diwan, 2015; Schiffbauer et al., 2015). Reducing such favouritism and competitive barriers is important for fostering employment creation and labour demand.

Informality is widespread even among formal firms, accounting for nearly a quarter (23%) of total employment. It is more common in sole proprietorships, private sector firms, in firms with less educated managers, and firms employing part-time workers. Notably, the size, capital, productivity, and wages are not strong predictors of informality once other factors are controlled. We also examined the evolution of informal employment over the firm's life cycle. The analysis reveals limited progress in informalisation, with a negligible average annual decline in informal employment of just 0.08 percentage points. This suggests structural inertia or weak incentives to formalise employment. Even firms that transition from informal to formal status often continue to rely heavily on informal labour.

Taken together, the findings suggest that improving labour formality in Egypt's manufacturing sector requires intentional policy interventions. Egypt has recently undertaken reforms to its social insurance law in an effort to increase employment formality (Barsoum & Selwaness, 2022). Both firm-level and worker-level formality have been declining over time, with little of that change due to the structure of the economy (Assaad & Wahby, 2023; Krafft & Hannafi, 2023). Firms and workers need to find the benefits of formality exceed its costs (Krafft et al., 2024; Krafft & Hannafi, 2023). Simplifications of tax procedures and lowering tax rates for small firms can increase formality and employment (Fajnzylber et al., 2011). Increasing enforcement without changing the costs and benefits of formality can lead to job destruction rather than formalization (Krafft et al., 2024; Samaniego de la Parra & Fernández Bujanda, 2024). Wage incentives for workers or subsidies for firms can also help formalize workers (Abel et al., 2022; Asik et al., 2022). Future research is needed to better understand not just which and how many, but why some workers remain informal within formal firms, in order to design effective policy responses.

Acknowledgments

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