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## Do productivity gains translate into adequate wages? Firm-level evidence from Ethiopia (LIMMS, 2018-2020)

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# ► Do Productivity Gains Translate into Adequate Wages?

Firm-Level Evidence from Ethiopia (LIMMS, 2018–2020)

Author / Ding Xu





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## Abstract

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This paper examines the relationship between firm productivity, wage dynamics, and employment patterns in Ethiopia's manufacturing sector, using firm-level data from the Large and Medium Manufacturing and Electricity Industries Survey (LIMMS) for 2018–2020. In line with the objectives of the SAW-A project—which promotes adequate wages and sustainable livelihoods through improved wage-setting and social dialogue—the study explores how firm characteristics such as size, age, and ownership shape the translation of productivity gains into fair and decent remuneration for workers.

The study addresses two key research questions: (1) To what extent does productivity growth translate into wage increases in Ethiopia's manufacturing sector? (2) How do firm characteristics mediate this relationship, particularly in terms of employment expansion and wage inequality? Using regression analysis, the paper estimates firm-level wage-productivity elasticity, controlling for sectoral, regional, and firm-specific factors.

Findings reveal that a 1% increase in value added per worker leads to only a 0.2% rise in real wages, suggesting that only 20% of productivity gains are passed on to workers. Wage-productivity elasticity also varies significantly across subsectors, with industries such as beverages and textiles exhibiting stronger pass-through effects compared to food production. Additionally, the study highlights gender and regional wage disparities, with firms employing a higher share of female workers paying systematically lower wages and certain regions demonstrating high productivity but persistently low wages.

By situating the analysis within the broader effort to promote adequate and living wages under the SAW-A framework, the paper underscores the structural barriers that prevent productivity growth from translating into better living standards. Strengthening collective bargaining, improving wage-setting institutions, and promoting equitable distribution of productivity gains emerge as critical pathways for ensuring that industrial development in Ethiopia supports both enterprise sustainability and decent livelihoods.

## About the authors

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**Ding Xu** is an Economist at the International Labour Organization (ILO), INWORK Branch. His research examines wage policies, labour market dynamics, and the relationship between productivity, employment, and structural transformation. He focuses on the economic factors of minimum and living wage setting, analyzing firm behaviour and wage-productivity linkages, and examining how enterprises respond to wage policies in developing countries.

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## Executive Summary

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### Economic Situation

Ethiopia has faced considerable economic challenges in recent years, exacerbated by external shocks such as the COVID-19 pandemic, internal conflict, declining official development assistance, and climate-related events like droughts and floods. Real GDP growth peaked at 10% in 2016 but has slowed to approximately 6% since 2020. Despite this slowdown, Ethiopia's growth remained above the regional average for East Africa, with projections from the IMF suggesting recovery to above 6% in 2023, supported by prudent fiscal and monetary policies ([African Economic Outlook, 2023](#)).

The COVID-19 pandemic severely disrupted Ethiopia's industrial parks, with most firms reporting reduced sales and limited government support ([Mengistu, 2020](#)). Simultaneously, the conflict in northern Ethiopia has had a lasting impact on the manufacturing sector, particularly in the apparel industry. The closure of factories in Tigray and the suspension of Ethiopia's African Growth and Opportunity Act<sup>1</sup> (AGOA) privileges resulted in significant job losses, notably in Hawassa Industrial Park, which at its peak employed over 35,000 workers ([IndustriALL Global Union, 2022](#)).

To address structural and economic challenges, the government has introduced reforms such as the Ten-Year Perspective Development Plan (2021–2030) and the Homegrown Economic Reform Agenda (HGER). These initiatives aim to transition the economy from public- to private-sector-led growth while enhancing productivity and competitiveness. However, Ethiopia's industrial transformation remains slow, with significant state ownership, a nascent private sector, and an underdeveloped export base.

### Productivity and Wage Challenges

Ethiopia's labour productivity is among the lowest in Eastern Africa, contributing to significant food insecurity and economic vulnerability. Productivity levels in agriculture, which dominates employment, are notably low, while industrial productivity is less than half of that in neighboring countries like Uganda and Kenya. Most industrial jobs are concentrated in large firms, with small domestic firms struggling due to limited access to finance and an unfavorable business climate. Additionally, foreign-owned and publicly owned firms exhibit higher productivity than small domestic private firms, further widening the productivity gap ([Oya, 2019](#)).

Efforts to accelerate industrialization and urbanization in Ethiopia must address not only firm-level productivity but also the conditions that influence wage outcomes and labour supply. Low wages, limited training, and poor working conditions hinder the ability of industrial firms to attract and retain skilled workers—ultimately constraining productivity growth. As noted by the [World Bank \(2019\)](#), investments in improved wages, skills development, and decent work conditions—alongside complementary policies for housing and urban services—are essential to building a sustainable industrial workforce and ensuring productivity gains translate into meaningful improvements in workers' livelihoods.

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<sup>1</sup> On January 1, 2022, the United States suspended Ethiopia's participation in AGOA, citing "gross violations of internationally recognized human rights" amid the conflict in the Tigray region.

This paper examines firm-level dynamics in Ethiopia's manufacturing sector, focusing on employment, wages, productivity, and other firm characteristics. In this paper, we measure productivity using two metrics: **output<sup>2</sup> per worker** and **value added per worker**. Output per worker is defined as total sales divided by the number of workers employed, reflecting the revenue generated per worker. Value added per worker is calculated as total sales minus the cost of intermediate inputs (including services and input costs, adjusted for inventory changes) divided by the number of workers employed. While output per worker emphasizes revenue generation, value added per worker captures the net value created by labour after accounting for input costs, providing a clearer measure of workers' productivity contribution to the production process. Using descriptive data and regression analysis, the study examines the relationship between wage and labour productivity, providing insights into the connections between firm performance and worker outcomes in Ethiopia's evolving economic landscape.

The paper is structured into three chapters and nine sections. Chapter 1 (Section 2) provides a literature review of empirical theories on firm employment and productivity. Chapter 2 (Section 3) provides a brief overview of the LIMMS data and sets out the regression method. In Chapter 3, Section 4 discusses where wage formal wage workers work in terms of firm characteristics such as size and age. In Section 5 and 6, we look at which type of firm employ more workers, operate more productive, and pay higher wages. Section 7 focuses on the dynamics between wage growth and productivity growth and how productivity gain is shared among workers. Section 8 provide regression results. Conclusions and policy implications are discussed in section 9.

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<sup>2</sup> Output can refer to either total sales or total production. In this analysis, we prioritize total sales as it more directly reflects revenue generation and firm profitability.

## ► Introduction

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### Economic Situation

Ethiopia has faced considerable economic challenges in recent years, exacerbated by external shocks such as the COVID-19 pandemic, internal conflict, declining official development assistance, and climate-related events like droughts and floods. Real GDP growth peaked at 10% in 2016 but has slowed to approximately 6% since 2020. Despite this slowdown, Ethiopia's growth remained above the regional average for East Africa, with projections from the IMF suggesting recovery to above 6% in 2023, supported by prudent fiscal and monetary policies ([African Economic Outlook, 2023](#)).

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To address structural and economic challenges, the government has introduced reforms such as the Ten-Year Perspective Development Plan (2021–2030) and the Homegrown Economic Reform Agenda (HGER). These initiatives aim to transition the economy from public- to private-sector-led growth while enhancing productivity and competitiveness. However, Ethiopia's industrial transformation remains slow, with significant state ownership, a nascent private sector, and an underdeveloped export base.

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Efforts to accelerate industrialization and urbanization in Ethiopia must address not only firm-level productivity but also the conditions that influence wage outcomes and labour supply. Low wages, limited training, and poor working conditions hinder the ability of industrial firms to attract and retain skilled workers—ultimately constraining productivity growth. As noted by the [World Bank \(2019\)](#), investments in improved wages, skills development, and decent work conditions—alongside complementary policies for housing and urban services—are essential to building a sustainable industrial workforce and ensuring productivity gains translate into meaningful improvements in workers' livelihoods.

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<sup>3</sup> On January 1, 2022, the United States suspended Ethiopia's participation in AGOA, citing "gross violations of internationally recognized human rights" amid the conflict in the Tigray region.

This paper examines firm-level dynamics in Ethiopia's manufacturing sector, focusing on employment, wages, productivity, and other firm characteristics. In this paper, we measure productivity using two metrics: **output<sup>4</sup> per worker** and **value added per worker**. Output per worker is defined as total sales divided by the number of workers employed, reflecting the revenue generated per worker. Value added per worker is calculated as total sales minus the cost of intermediate inputs (including services and input costs, adjusted for inventory changes) divided by the number of workers employed. While output per worker emphasizes revenue generation, value added per worker captures the net value created by labour after accounting for input costs, providing a clearer measure of workers' productivity contribution to the production process. Using descriptive data and regression analysis, the study examines the relationship between wage and labour productivity, providing insights into the connections between firm performance and worker outcomes in Ethiopia's evolving economic landscape.

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<sup>4</sup> Output can refer to either total sales or total production. In this analysis, we prioritize total sales as it more directly reflects revenue generation and firm profitability.

## ► 1 Literature Review

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The relationship between firm productivity and wages has been widely studied, particularly in OECD countries, yet evidence from developing economies remains limited. In these contexts, labour market institutions, firm characteristics, and structural factors often diverge, leading to unique dynamics in the productivity-wage relationship. This section reviews the existing literature, focusing on four key theoretical questions relevant to Ethiopia's manufacturing sector.

### 1. Are Large Firms<sup>5</sup> Major Employers?

Empirical evidence suggests that large firms generally employ more workers, though their contributions to net job creation vary. [Davis, Haltiwanger, and Schuh \(1996\)](#) highlight that while large firms account for a significant share of employment, small and young firms often play a disproportionate role in job creation due to their dynamism. Similarly, [McMillan et al. \(2014\)](#) emphasize the critical role of manufacturing, particularly large firms, in structural transformation and poverty reduction in Sub-Saharan Africa.

In the Ethiopian context, [Page and Tarp \(2018\)](#) argue that large manufacturing firms are central to employment growth and wage increases, aligning with broader trends observed in African manufacturing. In the meantime, higher entry-exit rates among small firms undermine their ability to contribute sustainably to net job creation ([Shiferaw, 2017](#)).

### 2. Do Large Firms Exhibit Higher Labour Productivity?

The evidence on whether large firms are consistently more productive than small firms is mixed. [McMillan and Zeufack \(2019\)](#) find that large firms in Sub-Saharan Africa exhibit robust labour productivity growth, but these gains often come with capital-intensive approaches, limiting proportional employment growth. Conversely, [Haltiwanger et al. \(2016\)](#) note that young, fast-growing firms can achieve high productivity growth, even if they are not large. This heterogeneity within firm size categories highlights that large firms are not always the most productive, particularly when comparing domestic and foreign-owned enterprises [Waldkirch \(2015\)](#).

In Ethiopia, [McCullough \(2015\)](#) find that productivity disparities across firm sizes contribute to wage and employment gaps. Larger firms benefit from economies of scale, better access to finance, and capital-intensive technologies, driving higher productivity compared to smaller enterprises.

### 3. Do Large Firms Pay Higher Wages?

Evidence consistently shows that large firms tend to pay higher wages than smaller firms. [Reed and Tran \(2020\)](#) document a significant wage premium in developing economies, often attributed to human capital sorting<sup>6</sup> and industry characteristics. Similarly, [Brown, Deardorff, and Stern](#)

<sup>5</sup> Large firms are defined differently depending on the context, often based on employees, revenue, or assets. Here, we use the World Bank's Enterprise Surveys classification for developing countries: small firms (5–19 employees), medium firms (20–99 employees), and large firms (100+ employees).

<sup>6</sup> Human capital sorting refers to the process by which individuals with different levels of skills, education, and experience (collectively referred to as "human capital") sort themselves into different jobs, firms, industries, or geographic locations based on their attributes and the demands of employers.

(2001) highlight that foreign-owned and export-oriented firms—typically larger—offer better wages and working conditions in developing nations.

In Ethiopia, these patterns hold true, with large firms offering higher wages, particularly in sectors like manufacturing and apparel. This wage premium reflects both higher productivity and the firm's ability to attract skilled labour. Nonetheless, disparities remain, as smaller firms struggle to match the wage standards set by larger or foreign-owned competitors.

#### 4. Do Productive Firms Pay Higher Wages?

As the [OECD \(2019\)](#) explains, unit labour costs—calculated as wages per hours worked relative to productivity—serve as a key indicator of competitiveness. When wage hikes are accompanied by stronger productivity gains, unit labour costs remain stable or decline, thereby maintaining firms' competitive edge, particularly in export-oriented sectors. [Foster et al. \(2001\)](#) further show that industry-wide productivity gains are driven by the reallocation of resources toward more efficient firms, benefiting wages over time.

In Ethiopia, [Oya \(2019\)](#) observes that foreign-owned and publicly owned firms tend to exhibit higher productivity and pay correspondingly higher wages. This aligns with global evidence from [Brown et al. \(2001\)](#), who find that multinational firms are often at the forefront of linking productivity with wage increases in developing countries.

Regarding the strength of the wage–productivity link, evidence from developed economies shows that elasticity has declined over time, though it remains moderate. [Stansbury and Summers \(2017\)](#) report elasticities in the range of 0.4 to 0.7 in the U.S., depending on the wage measure used (average, median, or production/non-supervisory wages). In contrast, available evidence for developing countries suggests significantly lower elasticities—typically between 0.1 and 0.3, meaning that a smaller share of productivity gains is passed on to workers. Although studies in this area are limited, examples include [Bhattacharya et al. \(2011\)](#) for India (which focuses on the reverse relationship), [Wakeford \(2004\)](#) for South Africa, and [Katovich and Maia \(2018\)](#) for Brazil.

Literature consistently points to a strong association between firm size, productivity, and wages, with larger and more productive firms playing an outsized role in shaping employment and wage patterns. However, the mechanisms underlying these dynamics remain underexplored in the context of Ethiopia's manufacturing sector. The remainder of this section addresses this gap through an empirical investigation of firm-level data, guided by four key research questions.

## ► 2 Data and Methods

### Data summary

This paper utilizes establishment-level panel data from Ethiopia's manufacturing sector for the period 2018–2020 to analyze firm-level wage and productivity dynamics. The data are sourced from the annual Large and Medium Scale Manufacturing and Electricity Industries Survey (LIMMS), conducted by Ethiopia's Central Statistical Authority (CSA).

► **Table 1. Key summary statistics**

	2018	2019	2020
Total number of workers	228882	232659	213357
Total number of firms	2416	2864	2949
Mean number of workers per firm	94.7	81.2	72.3
Median number of workers per firm	21	18	16
Mean firm age	13.2	8.2 <sup>1</sup>	10.4
Mean output per worker (Birr'000)	663.6	644.4	552.6
Median output per worker (Birr'000)	266.5	262.5	218.9
Mean value added per worker (Birr'000)	236.9	255.9	218.6
Median value added per worker (Birr'000)	76.1	69.3	56.4
Mean monthly wage	2979.8	2927.4	2895.8
Median monthly wage	1508.2	1653.7	1682.3

<sup>1</sup> After imputing 2019 firm age with 2020 data in the panel, 635 out of 2864 observations still lack this variable.

Source: LIMMS 2018-20 (own calculations).

Table 1 above highlights the key summary statistics – variable definitions are provided in the data appendix, and complete summary of statistics are in appendix Table A1. The LIMMS panel covers both production and non-production worker<sup>7</sup> in both public and private formal enterprises in all regions<sup>8</sup> of the country. From 2018 to 2020, the total number of workers varied between 210 and 230 thousand. The number of firms increased from 2400 in 2018 to almost 3000 in 2020. The average number of workers per firm dropped from 95 in 2018 to 72 in 2020. Half of the firms in our data employ 20 or fewer employees, emphasizing the large number of small formal firms in terms of the employment size present in the data. The average firm age declines from 13.2 years in 2018 to 10.4 years in 2020. This shift may indicate increased entry by new firms and the exit of older ones. Average output per worker is on a downward trend from 2018 to 2020. Average value added per worker increased in 2019, but then decreased in 2020, showing a sign of a possible Covid-19 impact on the manufacturing firms in aggregate productivity. A list of key

<sup>7</sup> Production workers are directly involved in creating, assembling, or transforming goods, while non-production workers support or manage production through administrative, managerial, or service roles.

<sup>8</sup> Tigray is excluded in the survey since 2019



variables including their means and standard deviations over the 2018 to 2020 period is provided in Table A1 in the data appendix.

## Missing Data

The LIMMS 2021 dataset was excluded due to extensive missing data on firm wage bills. Additionally, LIMMS 2018 uses a different firm identifier than LIMMS 2019 and 2020, making it impossible to link firms across these years. As a result, we constructed a panel dataset consisting of 2152 firms for the period 2019–2020. However, in 2019, nearly half of the firms did not report their starting year. After imputing 2019 firm age using 2020 data for firms in the panel, over 20% of firms in LIMMS 2019 still lack reported age information. This could lead to biased estimates if the missing data on firm age is non-random—for instance, if newer firms are less likely to report their operational start year. Tables 2 and 3 below present the number of firms that do not report firm age after imputation, both in the total dataset and within the panel data.

► **Table 2. Number of Firms that do not report starting year of operation**

Year	Yes	No	Total
2018	2407	6	2416
2019	2229	635	2864
2020	2680	269	2949
Total	7316	913	8229

► **Table 3. Number of Firms that do not report starting year of operation in the panel**

Panel	Yes	No	Total
2019-20	1975	177	2152

## Outliers

We excluded extreme outliers for output per worker and value added per worker, defined as log ratios greater than 16 or less than -16<sup>9</sup>, and a total of 196 firms were excluded across the three years. Additionally, firms without employment or production data were removed from the analysis.

## Regression Method

The multivariate analysis in the regression analysis enables us to deepen our understanding of productivity dynamics. The default model is a random effects model, which assumes that the specific individual effects are uncorrelated with the independent variables and capitalize on the

<sup>9</sup> In log terms, values beyond  $\pm 16$  are implausibly large and can distort regression estimates, bias summary statistics, and inflate standard errors.

data. All specifications control for 2-digit sector, location and year. Standard errors are clustered by size, location and sector and therefore suppose correlation within clusters, but not between<sup>10</sup>.

$$[1] \quad Y_{\{i|st\}} = \beta^0 + \beta^1 \ln(Productivity_{\{i|st\}}) + \beta^2 S_{\{i|st\}} + \beta^3 A_{\{i|st\}} + \beta^4 F_{\{i|st\}} + \varepsilon_{\{i|st\}}$$

The basic specification is expressed in equation 1, where Y is logged real wages, i identifies the firm, l the location, s the sector and t the year. S is a vector of size category dummies, A is a vector of age category dummies, F is ownership (a firm is identified as a foreign firm if 10 percent of shares or more are foreign owned).

[2]

$$Y_{\{i|st\}} = \beta^0 + \beta^1 \ln(Productivity_{\{i|st\}}) + \sum_{\{j\} \in \beta_{Qj}} \beta_{Qj} Sector_{\{j\}} + \sum_{\{j\} \in \beta_{Pj}} \beta_{Pj} (Productivity_{\{i|st\}} \times Sector_{\{j\}}) + \beta^4 S_{\{i|st\}} + \beta^5 A_{\{i|st\}} + \beta^6 F_{\{i|st\}} + \varepsilon_{\{i|st\}}$$

In order to pick up wage productivity elasticity for each of the 2-digit sectors, we in equation 2, add interaction terms between productivity and sector dummies, allowing the wage-productivity relationship to vary by sector, where j identifies 2-digit sector. Additional independent variables included female worker share, trade orientation, export status, productivity, capital intensity<sup>11</sup> and measures of labour and output market concentration.

To account for firm-level factors beyond sectoral differences, we address the correlation between firm size and age by grouping firms into meaningful categories, following the approach of [Haltiwanger, Jarmin, and Miranda \(2013\)](#). This method mitigates multicollinearity and captures non-linear effects, allowing for clearer interpretation of their independent impacts. Details on size and age classifications are provided in the data appendix.

<sup>10</sup> Six size categories, seven sectors, and 11 regions

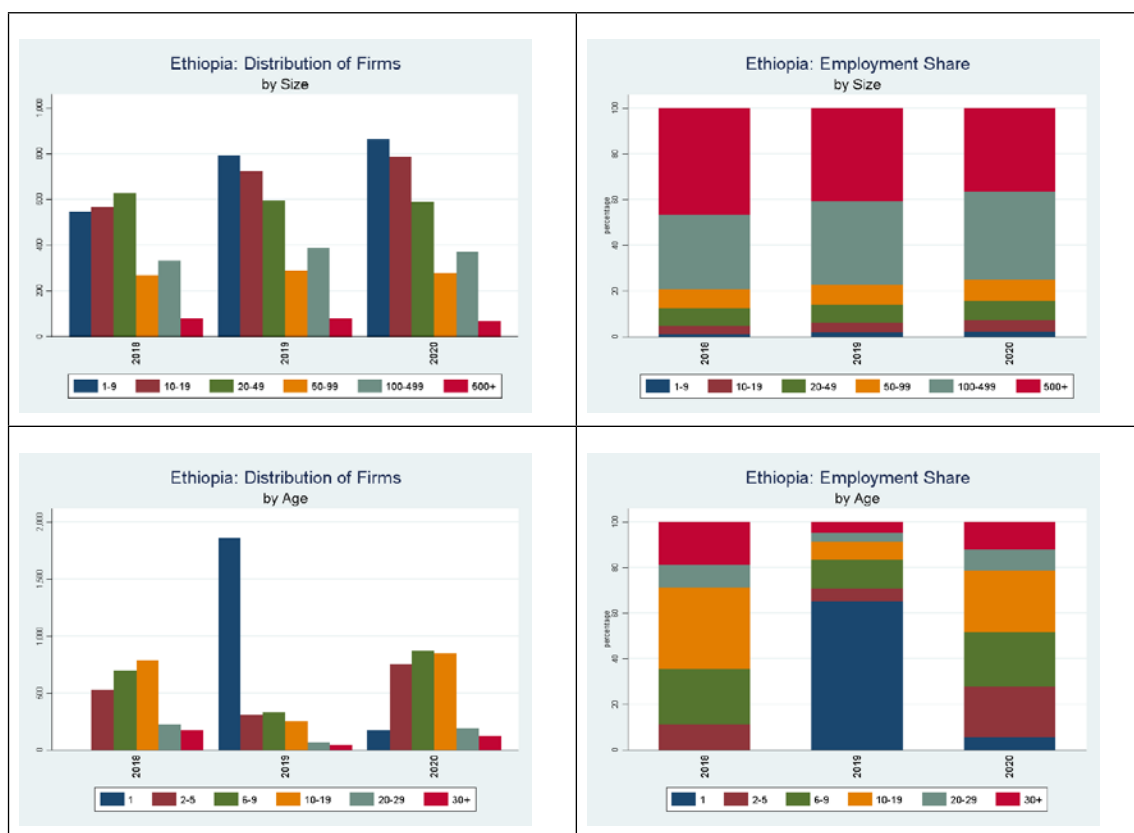
<sup>11</sup> A firm is classified as capital-intensive if its capital-to-labour ratio is greater than or equal to the median capital intensity for its sector and year or its sector-wide median (if sector-year data is insufficient <20), otherwise a firm is classified as labour-intensive if its capital-to-labour ratio falls below these medians.

## ► 3 Empirical Findings of the Study

### Employment Patterns of Formal Wage Workers

It is important to note that due to the limited time span of available data, the analysis does not aim to establish long-term trends. Rather, it reflects short-term fluctuations between specific survey years. Any reference to “growth” or “decline” should be interpreted in this context.

► Figure 1. Number and share of employment by firm size and age, 2018-20



Source: Author's own calculation based on LIMMS data.

In Figure 1, firms with over 100 employees dominate the labour market, employing nearly 80% of wage workers. Between 2018 and 2020, there were year-to-year shifts, with SME entry and some large firm exits reducing the share of workers in firms with 500+ employees. This job loss highlights the labour market's dependence on large firms, whose contractions can significantly affect aggregate employment.

Most manufacturing firms have been operational for over a decade. Between 2018<sup>12</sup> and 2020, however, there was a modest increase in firms aged 2–9 years, indicating some resilience and

<sup>12</sup> In the 2019 LIMMS data, even after imputation, over 20% of firms (635 out of 2,864) still lack information on their commencement date of operation, we assign them as firm age = 1.

entry among younger firms despite economic disruptions. These firms likely faced pressure from the COVID-19 pandemic and internal conflicts. In contrast, more established firms (10+ years) remained relatively stable or grew slightly, reflecting greater adaptability.

To better understand employment dynamics, we examine the characteristics of firms that entered or exited the market between 2018 and 2020. Figures 2 and 3 illustrate these patterns. It is important to note that the Tigray region is excluded from these two figures due to the outbreak of conflict beginning in 2019<sup>13</sup>.

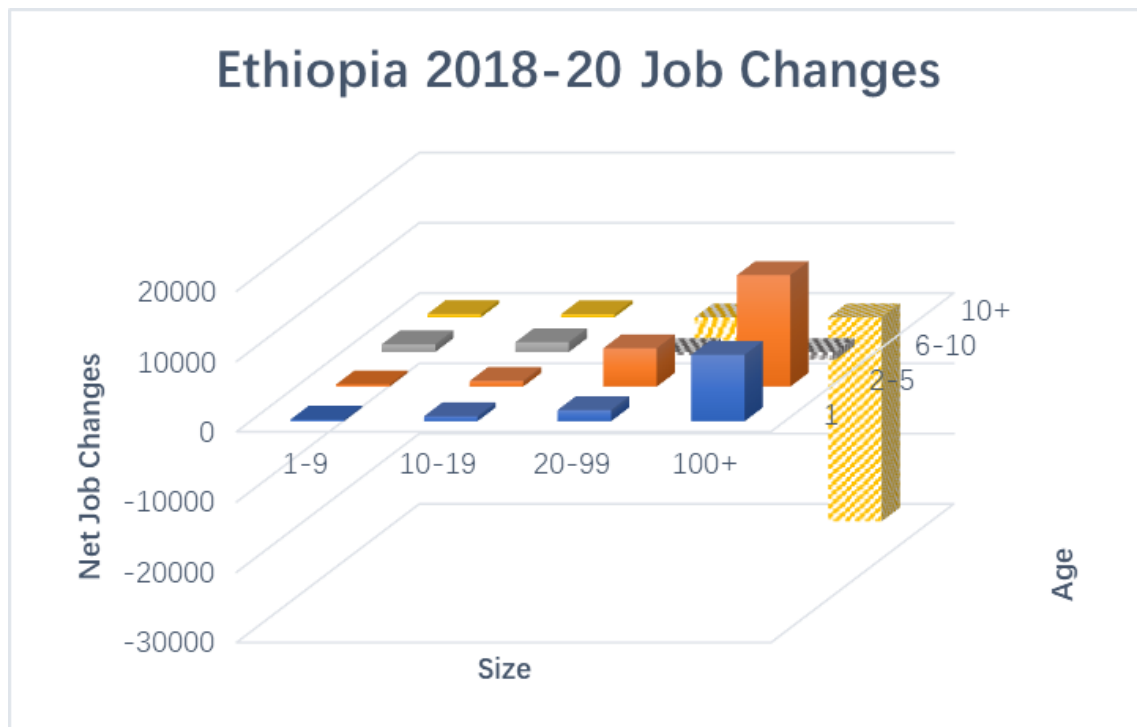
► **Figure 2. Firm changes nationwide (exclude Tigray region), by size and age, 2018-20**



Source: Author's own calculation based on LIMMS data.

<sup>13</sup> Tigray in 2018 accounted for 198 manufacturing firms employing around 20,000 workers, with just 22 large firms responsible for 80% of the region's wage-employed manufacturing workforce.

► Figure 3. Job changes nationwide (exclude Tigray region), by size and age, 2018-20



Source: Author's own calculation based on LIMMS data.

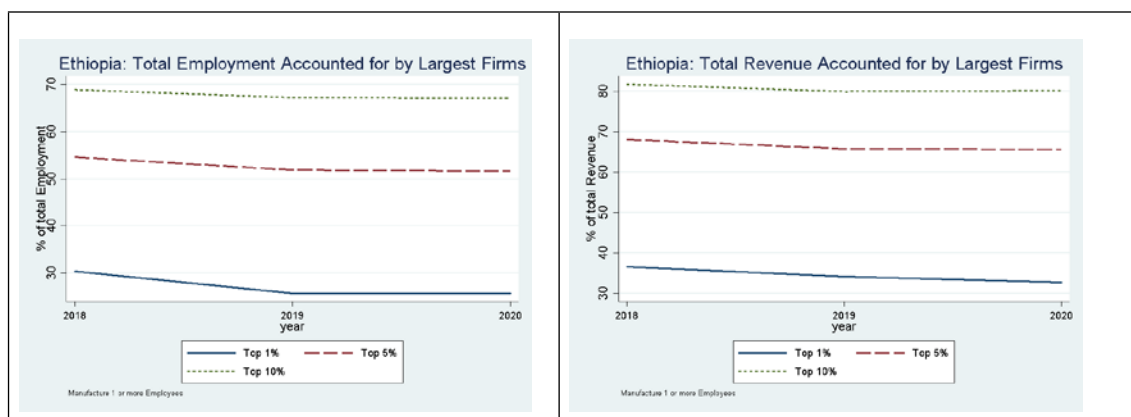
Between 2018 and 2020, manufacturing jobs in Ethiopia increased by more than 4000, representing an 2% decrease. Despite the small increment in jobs, the total number of manufacturing firms increased by over 700 during the same period—a 33% growth—driven largely by SMEs.

Although firm data from the Tigray region is excluded, Figure 3 reveals that most job losses occurred in large firms—defined as those with more than 100 employees and over a decade of operational history. In contrast, SMEs in the manufacturing sector have shown resilience by absorbing some of the job losses from larger firms. However, their limited ability to scale constrains their capacity to generate substantial employment or drive broader industrial development.

## What Type of Firms Employ More Workers?

In Ethiopia, while new SMEs demonstrate resilience, they often struggle to scale operations or create substantial employment over time. As in many low-income countries, sales, employment, and value added are highly concentrated in a few large, capital-intensive firms. Given their critical role in driving employment and productivity, this analysis focuses on large firms to better understand their impact on Ethiopia's manufacturing sector.

► **Figure 4. Firm market concentration by employment and sales revenue, 2018-20**



Source: Author's own calculation based on LIMMS data.

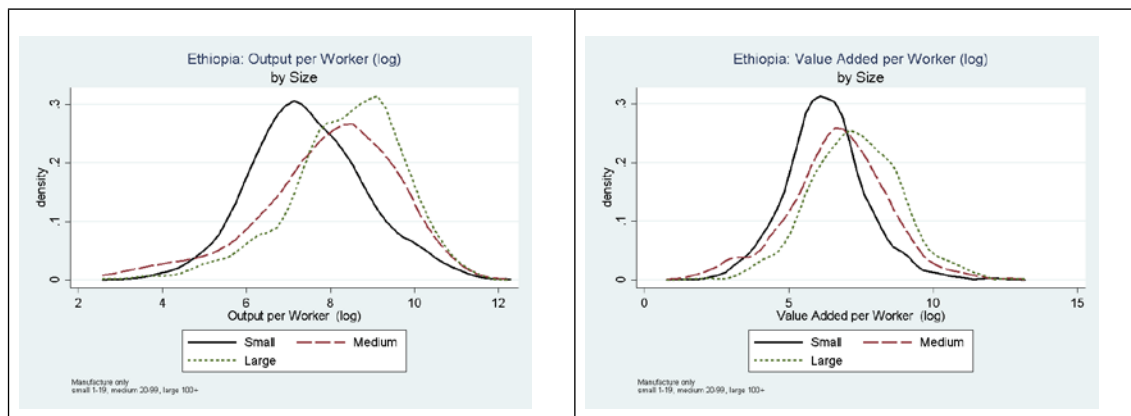
Figure 4 highlights the significant concentration of resources in Ethiopia's manufacturing sector, where large firms dominate employment and revenue. In 2018, the top 1% of firms, measured by employment, accounted for 30% of the total workforce, while the top 10% contributed nearly 70% of total employment. Similarly, the top 1% of firms captured nearly 40% of total sales revenue, with the top 10% earning over 80% of market revenue. Although this concentration slightly decreased in 2019 and 2020, employment and revenue remain heavily concentrated among large firms.

This concentration of economic activity highlights the need to understand how firm dynamics influence wages and employment in Ethiopia's manufacturing sector, especially where a few firms dominate, and workers have limited job options.

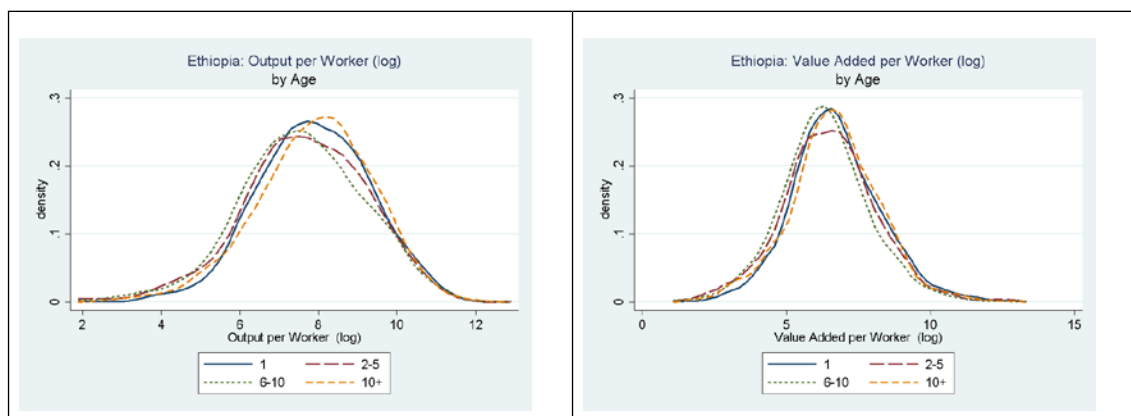
## What Type of Firms Are More Productive?

► Figure 5. Firm labour productivity density by size, age and ownership, 2018-20

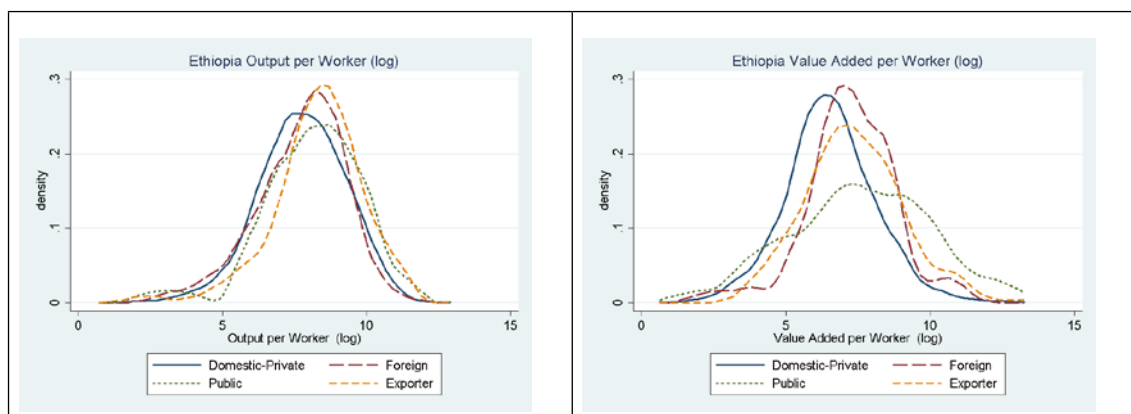
a) by size



b) by age



c) by ownership



Source: Author's own calculation based on LIMMS data.

Figure 5 (a) depicts the distribution of output per worker (log) and value added per worker (log) by firm size in Ethiopia's manufacturing sector. Small firms exhibit the lowest output and value

added per worker, as reflected in their broader and lower density distribution. Medium firms show greater consistency, with a higher and narrower peak, while large firms demonstrate the highest productivity, concentrated around the upper end of the scale. In Ethiopia's manufacturing sector, larger firms not only employ more workers but also demonstrate significantly higher productivity levels.

We then examine the productivity distribution based on firm age (b) and ownership (c). While firms in all age groups exhibit similar peaks in output per worker, older firms (10+ years) display a narrower distribution, reflecting greater consistency in their productivity levels. The overlap across distributions highlights that firm age alone may not fully account for variations in output and value added per worker, emphasizing the need to explore additional factors influencing firm productivity.

Exporters and foreign-owned firms demonstrate higher average productivity, as reflected in their distributions being concentrated toward the upper end of the value added scale. This aligns with the findings of [Van Biesebroeck \(2005\)](#), which demonstrate that exporters in Sub-Saharan Africa exhibit higher productivity, driven in part by the benefits of trade liberalization. In contrast, domestic-private firms have relatively moderate and consistent productivity levels, while public firms show the widest variability, reflecting differences in efficiency across government-owned enterprises among manufacturing subsectors.

► **Table 4. Monthly value added per worker and average wage in birr, 2020**

2020	Value-added per worker			Wage		
firm_size	N	Average	Median	N	Average	Median
Small 1-19	1'197	11'756	3'641	1'428	1'998	1'333
Medium 20-99	581	24'788	6'639	851	4'122	2'696
Large 100+	280	32'218	9'874	435	5'007	3'519
Total	2'058	18'219	4'764	2'714	3'147	1'900

Source: Author's own calculation based on LIMMS data.

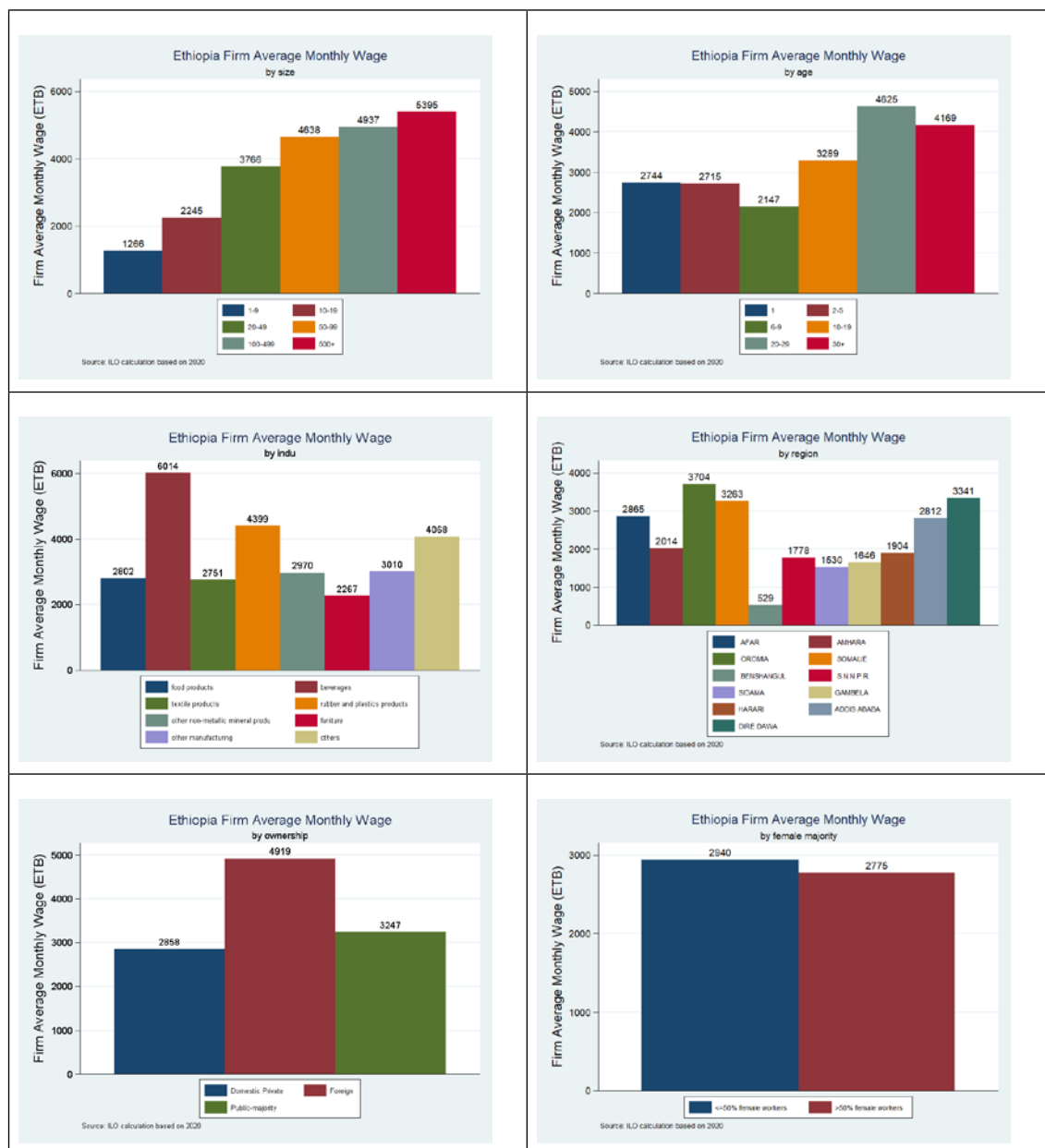
We now turn to the characteristics of productive firms to address a critical question: Do more productive firms offer higher wages? Initial observations from Table 4 suggest that larger firms tend to exhibit higher value added per worker and offer higher wages. To deepen this analysis, we will further explore firm characteristics in the next chapter, as understanding this relationship is vital for assessing whether Ethiopia's manufacturing labour market fosters decent work and supports the creation of quality jobs. Investigating this dynamic provides essential insights into how firm-level productivity impacts wage-setting practices and broader labour market outcomes.



## What Type of Firms Pay Higher Wages?

To address this question, we begin by examining the monthly wage (figure 6) and value added per worker (figure 7) by characteristics<sup>14</sup> of manufacturing firms in Ethiopia.

► Figure 6. Average wage by firm characteristics in manufacturing sector, 2020



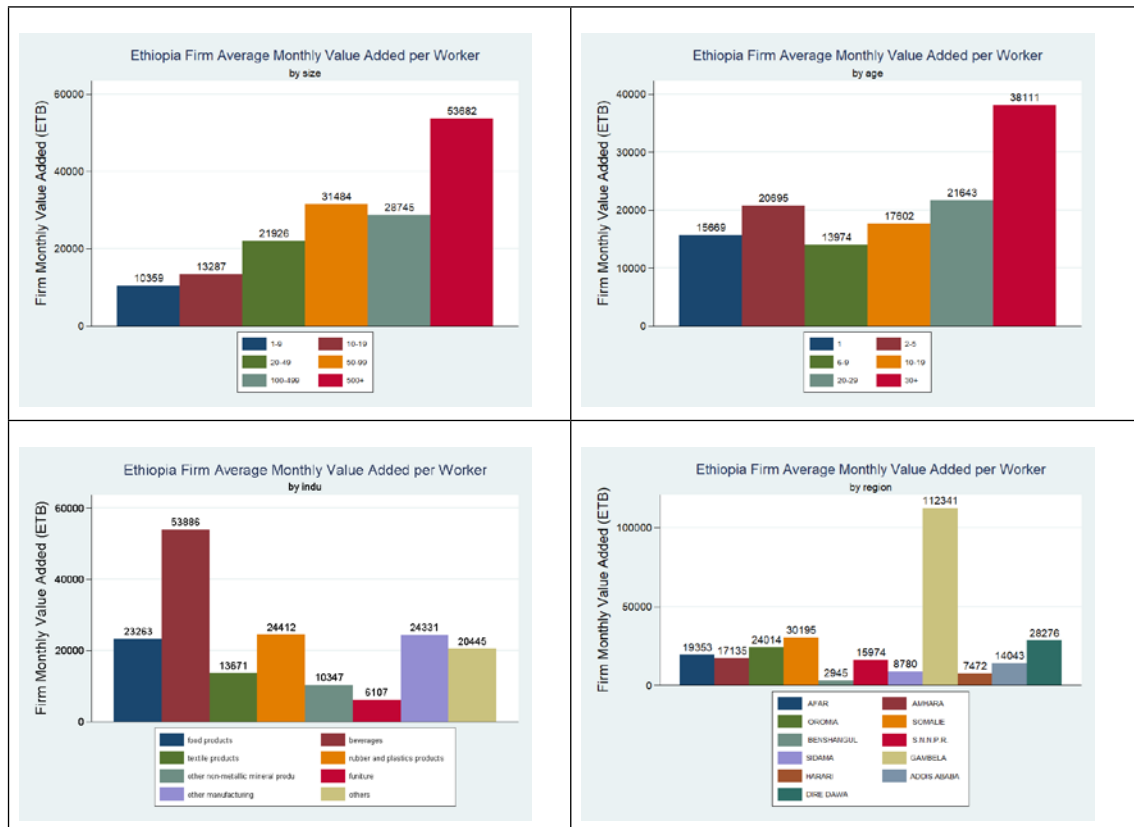
Source: Author's own calculation based on LIMMS data.

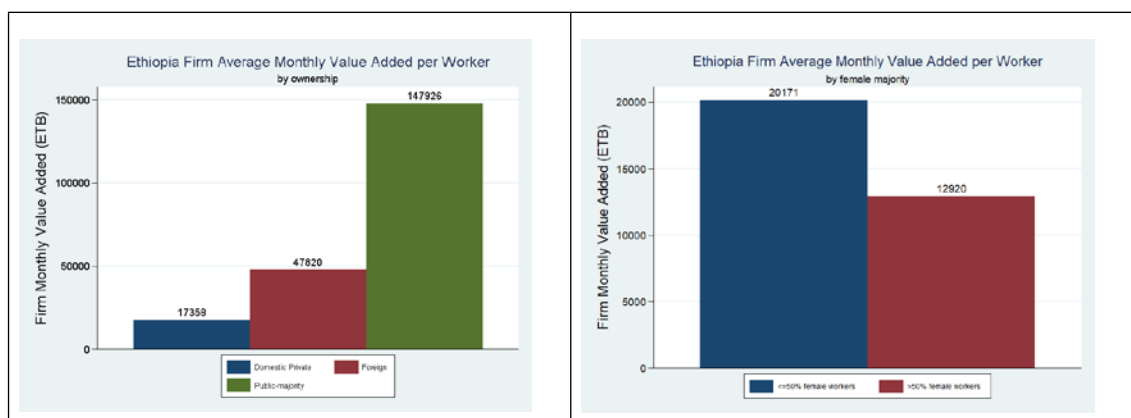
<sup>14</sup> sector, location, size, age, ownership, majority of female workers (>50%)

Figure 6 illustrates that:

- Larger and more established firms generally pay higher wages, reflecting the benefits of economies of scale. As manufacturers grow and expand production, they often achieve greater efficiency, which can translate into higher worker compensation.
- Subsector analysis reveals significant variation in wages. For instance, the average wage in the beverage industry is nearly double that of other subsectors. In contrast, labour-intensive industries such as food products, textiles, and furniture tend to offer lower wages.
- Foreign-invested firms consistently pay higher wages compared to domestic or public-sector firms. Additionally, firms employing a higher proportion of female workers pay, on average, 165 ETB less per worker than firms with more male employees.

► **Figure 7. Average monthly value added per worker by firm characteristics in manufacturing sector, 2020**





Source: Author's own calculation based on LIMMS data.

A comparison of monthly value added per worker<sup>15</sup> in Figure 7 against monthly wages by firm characteristics in 2020 reveals notable trends. Firms employing over 500 workers demonstrate significantly higher value added per worker compared to smaller firms (<500 employees). However, average wages, as shown in Figure 6, increase more gradually with firm size. Firms that have been operating for more than 30 years also exhibit comparatively higher value added per worker, suggesting substantial gains to share. Yet, these long-established firms only pay the second-highest average wages, indicating a disconnect between productivity and wage distribution.

At the sectoral level, beverage, food products, rubber and plastics products, other manufacturing, and miscellaneous products exhibit high value added. However, only beverage and food product manufacturers stand out for paying comparatively higher wages. Wage and productivity disparities are also evident across regions. For instance, firms in Gambela are among the most profitable but offer the lowest average wages to workers, highlighting significant regional capital-labour income inequalities. One explanation is that in Gambela, most manufacturing firms are involved in food production, which is typically characterized by a high-revenue, low-wage profile.

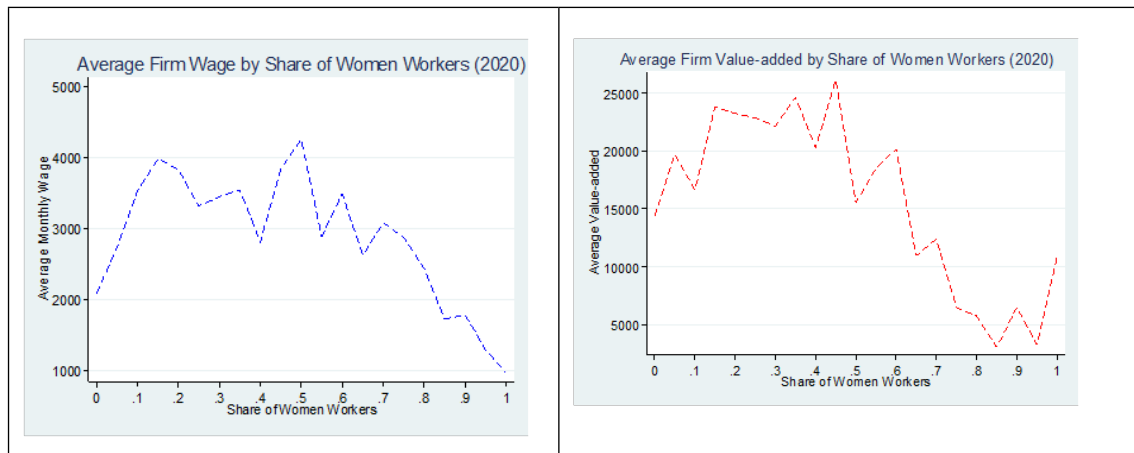
Foreign-invested firms pay higher wages than domestic or public-majority firms. Interestingly, public-majority firms generate more than three times the value added of foreign firms, yet this is not reflected in their wage levels. The wage differences across firm types likely reflect structural variations in incentives and wage-setting practices. Public firms often operate under rigid administrative pay scales and may prioritize employment stability or political mandates over market-driven compensation. In contrast, foreign firms—typically guided by commercial objectives and often benchmark wages against international standards or peer firms—offer higher wages to attract skilled labour and remain competitive, even when value added is lower. Domestic private firms tend to fall in between: while more flexible than public firms, they often face capital constraints and productivity challenges that limit their ability to raise wages. These contrasts highlight how differences in ownership and capital structure can shape both productivity and wage-setting behaviour across firms.

<sup>15</sup> While value added per worker is typically expressed on an annual basis, we convert it into a monthly figure to facilitate comparison with average monthly wages.

## A Gender Lens

The Global Wage Report 2018–19 highlights an inverse relationship between wages and the feminization of the workforce: enterprises with a higher share of female workers tend to pay lower average wages per hour. The report suggests that firms with more male workers may appear more productive because of structural differences in the types of enterprises they operate. For instance, male-dominated firms are often found in sectors like construction or manufacturing, which naturally have higher output levels. These firms also tend to be larger or have better access to equipment and financing—for example, a large, well-equipped factory is likely to generate more output per worker than a small tailoring shop with limited resources. These findings underscore the need for policies that address the underlying factors contributing to gender disparities in productivity and wages.

► **Figure 8. Firm monthly wage and value added per worker by degree of feminization in Ethiopia, 2020**

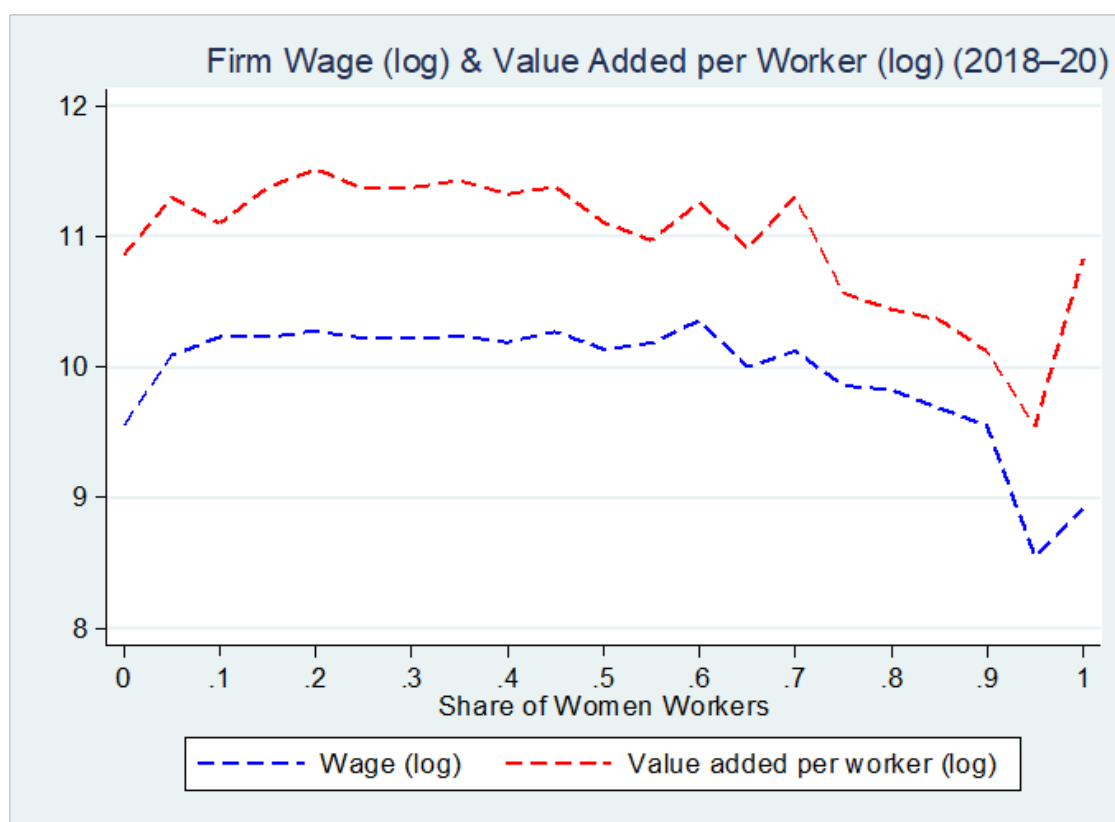


Source: Author's own calculation based on LIMMS data.

We apply a similar approach to Ethiopia's manufacturing sector and observe comparable patterns. In Figure 8, we plot the monthly wage and value added per worker by the share of women workers (from 0% to 100%) in 2020. Specifically, the average wage declines significantly as the share of female wage workers increases. When women comprise less than 50% of the workforce, the average monthly wage is close to 4,000 birr. However, this figure drops by more than half, to around 2,000 birr per month, in firms where over 80% of the workforce is female. This downward trend underscores the persistent gender disparities in wage levels within the sector.

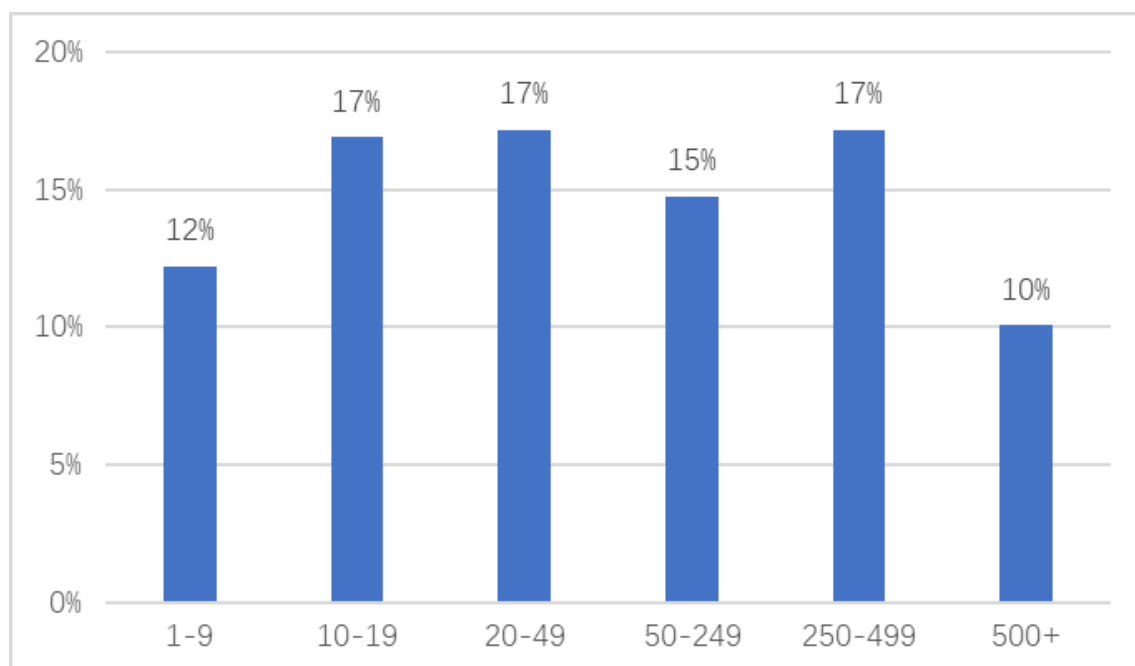
In terms of firm value added per worker, the data indicates that value added per worker generally declines when women make up more than 50% of the workforce. This may reflect higher labour productivity in male-dominated firms, as noted by (Carranza, Das, & Kotikula, 2023), who argue that gender-based employment segregation patterns vary across countries. On a global scale, women are more likely to be concentrated in low-productivity sectors, and within these sectors, they tend to work in low-productivity industries. However, this trend is not uniform; value added per worker often rebounds at certain levels of female representation. This could be due to sectoral differences, where gender-neutral subsectors with high overall value added maintain high productivity levels, even in firms with a greater share of female workers. Such variability highlights the need to consider sectoral composition when analyzing gender-related productivity trends.

► **Figure 9. Firm monthly real wage (log) and value added per worker (log) by degree of feminization in Ethiopia, 2018–20**



Source: Author's own calculation based on LIMMS data.

Figure 9 presents normalized log values of real wages and value added per worker, plotted against the share of women workers, using data from 2018 to 2020. Overall, value added per worker shows a gradual decline as the share of women workers increases beyond 50%, with a sharp drop above 80%, before rebounding near 100%. Wages, on the other hand, remain relatively stable but also decline noticeably when the share of women exceeds 80%. This pattern highlights potential productivity challenges in firms with higher proportions of women workers and underscores the need for further investigation into the factors influencing this relationship.

► **Figure 10. Wage vs Value added per worker ratio by firm size, 2020**

Source: Author's own calculation based on LIMMS data.

When examining the wage-to-value added per worker ratio<sup>16</sup> by firm size (Figure 10), firms employing 10 to 500 workers maintain a relatively consistent ratio of 15–17%. For small enterprises (1–9 employees), the ratio is understandably lower, reflecting their limited revenue capacity to sustain higher wage bills. Notably, the ratio is lowest—around 10%—for firms with over 500 employees. This indicates that large firms retain a greater share of value added, suggesting they are likely to have financial space to increase wages, particularly for low-paid production workers.

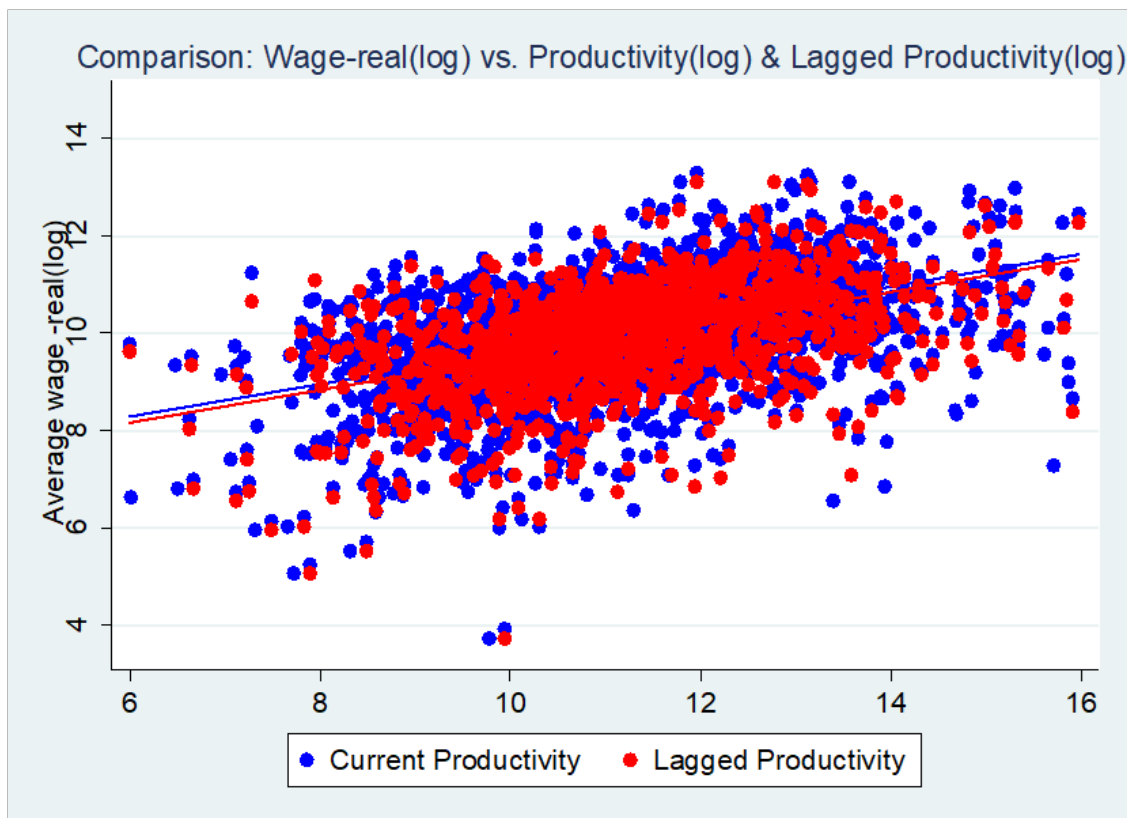
In summary, Ethiopia's manufacturing sector demonstrates that large firms are not only more productive but also tend to offer higher wages. Firms with over 500 employees exhibit nearly double the productivity of smaller firms. However, this higher productivity is not proportionally reflected in wage bills, as indicated by the low wage-to-value added ratio among large firms. This raises a critical question: how much of the gains in value added are shared with workers? In other words, what is the wage productivity elasticity in Ethiopia's manufacturing sector? This inquiry is essential for understanding the extent to which productivity growth translates into better wages and improved worker welfare.

<sup>16</sup> The wage-to-value-added per worker ratio is defined as the proportion of the average wage paid to workers relative to the value added per worker. It provides insight into how much of a firm's or sector's productivity (value added) is allocated to employee compensation.

## Do Firms Share Productivity Gain with Workers? If So, How Much?

To explore this question, we analyze the relationship between real wage and productivity<sup>17</sup>. First, we plot real wage (log) against contemporaneous productivity (log). Next, under the hypothesis that wage level are influenced by firm value added in the previous period ( $t-1$ ), we plot real wage (log) against lagged productivity (log).

► Figure 11. scatterplot real wage (log) against productivity (log) and lagged productivity (log), firm panel dataset.



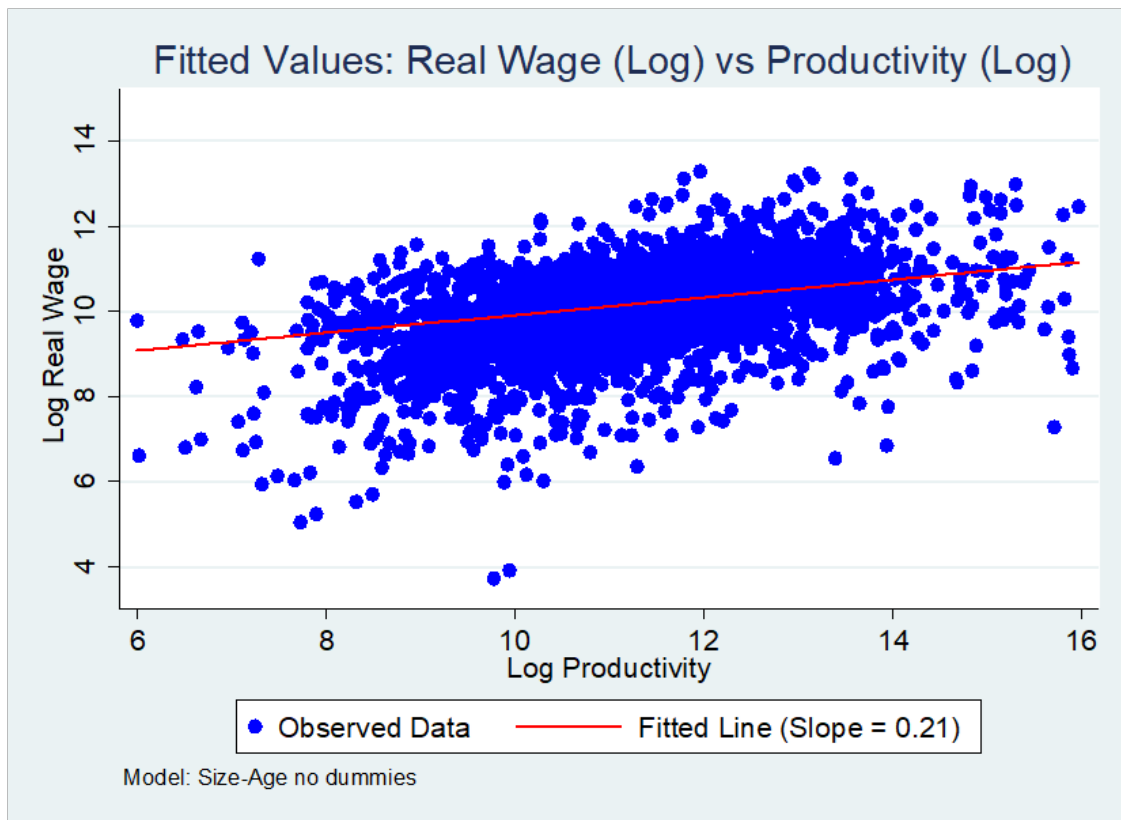
Source: Author's own calculation based on LIMMS data.

Figure 11 shows a seemingly positive relationship between productivity and real wages, showing that higher productivity is generally associated with higher real wages. This pattern holds regardless of whether current or lagged productivity is used<sup>18</sup>. When lagged productivity is plotted, the slope remains virtually unchanged, suggesting that there is minimal difference between using current or lagged productivity in estimating wage-productivity elasticity.

<sup>17</sup> In the regression analysis, we use value-added per worker as a proxy for productivity.

<sup>18</sup> Wages often reflect past performance, as adjustments typically occur during annual reviews or negotiations. As a result, firms may only raise wages after sustained productivity gains.

► Figure 12. Fitted Value of wage productivity elasticity, firm panel dataset.



Source: Author's own calculation based on LIMMS data.

Then we perform a panel regression to estimate the relationship between real wages and productivity, accounting for firm size and age. After obtaining the regression coefficients, we visualize the results by plotting the observed data along with the fitted regression line in Figure 12, where the slope of the fitted line represents the wage-productivity elasticity.

The regression results (see Annex Table B1) show that in Ethiopia's manufacturing sector, a 1% increase in value added per worker is associated with only a **0.21% increase in real wages**. This implies that **roughly 20% of productivity gains** are reflected in wage growth, while the majority is not passed on to workers.

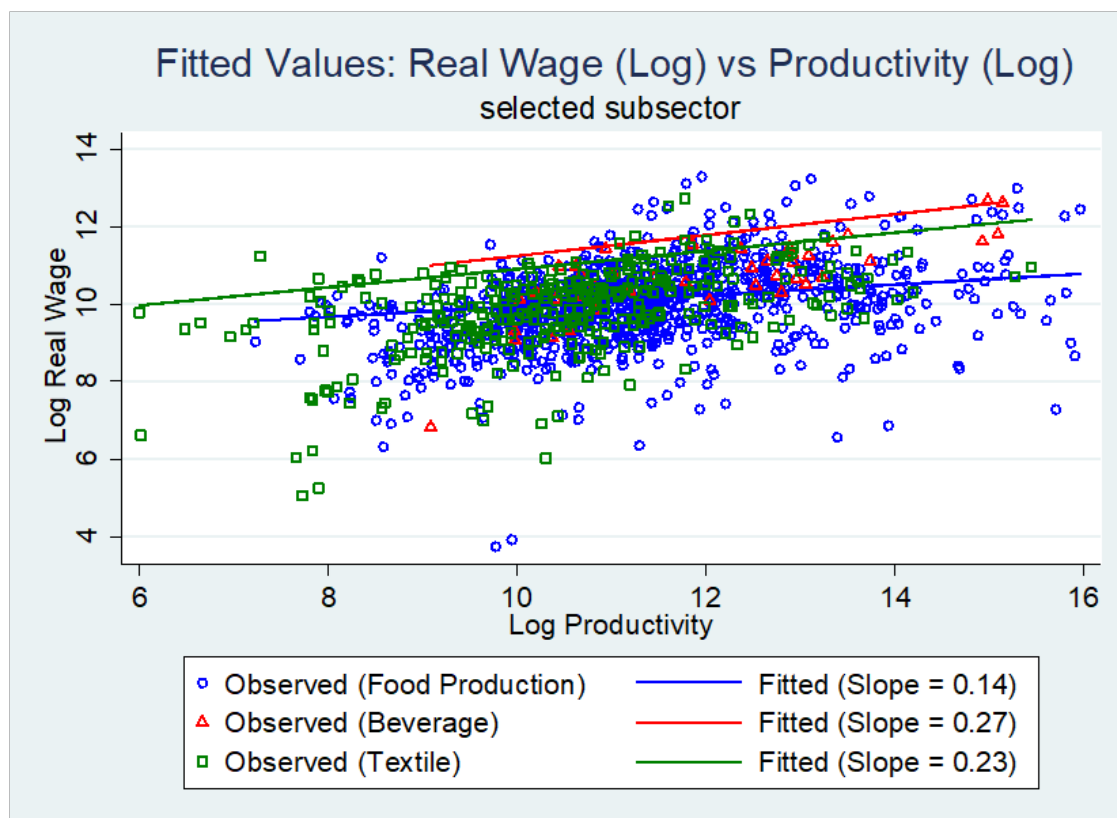
This finding is consistent with global evidence on **wage-productivity elasticity**. In developed economies, the elasticity has declined in recent decades but remains moderate—typically ranging from **0.4 to 0.7**, as reported by [Stansbury and Summers \(2017\)](#). In contrast, studies from developing countries point to significantly lower elasticities, often between **0.1 and 0.3** (e.g., [Wakeford \(2004\)](#); [Katovich and Maia \(2018\)](#)), indicating a much weaker pass-through of productivity gains to real wages.

The limited pass-through of productivity gains—only about 21%—likely reflects firm priorities such as reinvestment, debt repayment, or profit retention. In Ethiopia, where capital is scarce, productivity gains are often capital-driven, meaning returns go more to capital than labour. Weak wage-setting institutions and limited collective bargaining further reduce workers' ability to claim a fair share. This pattern is not unique to Ethiopia but common across developing countries with similar structural constraints.



Next, we extend this analysis by incorporating interaction terms between productivity and manufacturing subsectors. Using these interaction terms, we calculate the subsector-specific fitted values for real wages. We then generate plots for the subsector where the interaction coefficient is significant, comparing observed and fitted values. This approach enables us clearly visualize the sectoral differences in the wage-productivity elasticity, with each subsector showing a distinct slope.

► Figure 13. Fitted Value of wage productivity elasticity, firm panel dataset, selected subsector



Source: Author's own calculation based on LIMMS data.

The wage-productivity elasticity also varies across subsectors in Ethiopia's manufacturing sector (see regression table results in annexure Table B2). Regression results indicate that difference in elasticity compared to food production is particularly notable in "beverage" 0.131(.067), and "textile" 0.095(.039)<sup>19</sup>. This suggests that the pass-through of productivity gains to wages is significantly higher in the beverage sector—a 1% increase in value added per worker leads to a 0.27% rise in real wages, nearly double the 0.14% observed in the food production sector<sup>20</sup>, holding all other factors constant. These differences highlight variations in how subsectors distribute productivity gains, with beverage firms demonstrating a much higher share of benefits, assuming similar measurement standards and labor market structures across all subsectors.

<sup>19</sup> All mentioned industries have statistically significant coefficients, with standard errors indicating differences in elasticity from the baseline industry rather than overall significance.

<sup>20</sup> Food production is the base comparison subsector in the regression.

## Regression Results

The complete set of the regression results are in Annexure. Table B1 and B2 presents the results of the determinants of real wages – old firms (20y+) are likely to pay more on average to their workers than young firms, which is robust controlling for the productivity. Larger firm size does not necessarily correspond to higher wages, which contrasts with empirical findings that large firms generally tend to pay more. One possible explanation is that this relationship is complex and influenced by various factors, including productivity and employee composition [Haltiwanger et al. \(2014\)](#). Therefore, while large firms may have the capacity to offer higher wages, the actual wage levels are contingent upon multiple interrelated elements. There are also some differences regarding subsectors.

With respect to subsectors, the wage–productivity pass-through (elasticity) is higher in beverages (0.27) and textiles (0.23) than the manufacturing mean (0.21). Food production is notably lower at 0.14—about two-thirds of the manufacturing average. Estimates for non-metallic minerals, furniture, and other manufacturing are above the food coefficient but are not statistically significant.

Food processing and agriculture are closely relate. Because food processing sits within agricultural value chains, a 1% increase in value added per worker translates into only a 0.14% wage gain in food processing (versus 0.27% in beverages). This gap suggests that upstream productivity improvements may not reach workers unless wage-setting mechanisms (e.g., living-wage-aligned guidance and social dialogue) are paired with productivity support in the processing segment.

Firms that invest more in materials tend to offer higher wages, as suggested by a positive (though statistically insignificant) correlation between total investment and wages. In contrast, we find a statistically significant negative correlation between capital intensity and wages—indicating that capital-intensive firms in Ethiopia are more likely to pay lower wages than their labour-intensive counterparts.

This finding contrasts with standard neoclassical theory, which assumes that higher capital intensity boosts labour productivity and, consequently, wages. In theory, more capital (e.g., machinery or equipment) should raise the marginal product of labour and lead to higher pay.

However, the Ethiopian context may explain the divergence: capital-intensive firms especially domestic private ones often employ lower-skilled, easily replaceable labour; public enterprises may follow rigid pay scales; and foreign or large firms may prioritize cost controls. Weak labour market institutions and limited bargaining mechanisms further limit the pass-through of productivity gains to wages. Therefore, the observed wage pattern reflects broader institutional and structural factors, not just differences in production inputs.

Previous studies ([Blanchflower, Oswald, & Sanfey, 1996](#); [Amiti & Davis, 2012](#); [Manning, 2003](#)) suggest that firms with monopsony power<sup>21</sup> in sales and labour markets tend to offer lower wages. This aligns with the general hypothesis that firms with monopoly power or high market concentration pay lower wages due to reduced competition and less pressure to attract and retain employees by offering competitive wages. However, our regression results show that the coefficient of Herfindahl index, a measure of market concentration, is not significant. This suggests that market concentration in Ethiopia's manufacturing sector does not have a discernible impact on wage levels or increases.

<sup>21</sup> Normalized Herfindahl index by sector and time

## ► Conclusion

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This study underscores the intricate relationship between firm-level productivity and wage dynamics in Ethiopia's manufacturing sector, with findings that hold significant implications for both policy and practice. While productivity growth has been associated with wage increases, this relationship is neither uniform across firms nor sufficient to ensure equitable wage distribution. The results highlight structural barriers, particularly for smaller firms, that prevent workers from fully benefiting from productivity gains.

### Key Findings: Linking Productivity and Wage in Ethiopia's Manufacturing Sector

1. **Concentration of Resources:** The manufacturing sector remains dominated by a few large firms that account for a disproportionate share of employment and output. These firms exhibit higher productivity levels but do not consistently translate these gains into fair wage increases for workers.
2. **Productivity-Wage Elasticity:** On average, a 1% increase in value added per worker results in only a **0.2%** rise in real wages, indicating that just **20% of productivity gains** are shared with workers in Ethiopia's manufacturing sector. This finding aligns with broader patterns observed in many developing countries, where wage-productivity elasticities tend to be low—typically between **0.1 and 0.3**—reflecting a limited pass-through of productivity improvements to wages. The elasticity also varies by subsector: beverage and textile firms show a stronger link between productivity and wages, while food production firms display a much weaker relationship.
3. **Wage Disparities:** Larger, older, and foreign-invested firms pay higher wages compared to their smaller, younger, and domestic counterparts. However, significant gender and regional disparities persist. Firms with a higher share of female workers tend to offer lower wages, and regions like Gambela demonstrate high productivity but low wage levels.
4. **Barriers for Small Firms:** Small and medium-sized enterprises (SMEs) show resilience but struggle to scale operations or improve productivity and wages. These firms face constraints in accessing finance, skilled labour, and capital-intensive technologies, which limit their capacity to compete with larger enterprises.

### Policy Implications: Bridging the Productivity-Wage Gap for Inclusive Industrial Growth

To achieve inclusive and sustainable industrial growth, Ethiopia must pursue a dual strategy: raising firm-level productivity while ensuring that the gain or value-added are more equitably shared with workers. While improving firm performance is critical, productivity gains alone do not guarantee better wages. A key constraint lies in labour market institutions that are currently too weak to ensure fair wage-setting.

#### 1. Strengthening Labour Market and Wage-Setting Institutions

Ethiopia's wage-setting framework is largely decentralized, with no statutory national minimum wage in the private sector. Collective bargaining coverage remains limited outside the public

sector, and enforcement mechanisms for labour rights are often weak. Strengthening the institutional foundation for wage determination is critical. This includes:

- Establishing a legal minimum wage mechanism, informed by social dialogue and economic analysis.
- Expanding collective bargaining coverage, particularly in industrial parks and large manufacturing firms.
- Investing in labour inspection systems and institutional capacities to monitor compliance and support dispute resolution.

## **2. Supporting Small and Medium Enterprises (SMEs)**

Many Ethiopian SMEs face structural constraints—such as limited access to finance, technology, and skilled labour—that restrict both productivity and wage growth. Policy support should focus on:

- Affordable credit schemes, especially for female-majority entrepreneurs and firms in under-developed regions.
- Technology transfer and productivity-enhancing training linked to industrial policy goals.
- Facilitated linkages between SMEs and larger value chains to support scale and learning.

## **3. Promoting Wage Equity and Inclusion**

Wage inequality persists across gender, geography, and firm size. Policies should encourage:

- Gender-responsive wage practices, including transparent pay structures and workplace equity audits.
- Incentives for firms to locate or invest in lagging regions, particularly those with a surplus of low-paid or informal wage workers.
- Monitoring systems to track progress on closing the wage gaps across subsectors and demographic groups.

## **4. Sectoral Focus to Maximize Wage–Productivity Linkages**

Given the variation in wage–productivity elasticity across subsectors in Ethiopia, policy should tailor interventions accordingly:

- Prioritize high pass-through subsectors. Focus investment, technology adoption, and workforce upgrading in beverages ( $\approx 0.27$ ) and textiles ( $\approx 0.23$ ), where productivity gains are more likely to translate into higher pay than the manufacturing average ( $\approx 0.21$ ).
- Bridge to agriculture via food processing. Because food processing anchors agriculture value chains and shows a lower pass-through ( $\approx 0.14$ ), pair wage-setting mechanisms (e.g., living-wage guidance, social dialogue) with productivity support (skills and process upgrades) to raise the share of gains reaching workers.
- Subsectoral industrial strategies. Combine skills development, technology diffusion, and wage-setting tools to ensure productivity gains are shared with wage workers.

In conclusion, Ethiopia's manufacturing sector holds significant potential to drive inclusive economic transformation. However, this promise can only be realized if productivity improvements translate into meaningful wage gains for workers. Strengthening labour market institutions, adopting evidence-based wage policies, and enabling enterprise growth—particularly among

SMEs and high-potential subsectors in manufacturing—are critical steps. Through the technical cooperation project **Setting Adequate Wages – a focus on Agriculture (SAW-A)**, which targets wages and productivity along agriculture value chains and agro-processing, these reforms can be operationalized by piloting living-wage-aligned guidance, supporting productivity upgrading, and improving the pass-through from value added to pay. A more coherent and inclusive wage-setting framework—reinforced by SAW-A partnerships with government, social partners, and firms—would not only support decent work but also bolster the legitimacy and sustainability of Ethiopia’s industrialization and its links to the rural economy.

## Annex

### Variable definitions

**Employment** is the average of total number of for the month March, June, September and December, excluding temporary workers.

**Age** is determined in reference to the birth year. Only when birth year is missing, age is considered to be entry (age 1) when firm is first observed in the data.

**Firm size** is determined as the number of workers employed by a firm. The employment variable is used to construct the categories of firm's size.

Firm size categories			Age categories		
1-19	1-9	1-9	1-5	1	1-5
20-99	10-19	10-19	6-9	2-5	6-9
100+	20-99	20-49	10+	6-9	10-19
	100+	50-249		10+	20-29
		250-499			30+
		500+			

**Sales** revenues are the total value of goods or services sold, adjusted to real terms using a price deflator to ensure comparability across years. In this paper, we use firm sales as a measure of firm **output**, as it captures revenue generation and profitability.

**Value Added** is sales revenues less intermediary inputs including services. Intermediary inputs is producer's total expenditures on inputs (cost incurred in the current year adjusted by change in inventories).

**Capital** is the capital stock replacement value – it does not include new purchases but includes lease capital.

**Wage** is the average wage bills per worker.

**Productivity** variables<sup>22</sup> include output (sales) per worker “Y/L” (or value of production per worker if sales is not available), value added per worker “VA/L”. Outliers for Y/L and VA/L are defined as those observations in the 1st and the 99th percentile at the two-digit sector level, for those sectors with 20 or more observations present. Using the natural log of the production variable, very large values greater than 16 or less than -16 are also identified as outliers and removed from the analysis.

<sup>22</sup> We excluded total factor productivity (TFP) as a measure of productivity because it falls outside the scope of the wage productivity analysis in this paper.

**Herfindahl index** is calculated for sales and labour. The normalized Herfindahl index sums the squared market share, either in terms of sales or labour, of each firm competing in the market resulting in a sectorial level measure of the amount of concentration that exists. A Herfindahl index greater than 0.25 is considered a highly-concentrated market.

**Capital intense** firms include those with a capital/labour ratio is equal or above the median of its 2-digit sector.

**Tradable** sectors are those in agriculture, fishing, mining, manufacture, wholesale-retail-repair vehicles, water and air transportation, accommodation and food services, arts-entertainment recreation, and repair of computers and household goods.

**Note:** Standardized variables are generated assuring comparability of definitions across countries. These include those related to firm characteristics, such as, age, size, sector, ownership, and legal status, as well as those related to productivity, output, employment breakdown, investment, and more. Categorical variables group firm's size or age in different categories; also sectors and locations.

## Summary of statistics

► Table A1: Summary statistics (2018-2020)

Variable		2018	2019	2020
<b>Firm</b>	N	2614	2864	2949
	Mean	95.08	81.24	72.35
	St Dev	532.42	340.51	316.63
	Min	1	1	1
	Max	23276	14354	14354
<b>Age</b>	N	2407	2863	2949
	Mean	13.19	8.20	10.38
	St Dev	12.66	9.63	9.77
	Min	3	1	1
	Max	98	99	86
<b>Log Output per worker (LCU)</b>	N	2267	2688	2764
	Mean	12.36	12.45	12.27
	St Dev	1.66	1.44	1.46
	Min	5.84	6.78	5.56
	Max	16	16	16
<b>Log Value added per worker (LCU)</b>	N	1690	2010	2058
	Mean	11.18	11.23	11.02
	St Dev	1.59	1.52	1.53
	Min	5.48	5.99	5.60
	Max	16	16	16
<b>Sales (real LCU 000)</b>	N	2311	2747	2823
	Mean	83700	74300	53700
	St Dev	358000	301000	222000
	Min	0	0	0
	Max	7070000	5260000	5870000
<b>Intermediate material (real LCU 000)</b>	N	2416	2864	2949
	Mean	39800	43500	32900
	St Dev	128000	149000	108000
	Min	0	0	0
	Max	2390000	3020000	1530000
<b>Average annual labour cost per worker (real LCU 000)</b>	N	2416	2864	2949
	Mean	50	42	35
	St Dev	257	83	66
	Min	0	0	0
	Max	10700	2774	1947



Variable		2018	2019	2020
<b>Domestic firms (1/0)</b>	N	2416	2864	2949
	Mean	0.97	0.98	0.98
	St Dev	0.16	0.15	0.14
	Min	0	0	0
	Max	1	1	1
<b>Exporter firms (1/0)</b>	N	104	94	83
	Mean	1	1	1
	St Dev	0	0	0
	Min	1	1	1
	Max	1	1	1

Source: Author's own calculation based on LIMMS data.

## Annexure - Regression results tables

► Table B1: Determinants Real Wage (log)

	CS-2020	Size no-dummies	Size-Age no-dummies	lnLPQ Size-Age	Size-Age location-dummies	Size-Age with-dummies	Basic	Sectors	Regions
ValueAddedperWorker (log)	0.254***	0.204***	0.206***		0.195***	0.190***	0.190***	0.201***	0.197***
	-0.03	-0.0287	-0.0265		-0.0288	-0.0266	-0.0264	-0.0227	-0.0223
sz_10to19	-0.733**	0.655***	-0.634**	-0.287	-0.434	-0.463	-0.453	0.690***	0.658***
	-0.306	-0.253	-0.255	-0.339	-0.312	-0.289	-0.29	-0.22	-0.225
sz_20to49	-0.628*	-0.658**	-0.635**	-0.264	-0.447	-0.477*	-0.468	0.694***	0.662***
	-0.31	-0.27	-0.27	-0.35	-0.312	-0.285	-0.287	-0.235	-0.241
sz_50to249	-0.402	-0.426	-0.412	-0.0395	-0.292	-0.314	-0.305	-0.453*	-0.427
	-0.319	-0.291	-0.29	-0.366	-0.345	-0.317	-0.315	-0.257	-0.265
sz_250to499	-0.0769	-0.105	-0.0905	0.131	-0.0222	-0.0633	-0.0555	-0.145	-0.13
	-0.31	-0.268	-0.27	-0.346	-0.309	-0.289	-0.291	-0.253	-0.266
sz_500plus	-0.0132	0.108	0.0963	0.299	0.12	0.0859	0.0931	0.0393	0.0546
	-0.323	-0.302	-0.303	-0.308	-0.338	-0.322	-0.324	-0.286	-0.293
age_6to9	0.0154		-0.00561	-0.0402	-0.00719	-0.0132	-0.0131	-0.0102	0.00756
	-0.0865		-0.0597	-0.0401	-0.0601	-0.0595	-0.0591	-0.0559	-0.0538
age_10to19	0.066		0.103	0.061	0.0751	0.0382	0.0381	0.0696	0.0725
	-0.0525		-0.0682	-0.0511	-0.0547	-0.0517	-0.0511	-0.0634	-0.0602
age_20to29	0.288**		0.216**	0.222***	0.235***	0.174**	0.173**	0.162**	0.161**
	-0.124		-0.0856	-0.0364	-0.0847	-0.0784	-0.0778	-0.0722	-0.0699
age_30plus	0.262***		0.341***	0.340***	0.362***	0.308***	0.304***	0.290***	0.305***
	-0.0728		-0.106	-0.0649	-0.11	-0.0934	-0.102	-0.106	-0.11
FDI	0.0283						0.0171	-0.0542	-0.0571
	-0.176						-0.279	-0.238	-0.256
public	-0.135						0.121	0.0656	-0.0447
	-0.236						-0.248	-0.208	-0.216
Output per Worker (log)				0.268***					
Constant	7.399***	7.946***	7.838***	6.520***				7.894***	
	-0.533	-0.408	-0.392	-0.645				-0.336	
Observations	1,371	1,372	1,371	1,847	1,371	1,371	1,371	1,371	1,371
R-squared	0.413								
Sector dummies	YES	NO	NO	NO	NO	YES	YES	YES	YES
Location dummies	YES	NO	NO	NO	YES	YES	YES	NO	NO

	CS-2020	Size no-dummies	Size-Age no-dummies	InLPQ Size-Age	Size-Age location-dummies	Size-Age with-dummies	Basic	Sectors	Regions
Year Dummies	YES	NO	NO	YES	YES	YES	YES	YES	YES
Number of id		4,066	4,061	5,300	4,061	4,061	4,061	4,061	4,061
Between R2		0.291	0.296	0.27	0.000492	0.000984	0.000987	0.308	0.00141
Overall R2		0.293	0.297	0.271	0.000976	0.001630	0.001630	0.308	0.00173
Within R2		0.0528	0.0475	0.0957	0.122	0.12	0.12	0.0492	0.117

► Table B2: Determinants Real Wage (log), continue

	exporter	sh_fem	femmaj	investment	k_factint	herfindahl_L	sector in- teraction
Value Added per Worker (log)	0.186***	0.188***	0.188***	0.188***	0.184***	0.189***	0.136***
	-0.0256	-0.0275	-0.0273	-0.0261	-0.0267	-0.0269	-0.029
sz_10to19	-0.0156	-0.0149	-0.0133	-0.0104	-0.00736	-0.0126	0.656***
	-0.0611	-0.058	-0.0581	-0.0599	-0.0616	-0.0592	-0.185
sz_20to49	0.0361	0.0366	0.0385	0.0412	0.0387	0.0389	0.655***
	-0.0536	-0.0497	-0.0492	-0.0529	-0.0515	-0.0514	-0.199
sz_50to249	0.171**	0.163**	0.166**	0.172**	0.184**	0.173**	-0.412*
	-0.0794	-0.0723	-0.0737	-0.0766	-0.0757	-0.0781	-0.231
sz_250to499	0.311***	0.300***	0.308***	0.306***	0.286***	0.303***	-0.116
	-0.108	-0.0993	-0.0991	-0.102	-0.0992	-0.103	-0.222
sz_500plus	-0.0156	-0.0149	-0.0133	-0.0104	-0.00736	-0.0126	0.0497
	-0.0611	-0.058	-0.0581	-0.0599	-0.0616	-0.0592	-0.236
age_6to9	-0.0156	-0.0149	-0.0133	-0.0104	-0.00736	-0.0126	0.00589
	-0.0611	-0.058	-0.0581	-0.0599	-0.0616	-0.0592	-0.0568
age_10to19	0.0361	0.0366	0.0385	0.0412	0.0387	0.0389	0.0698
	-0.0536	-0.0497	-0.0492	-0.0529	-0.0515	-0.0514	-0.0666
age_20to29	0.171**	0.163**	0.166**	0.172**	0.184**	0.173**	0.154**
	-0.0794	-0.0723	-0.0737	-0.0766	-0.0757	-0.0781	-0.0748
age_30plus	0.311***	0.300***	0.308***	0.306***	0.286***	0.303***	0.299***
	-0.108	-0.0993	-0.0991	-0.102	-0.0992	-0.103	-0.0909
FDI	-0.0885	0.0151	0.00402	0.0184	0.0193	0.0176	
	-0.281	-0.278	-0.275	-0.28	-0.263	-0.28	
public	0.123	0.18	0.173	0.116	0.0933	0.131	
	-0.249	-0.251	-0.261	-0.253	-0.25	-0.251	
xvar	-0.0375	-0.285	-0.11	0.234	-0.178***	0.069	
	0	0	0	0	0	0	

Sector#c. ln(Productivity)

	exporter	sh_fem	femmaj	investment	k_factint	herfindahl_L	sector interaction
beverages							0.131** -0.0669
textile products							0.0945** -0.0392
rubber and plastics							0 -0.0869
other non-metallic mineral							0.0821 -0.0741
furniture							0.0859 -0.0661
other manufacturing							0.216 -0.175
others							0.126** -0.0498
Constant	6.590*** -0.391	6.682*** -0.401	9.251*** -0.431	8.969*** -0.453	9.278*** -0.41	9.172*** -0.386	8.574*** -0.352
Observations	1,369	1,371	1,371	1,371	1,371	1,371	1,371
R-squared							
Sector dummies	YES	YES	YES	YES	YES	YES	YES
Location dummies	YES	YES	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES	YES	YES
Number of id	4,050	4,061	4,061	4,061	4,061	4,061	4,061
Between R2	0.206	0.208	0.144	0.141	0.159	0.14	0.305
Overall R2	0.223	0.226	0.175	0.172	0.189	0.17	0.305
Within R2	0.123	0.115	0.118	0.126	0.123	0.119	0.0592

Robust standard errors in parentheses

Omitted: micro (1-9), young (1-5), and domestic only in column X.

\*\*\*p&lt;0.01, \*\*p&lt;0.05, \*p&lt;0.1

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