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**Framing the change: analysing employment
change, (in)adequacy, and (de)feminization in
Cameroon's tertiary firms**

Yselle Malah Kuete*

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Abstract: Cameroon is an example of a developing country where the transition from agriculture to services has defied standard patterns seen in developed countries. While prior research has explored this shift's impact on economic growth, its effects on women's representation in the labour market have been overlooked. This study addresses this gap by examining how changes in the tertiary sector affect women's employment. Decomposition analysis based on 461 Cameroonian firms indicates a 6.2 per cent feminization pattern over the past decade, primarily driven by increased female employment in wholesale and construction industries. This growth results from within-industry effects rather than reallocation effects, emphasizing the significance of internal industry factors over external influences like government policies or broader economic changes. Importantly, econometric estimations, adjusting for fixed effects, endogeneity, and selection biases, reveal that an inadequately trained workforce hinders further feminization. The paper concludes with recommendations for promoting gender equality in Cameroon and across Africa.

Key words: employment change, (de)feminization, services, decomposition analysis, Cameroon

JEL classification: M51, J16, M53, N37, C3

* Faculty of Economics, University of Yaoundé, Cameroon; email address: florayselle27@yahoo.com

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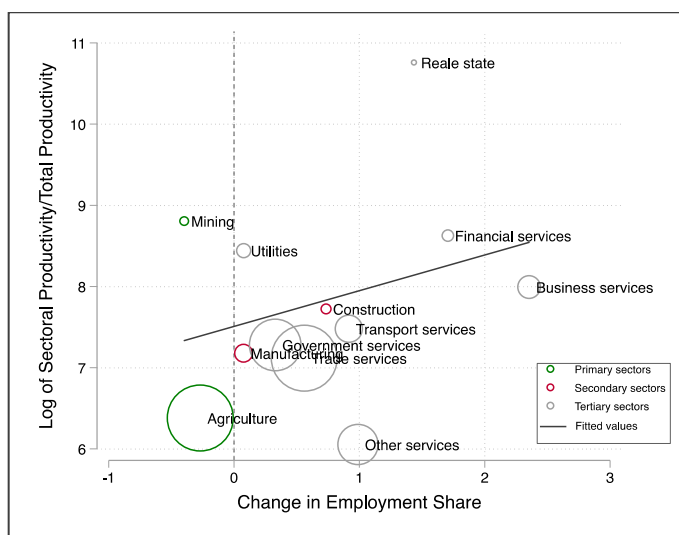
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

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1 Introduction

Recent evidence indicates that developing countries are undergoing an economic transition characterized primarily by a significant increase in the share of the services sector in their economies (Atta-Ankomah and Osei 2021; Diao et al. 2018; Lee and McKibbin 2018). This trend is also observed in Cameroon. Indeed, the country’s structural change over the past three decades has deviated from the standard pattern, where labour resources typically shift from the primary sector to the secondary and subsequently to the tertiary sector (Clark 1940; Fisher 1939; Syrquin 1988). As shown in Figure 1, the primary agriculture and mining sectors have experienced the largest relative loss of employment, with agriculture being the sector with the lowest productivity. In contrast there has been a modest shift of employment towards the manufacturing and construction secondary sectors, while the tertiary sectors such as real estate, financial services, and business services have experienced substantial employment growth. These sectors have also shown the highest levels of sectoral productivity. Therefore, the overall movement of labour between sectors has been positively correlated with productivity growth.

Figure 1: Correlation between sectoral productivity and change in employment shares in Cameroon (1990–2018)



Note: size of circle represents employment share in 1990.

Source: author’s construction using the GGDC/UNU-WIDER Economic Transformation Database (ETD) (Kruse et al. 2022).

Based on these premises the objective of this article is to examine the effect of this ‘tertiarization’ of the Cameroonian economy on women. It seeks to expand our understanding beyond the existing literature on the impact of structural change, which has predominantly focused on its impact on economic growth.

The role of structural change in driving economic growth in developing countries has gained renewed attention as neoclassical growth models have demonstrated limitations in providing a comprehensive explanation of growth dynamics. Structural change is now recognized as a significant determinant of growth, facilitated by migration of labour from low- to high-productivity sectors (Diao et al. 2018; Koopman and Wacker 2023; Rodrik et al. 2016) and the intra-sectoral reallocation of resources, particularly when there is a substantial output gap between the sectors of origin and destination (Fagerberg 2000). However, there is scepticism regarding its effectiveness

in promoting sustainable economic growth (Baumol 1967; McMillan et al. 2014; Timmer and de Vries 2009).¹

Beyond the impact on economic growth, empirical evidence has also indicated that structural change can have implications for inequality and poverty. Specifically, building on Kuznet's thesis, a body of research has found that, in developing and underdeveloped countries experiencing structural change, the decline in the agriculture employment share and the rise in the services employment share are associated with a reduction in poverty but also with an increase in inequality (Baymu and Sen 2019; Morsy et al. 2023). This pattern, referred to by López (2007) as the 'perverse effect of structural change', is driven by the shift of rural subsistence activities towards urban subsistence services and related sectors, resulting in slow economic growth and widespread poverty.

Following the existing literature, this research investigates the effect of structural change, specifically focusing on women's employment within the tertiary sector (retail trade and other services).² There are two main reasons driving this inquiry.

Firstly, similar to many other African countries, the tertiary sector in Cameroon has emerged as the most labour-intensive sector and a significant source of employment.³ However, women face greater challenges in accessing certain jobs and sectors than their male counterparts (Wirba et al. 2021). They encounter cultural barriers and social stereotypes rooted in their traditional roles within households and agricultural activities. In Cameroon as well as in numerous developing countries, women are more likely to be engaged in vulnerable employment when they enter the labour market compared to men (Breuer and Asiedu 2017; Jayachandran 2021).

Secondly, the existing literature has extensively documented the effect of structural change on female labour force participation, which is known as feminization U theory. Numerous studies have provided empirical and theoretical evidence that female labour market participation follows a U-shaped trend as countries undergo development and experience structural changes (Boserup 1970; Çağatay and Özler 1995; Gaddis and Klasen 2014; Mehrotra and Parida 2017; Rai et al. 2019). However, the effect of these structural changes on gender inequalities have been poorly documented. While a limited number of studies have explored this aspect, they primarily focus on gender inequalities in terms of labour market participation (Animashaun and Emediegwu 2023) or wage gap (Rendall 2013). Moreover, they typically focus on changes within the manufacturing industries and examine how industrialization either benefits or exacerbates gender equalities (Kucera and Tejani 2014; Saraçoğlu et al. 2018; Tejani and Kucera 2021; Tejani and Milberg 2016).

¹ According to Baumol (1967) there is a possibility of labour shifting from a sector with higher and rapidly growing productivity to a sector with lower and stagnant productivity, leading to a decline in the overall productivity growth rate of the economy, all else being equal. Similarly, Timmer and de Vries (2009) argued that growth accelerations are driven by productivity increases within sectors rather than the reallocation of employment to more productive sectors. McMillan et al. (2014) highlighted that structural change has had a growth-reducing effect in both Africa and Latin America since 1990, with particularly significant changes occurring in Latin America.

² The definition of the tertiary sector in this study follows the World Bank Enterprise Survey (World Bank 2016) and refers to industries in retail trade and other services (wholesale trade, information technology, hotels and restaurants, automobile maintenance, construction, and transportation).

³ Among the sub-sectors of Cameroon's tertiary sector, retail and wholesale trade have experienced strong growth in recent years, driven by increasing urbanization and growing consumer demand for goods and services. Similarly, the telecommunications and information technology sub-sectors have also witnessed significant expansion, fuelled by increased mobile penetration and internet usage. The tourism and hospitality sector has expanded to cater to the needs of both domestic and international tourists, capitalizing on the country's diverse range of tourist attractions (Capazario et al. 2020).

To the best of our knowledge, no study has provided evidence specifically within the service sector in developing countries, particularly in Africa.

To address these issues our paper makes a significant contribution by applying structural analysis tools to explore the relationship between structural change, women, and the tertiary sector in an African country. Furthermore, this study pays special attention to the role of skilled labour in driving the observed employment changes, particularly concerning women's employment. Despite its growth, the tertiary sector in Cameroon faces challenges related to the adequacy of the trained workforce (UNESCO 2020). The term 'adequacy' refers to workers or jobseekers who possess the skills and qualifications required by employers to fill available positions. The formal tertiary sector often demands professional certification, technical training, or a combination of specific skills but, unfortunately, these opportunities are not accessible to everyone. For instance the country experiences a scarcity of quality training and education programmes, leading to a low-skilled and unprofessional workforce in certain areas. Women are particularly affected as they still encounter cultural and social barriers which discourage them from pursuing vocational training in fields like engineering, science, technology, and technical trades, thereby limiting their opportunities in the job market.

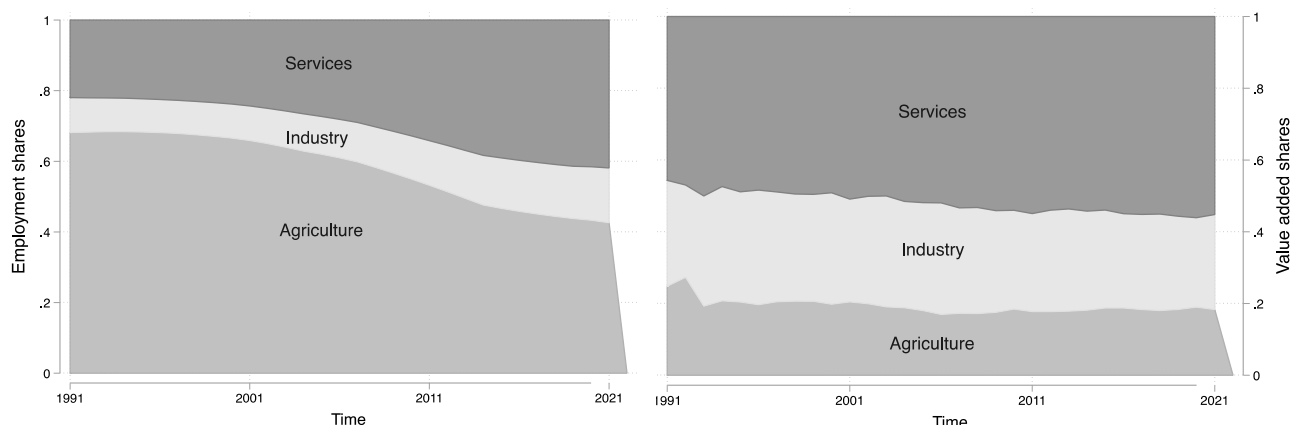
We employ a firm-level decomposition method to investigate whether the recent shifts in tertiary sector employment have led to positive outcomes for women in Cameroon. Subsequently, we seek to identify whether within-industry effects or reallocation effects are the driving forces behind these changes. Based on our findings, we provide empirical evidence that highlights the key factors driving these changes, with particular emphasis on inadequate workforce training.

The remainder of this paper is structured as follows: Section 2 presents an overview of structural change pattern and gender in Cameroon; Section 3 presents an explanation of the data and method; Sections 4 and 5 discuss the findings; and Section 6 concludes.

2 Patterns of structural change and gender in Cameroon

The trend of sectoral shares of value added and employment in Cameroon over the past three decades is illustrated in Figure 2. Over the years, there has been a gradual decline in the primary and secondary sectors, while the tertiary sector has experienced significant growth and the secondary sector has remained relatively stable. The primary sector, primarily agriculture, was the most dominant in 1991, accounting for nearly 68 per cent of total employment but less than 25 per cent of total value added. In contrast the services sector held approximately 22 per cent of total employment and emerged as the most productive sector, contributing around 44 per cent of total value added. The secondary industry sector remained the least dominant in both employment and value added. This pattern is similar to that observed in most sub-Saharan African economies with similar development models, indicating that the structural change pattern tends to bypass the secondary sector. As highlighted by Cadot et al. (2016), the manufacturing sector has not experienced substantial development in terms of employment and value added in sub-Saharan Africa as a whole.

Figure 2: Sector shares in the Cameroon Economy (1991–2021)



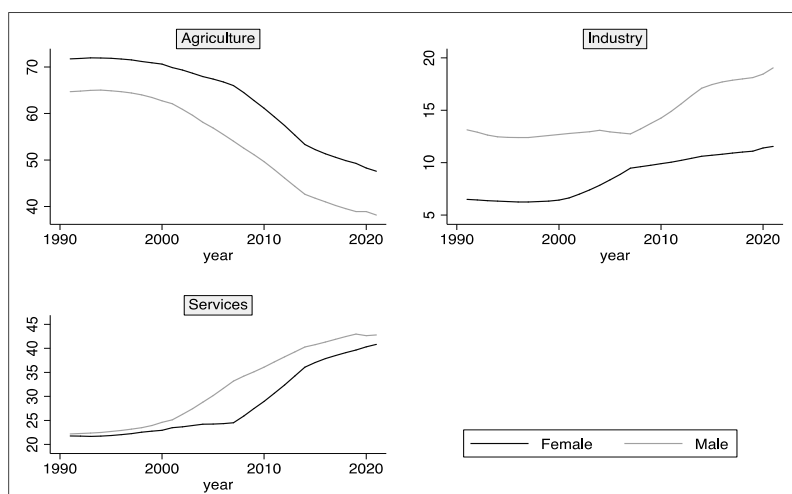
Note: employment shares, presented as a percentage of total employment, indicate the proportion of full-time employees in each sector, while value-added shares represent the respective shares of total value added by the three sectors as a percentage of gross domestic product.

Source: author's construction based on World Development Indicators (World Bank 2023) and ILOstat (ILO 2021) data.

Now, let us examine these trends by gender, specifically focusing on employment (Figure 3). Overall, the observed trends remain consistent with the previous patterns: a decline in the agricultural sector and an increase in the services sector. However, while these patterns appear similar for both men and women, they do reveal differences between sectors.

In the agricultural sector the employment rate for women remains higher than that of their male counterparts. This higher representation of women in agriculture can be attributed to social and cultural norms in Cameroon, where women are primarily responsible for food production. They have easier access to resources and opportunities in this sector, including land, seeds, water, and agricultural credit. Additionally, due to disparities in access to education and the agricultural sector relying less on formal qualifications, it offers more employment opportunities for women. Conversely, in the industrial and services sectors, the employment rates of women are lower compared to men. This can be attributed to the fact that these sectors often have work demands that do not always align with the family constraints and domestic responsibilities of women.

Figure 3: Gender employment shares in Cameroon sectors (1991–2021)



Source: author's construction based on ILOstat (ILO 2021) data.

By focusing specifically on the services sector, Table 1 presents data on employment change in the services sector for selected developing countries, with a focus on gender-related employment data measured through the gender gap ratio. Observing the data for the top four developing countries with the highest change in services employment (difference between the employment rate in 2020 and that observed in 1991), we note that China has the highest percentage of total employment in the services sector, closely followed by St. Lucia, Yemen, and Mauritius. Among these countries Mauritius exhibits the largest gender gap in the change of employment in the tertiary services sector, with women accounting for a change of 41.15 per cent, which is more than double the change in the male employment rate (17.43 per cent).

Focusing specifically on African countries, Cameroon shows the smallest gender gap in the change of employment in services, with women accounting for 18.57 per cent, which is lower than the male employment rate (20.47 per cent). The gender parity gap is unfavourable to women, whereas in other countries the change in the female employment rate in services has exceeded that of men. According to ILOSTAT data the country ranks 18th among developing countries with the highest change in employment in the services sector, fifth at the continental level, and first in Central Africa. Furthermore, out of the 17 developing countries it precedes, Cameroon is the second, and first in Africa, where male employment in services is higher than that of females. The overall trend leans towards feminization of the services sector in other countries, while in Cameroon, between 1991 and 2020, it was more towards masculinization of this sector.

This data suggests that in certain countries, women are relatively better represented in service sector employment compared to men, while in other countries, as is the case for Cameroon, the gender gap in service employment is more balanced.

Table 1: Case study of tertiarization and gender in other developing countries

Country name	Employment change in services	Employment change in services, female	Employment change in services, male	Gender gap
Top 4 developing countries with the highest change in services				
China	28.51	34.23	23.78	1.43
St. Lucia	27.08	27.72	23.04	1.20
Yemen, Rep.	26.50	26.39	23.15	1.14
Mauritius	26.11	41.15	17.42	2.36
Top African countries with the highest change in services				
Namibia	24.84	31.22	17.83	1.75
Benin	22.82	27.73	17.92	1.54
Senegal	20.86	25.55	16.46	1.55
Cameroon	19.58	18.57	20.46	0.90

Note: we present data for only a few countries that deserve special attention. Information for other countries can be obtained using the ILOSTAT database. Employment change is calculated as the employment rate in 2020 minus the employment rate in 1991. The gender gap is obtained by taking the ratio of the change in female employment to male employment.

Source: author's calculations based on ILOSTAT (ILO 2021) data.

3 Data and method

3.1 Data description

Our main data source is the World Bank Enterprise Surveys (World Bank 2016) which provide detailed information on private sector firms. The data used is drawn from the two latest surveys (2009 and 2016). The analysis is based on data related to employment in the formal industries of the tertiary sector according to the International Standard Industrial Classification (ISIC), revision 4. This includes retail trade (ISIC 52) and other services, including wholesale trade (51), accommodation and food services (55), automotive repair (50), construction (45), and transportation (60–64).

Employment refers to the total number of permanent full-time employees (including directors) employed by the firm at the end of the last financial year. Permanent full-time employees are defined as all employees who are remunerated on a contractual basis for a period of one fiscal year or more and/or who have the assurance that their employment contract will be renewed, and who work full-time hours throughout the day.

By selecting only firms that had available data on total employment and female employment, we obtained a pooled sample of 461 firms for 2009 and 2016. The analysis encompasses the three main regions of the country: Centre, West, and Littoral.

Table 2 presents the descriptive statistics of the data for the various industries studied. We observe that the retail trade, wholesale trade, and hotel and restaurant industries exhibit relatively similar firm averages, with 233, 65, and 68 surveyed firms, respectively. However, the standard deviation is higher for wholesale trade and hotels and restaurants, indicating a greater variation in the number of firms in these sectors. On the other hand the industries of services of motor vehicles, construction, and transport have fewer surveyed firms, with 33, 38, and 24, respectively. The average number of firms is higher in the construction industry (63.5), indicating a higher concentration of firms compared to other industries studied. However, the standard deviation is also higher for construction and transport, which could be related to regional variations or specific characteristics of these industries. Overall, these results suggest that certain industries display more diversity in terms of the number of firms, while others show a higher concentration.

Table 2: Descriptive statistics

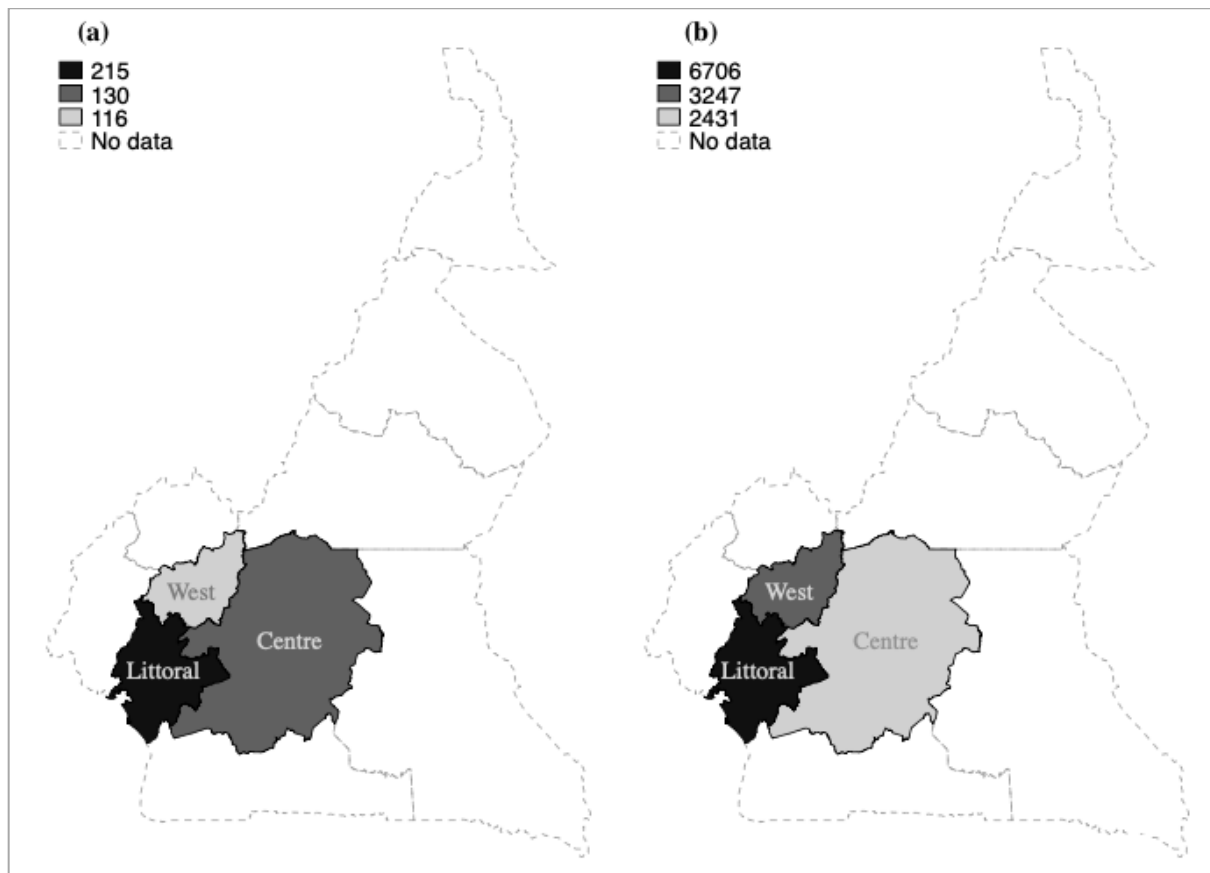
ISIC	Industries	N	Mean	SD	Min	Max
52	Retail	233	15.07	22.08	1	170
51	Wholesale	65	29.03	51.23	2	362
55	Hotel and restaurant Section H	68	29.52	51.59	1	324
50	Services of motor vehicles	33	27.42	44.96	3	150
45	Construction Section F	38	63.5	100.9	5	500
60-64	Transport Section I	24	69	58.11	5	210

Source: author.

Figure 4 highlights the spatial distribution of the total number of selected firms (a) and total employment (b) in the regions considered. The Littoral region stands out with the highest number of firms, with 215 establishments, and also records the highest number of jobs, employing 6,706 individuals. This suggests that the Littoral region is a significant centre of economic activity and employment opportunities. In comparison the Centre region has a total of 130 firms, which is lower than the Littoral region, but still maintains a considerable level of total employment. On the other hand the West region, despite having the lowest number of firms, manages to secure the

second-largest number of jobs among the three regions studied. This may indicate that the West region hosts larger businesses or industries with a substantial workforce.

Figure 4: Distribution of firms and total employment in the study



Source: author's construction. This map was created using Diva-Gis (version 7.5). GIS shapefiles on administrative areas (GADM) were downloaded from: <https://www.diva-gis.org/gdata>. The firm-level data used is from World Bank Enterprise Surveys (World Bank 2016).

The map provides valuable insights into the regional economic landscape, highlighting variations in firm concentration and employment across the regions studied. Although the resulting disparities may be influenced by various factors, such as the presence of industries, infrastructure, economic policies, and regional development initiatives, which are not considered in this study, these preliminary analyses are essential for a better understanding of the implications we are investigating further, particularly concerning women.

3.2 Decomposition method

In the literature several studies have examined the impact of structural changes between sectors using canonical decomposition methods, particularly shift-share analysis. First introduced by Fabricant (1942), shift-share analysis allows for the assessment of the contribution of structural change to overall productivity growth by decomposing it into two components: changes in productivity within each sector (referred to as the within effect) and changes in the sectoral allocation of labour (referred to as the between effect or structural change effect). However, as mentioned earlier, this study focuses not on the contribution of these changes to growth but on total female employment. Therefore, our interest lies not in the shift in the sector's workforce based on its level of productivity but in the changes in employment based on the sector's level of labour intensity.

The decomposition method used in this study follows the approach of Kucera and Tejani (2014), which was originally applied to the manufacturing industries. In this method female tertiary employment is decomposed into two components: intra-industry effects and reallocation effects based on total employment in the tertiary sector.

Let $S = F/T$ represent the female share in total tertiary employment and $s_i = f_i/t_i$ the share within each specific industry. The decomposition can be formulated as follows:

$$S = F/T = \sum f_i / \sum t_i \quad (1)$$

By considering first-order differences over time, the change in the female share of tertiary employment compared to the initial year can be expressed as follows:

$$\theta = S_1 - S_0/S_0 = \sum_i [\varphi_{i0}(g_i - n_i) + (\varphi_{i0} - \delta_{i0})n_i] \quad (2)$$

where $\varphi_{i0} = f_{i0}/F_0$; $g_i = f_{i1} - f_{i0}/f_{i0}$; $n_i = t_{i1} - t_{i0}/t_{i0}$; and $\delta_{i0} = t_{i0}/T_0$. Indices 1 and 0 respectively represent the final period and the base year, which in this study correspond to 2016 and 2009, respectively.

The first term on the left side of equation (2) measures the within-industry effect, which is the difference between the growth rate of female employment and the growth rate of total employment. The within-industry effect is positive if female employment in the industry has grown at a higher rate than total employment. The second term on the right side determines the reallocation effect, which is measured by the difference between the distribution of female employment in the industry and the distribution of total employment, multiplied by the growth rate of total employment in the industry. It is positive if, during the period under consideration, the level of employment in industries where the difference between the distribution of female employment and that of total employment was positive increased.

4 Findings

Table 3 presents the results of the decomposition. We find that overall in the tertiary sector of Cameroon the past decade has been characterized by a feminization of employment estimated at approximately 6.2 per cent, with 2.4 per cent for the retail sector and 3.8 per cent for the services sector. Overall, the observed feminization has been mainly driven by the construction services and wholesale. The finding in the wholesale sector is consistent with empirical evidence. This evidence suggests that the concentration of women in this sector is influenced by gender norms and stereotypes, which align with societal expectations regarding women's employment. Additionally, the wholesale sector tends to be more accessible in terms of educational requirements and specific skills. The result for the construction industry is somewhat curious but is particularly encouraging. Construction is often considered as masculinizing and a vast literature explains the apparent preference of employers for male workers due to the lesser importance of low-paid female labour in capital-intensive production (Greenstein and Anderson 2017; Tejani and Kucera 2021). In this study we find that construction industries have witnessed a significant feminization of employment. As Saraçoğlu et al. (2018) argue, this result can be explained by the fact that certain construction tasks may not require specialized technical skills and, as a result, may appear more accessible to women. Unlike the retail, construction services, and wholesale industries, the transport and hotel and restaurant industries have experienced a defeminization trend. The result for the transport industry can be explained by the more hostile work environment for women,

with challenging working conditions or safety concerns, which may discourage women from pursuing a career in this sector.

Table 3: Decomposition of changes in females shares of employment in tertiary industry (%)

Industry	Within-industry effect	Reallocation effect	Changes in the female share of employment
Retail	5.0	-2.6	2.4
Construction	1.5	3.5	5.1
Hotels and restaurants	5.4	-6.3	-0.8
Services of motor vehicles	-0.5	0.5	0.03
Transport	1.0	-4.5	-3.5
Wholesale	1.7	1.3	3.1
Total	14.3	-8.0	6.2

Source: author.

In addition we find that the within-industry effects are more significant than the reallocation effects in explaining these changes (Table 4). With the exception of the motor vehicle services industry, in all other industries, the within-industry effect has been positive. This implies that the feminization in the tertiary sector has been primarily driven by an increase in the share of female employment within these industries.

Taking account of the results of each component (within and reallocation effect), it becomes evident that the most significant factor in the feminization of tertiary employment is the increase in the proportion of women in the hotel and restaurant industries (5.4 per cent). At the same time, this sector has also experienced the largest decrease in the reallocation effect (-6.3 per cent). As the decrease in the reallocation effect outweighed the increase in the within effect, the consequence has been a defeminization in this sector.

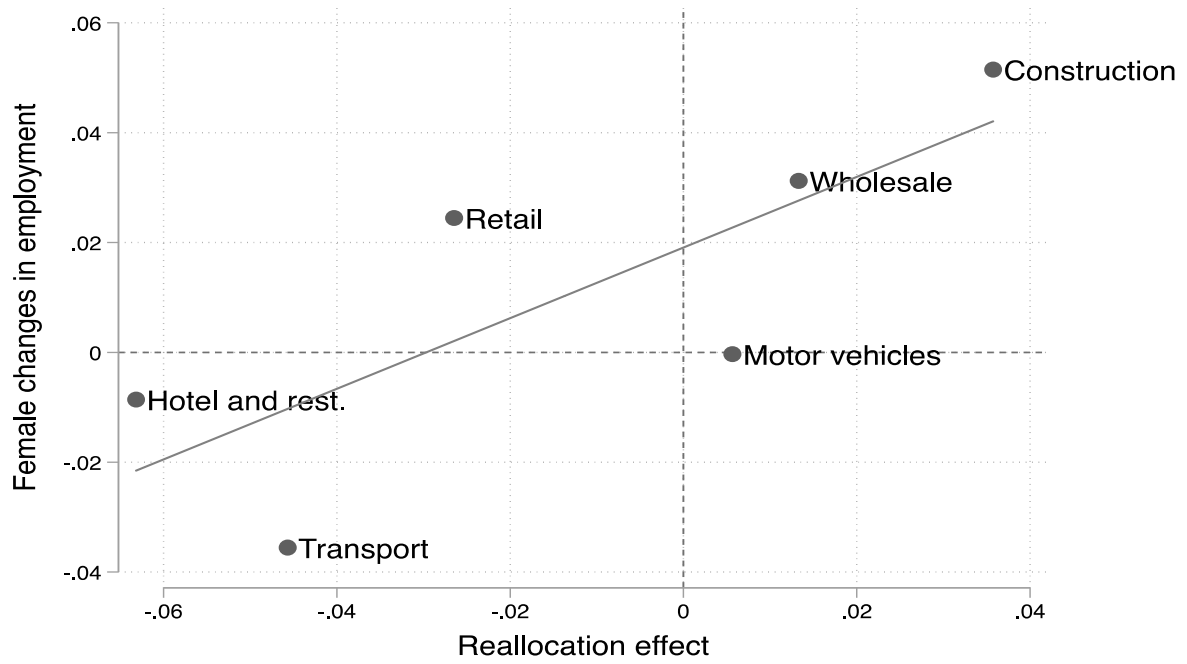
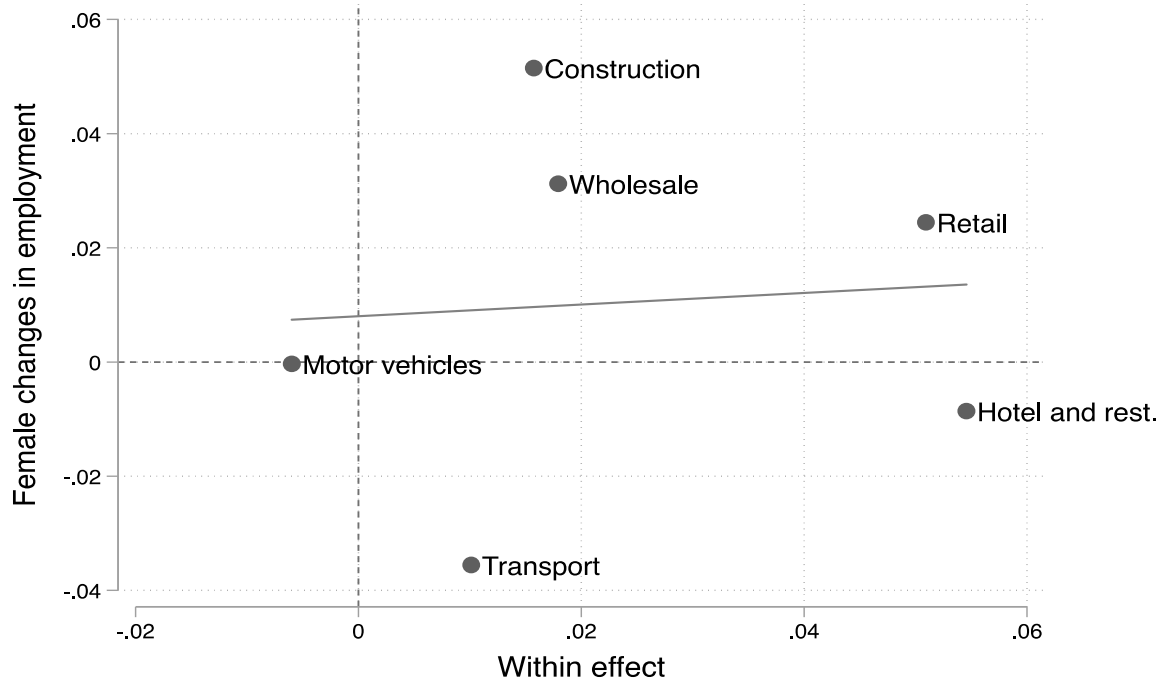
Table 4: Summary

Patterns	Industry	Profiles
Feminizing	Retail	Positive within-industry effect and negative reallocation effect
	Wholesale	Positive within-industry effect and reallocation effect
	Construction	
	Services of motor vehicles	Negative within-industry effect and positive reallocation effect
Defeminizing	Hotels and restaurants	Positive within-industry effect and negative reallocation effect
	Transport	

Source: author.

These findings suggest that, all else being equal, a structural change characterized by the development of labour-intensive sectors would have a limited decisive effect on women in this sector and, in general, as patterns of (de)feminization are generally driven by within-industry effects rather than reallocation effects. As Figure 5 shows, the reallocation effects appear to have a stronger positive correlation with feminization than the within-industry effects. Within-industry effects typically reflect employment movements between different occupations, depending on factors such as qualification levels and skills, within the same sector. In a sector experiencing an increased demand for skilled workers for example, there may be a restructuring of employment characterized by a decrease in the employment of less-qualified workers in favour of qualified ones, without necessarily causing a change in the overall sector employment or women's employment.

Figure 5: correlation between within effect (respectively reallocation effect) and female changes in employment (2009–16)



Source: author's construction based on decomposition results.

5 How important is the (in)adequately trained workforce?

The previous results showed feminization of employment in the tertiary sector, primarily driven by within-industry effects. However, the within-industry effect particularly in the Cameroonian tertiary sector, which is predominantly private, can be ‘endogenous’⁴ in the sense that it is determined or conditioned by internal factors or characteristics specific to each industry or other relevant economic actors. As such, external or exogenous factors such as government policies or broader structural changes in the economy are likely to have difficulty in impacting the within-industry dynamics and, consequently, encouraging employment feminization.

In this section we posit that, to encourage feminization (respectively reduce defeminization), more attention should be given to internal factors that affect labour demand within industries. These factors may include the nature of available jobs, the organizational culture of firms, the level of technology, productivity, or subjective considerations such as business choices and worker preferences. In this paper we specifically focus on the level of skills and qualifications of workers. Indeed, international organizations such as the World Bank, UNESCO and ILO (2023), unanimously agree on the critical role of skills and qualifications in improving employability. They emphasize that people with relevant and market-oriented skills are more likely to find quality employment and succeed in their transition into the workforce. We approximate this by the (in)adequately trained workforce derived from the 2009–16 Cameroon Enterprise Survey of the World Bank (World Bank 2016).

The survey index refers to the percentage of firms that perceive the level of education and training of the available workforce as insufficient to meet the skill requirements for operating their businesses. According to Dinh et al. (2010), this index can provide valuable insights into issues related to skill and education mismatches in a given economic context. It is based on responses provided by participating firms in the survey. Its purpose is to assess the alignment between the skills and education of available workers in the local labour market and the specific requirements of the businesses. If a high percentage of firms perceive that the available workforce lacks the necessary skills, it can indicate challenges and obstacles in terms of human resources and employability in that region or country. In the survey the obstacles of inadequation are categorized into five levels: no obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle. The index ranges from 1 to 5, corresponding to each level of mismatch.

5.1 Evidence from fixed-effects estimates

To empirically test how internal factors within industries may influence feminization in the tertiary sector in Cameroon, we employ a fixed-effects model to estimate the effect of an inadequately trained workforce, as well as other factors, on the share of female employment in the tertiary sector. The fixed-effects model allows us to control for time-invariant factors specific to each industry that may affect the dependent variable (Wooldridge 2005).

In the remainder of the article, the dependent variable is the share of female employment within each firm. As discussed in subsection 3.2, this is calculated by determining the proportion of the total number of female employees relative to the entire workforce of the firm, which includes both women and men. The key independent variable of interest is the extent to which the firm

⁴ ‘Endogenous’ here refers to factors that are internal to each firm, meaning they depend on the motivations and specific considerations of each firm. In contrast ‘exogenous’ factors refer to more general considerations that often depend on the government or external influences.

encounters obstacles due to the inadequately trained workforce. We also include other control variables that are likely to influence the share of female employment. These are sample size, firm size and age, international certification, legal status, firm competitiveness within the informal sector, obstacles to electricity infrastructure and crime, and the percentage of tertiary industries in each region. More specifically, the literature argues that international certification of firms contributes to increased productivity and business performance through efficiency gains (Goedhuys and Sleuwaegen 2013). Regarding firm size and age, research suggests that small and mature firms, particularly those older than ten years, exhibit higher job creation rates compared to large and mature firms (Ayyagari et al. 2011). Evidence indicates that informal competition has a negative impact on the productivity of firms in the formal sector (Beltrán 2020). Empirical results also demonstrate that eliminating electricity outages could lead to an increase in firm productivity (Abeberese et al. 2021). Factors such as crime, theft, and public disorder serve as obstacles that discourage the employment of women (Bruhn 2009). In addition to the aforementioned variables, we introduce a variable that accounts for the representation of service firms at the regional level. As depicted in Figure 3, the Littoral region exhibits the highest concentration of firms in the tertiary sector. According to the National Institute of Statistics of Cameroon (NIS 2020), there were approximately 7,7981 firms in this region in 2016, compared to 5,6654 and 1,4291 in the Centre and West regions, respectively. All variables used are described in Table A1 in the appendix.

Table 5: Fixed-effect regressions of drivers of female share of employment in the tertiary sector

	Dep. var. = female share of tertiary employment					
	(1)	(2)	(3)	(4)	(5)	(6)
Inadequately trained Workforce	-0.0240* (0.0129)	-0.0348*** (0.0127)	-0.0340** (0.0148)	-0.0342** (0.0152)	-0.0293* (0.0154)	-0.0278* (0.0154)
Age of establishment		-1.19e-04*** (2.98e-05)	-1.18e-04*** (3.01e-05)	-1.18e-04*** (3.02e-05)	-1.05e-04*** (3.25e-05)	-1.04e-04*** (3.33e-05)
International certification		-0.0048 (0.0045)	-0.0046 (0.0046)	-0.0047 (0.0047)	-0.0043 (0.0048)	-0.0037 (0.0049)
Legal status		0.0036 (0.0176)	0.0037 (0.0174)	0.0037 (0.0174)	0.0103 (0.0165)	0.0103 (0.0166)
Competition with informal sector		0.0368** (0.0183)	0.0369** (0.0182)	0.0369** (0.0183)	0.0291* (0.0169)	0.0301* (0.017)
Electricity obstacles		0.0027 (0.0078)	0.003 (0.0084)	0.0031 (0.0083)	0.0042 (0.0078)	0.0038 (0.0079)
Crime, theft and disorder obstacles			-0.0022 (0.0175)	-0.002 (0.018)	-0.0028 (0.0175)	-0.0035 (0.0175)
Sampling size				0.0044 (0.0506)	0.0363 (0.0536)	0.0417 (0.0529)
Firm size					-0.0857** (0.034)	-0.0824** (0.0349)
Regional share of firms in tertiary sector						1.05e-06 (1.52e-06)
Time fixed effects	No	Yes	Yes	Yes	Yes	Yes
Constant	0.3836*** (0.0325)	0.5420*** (0.0881)	0.5419*** (0.0883)	0.5358*** (0.1242)	0.5668*** (0.1255)	0.4597** (0.1979)
Observations	478	444	444	443	443	443
R-sq	0.026	0.141	0.141	0.141	0.199	0.202

Note: robust variance-covariance estimation. Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: author's estimates.

The results obtained are summarized in Table 5. After several simulations which incorporate control variables, we observe a significant and negative effect of the inadequately trained workforce. This seems to suggest that, overall, the trained workforce is not well aligned with the needs of the labour market demand in the tertiary sector. As Rees (2022) pointed out, in many developing countries a disparity exists between the skills possessed by the workforce and those demanded by the labour market. This discrepancy may stem from limited access to quality education or insufficient training programmes. Consequently, workers may lack the necessary skills for available job positions. In Cameroon, despite the implementation of various programmes in recent decades to address this issue, women still encounter more barriers than men in accessing quality training opportunities (NIS 2020). This can impede their suitability for the labour market's requirements. Moreover, women often bear family and domestic responsibilities that limit their ability to participate fully in training and the development of skills specific to the demands of the labour market, particularly within the tertiary sector.

5.2 Endogeneity issue

It is possible that the aforementioned results may be subject to endogeneity bias. Indeed, there could be a reverse causality between the share of female employment and the inadequately trained workforce through the supply and demand channel. The previous analysis revealed that inadequate training could restrict opportunities for women in the tertiary sector. However, on the other hand, if the tertiary sector provided ample employment opportunities for women, it could serve as an incentive for them to pursue training in areas specific to this sector.

To address this potential simultaneity in our analysis, we employ an instrumental variable (IV) regression approach. One of the main challenges associated with IV regression methods is identifying the appropriate instrument. In our case it would involve finding exogenous variables that are correlated with training inadequacy but not directly linked to women's employment share. An instrument that would have been relevant for this study is educational reform. If educational reforms had been implemented in Cameroon during the study period (2009–16) to address training mismatches, the introduction of these reforms could have served as an instrument to estimate the causal effect of women's employment share and training mismatch. However, to the best of our knowledge, no such reforms have been implemented in Cameroon over the past decade. The most recent significant educational reform in Cameroon occurred in 2006 with the adoption of the *Approche par Compétences*, which replaced the previous *Pédagogie Par Objectif* approach.⁵ The absence of data for the period prior to 2006 makes it impossible to assess the impact that such a reform has had on the Cameroonian education system and to use these results as an instrument in this study.

Nonetheless, we suggest using regional variations as an instrument. We hypothesize that inadequacy varies across different regions of the country such as the Centre, West, and Littoral regions. In Cameroon certain regions have more advanced training programmes and institutions than others, leading to significant disparities in the average education level (NIS 2020). A region with a higher average education level may indicate the presence of skilled labour and appropriate training opportunities. Therefore, we use a dummy variable that accounts for the different regions and their average regional literacy levels to instrument the variables related to workforce training inadequacy. This is derived by dividing the number of literate individuals within the region (aged between 15 and 64) by the total population, and then multiplying by 100 to obtain the percentage. The definition of literacy used follows UNESCO's (2006) criteria, which include individuals who

⁵ Ministerial order of 21 February 2006: n°315/B1/1464/MINEDUB.

can read and write or have at least a secondary education. Data for these variables at the regional level is sourced from the National Institute of Statistics of Cameroon (NIS 2020).

The estimated results using the two-stage least-squares (2SLS) method are presented in Table 6. We provide the results for the first and second stages of various model specifications (with and without controls).

Table 6: IV 2SLS regressions results

	Dep. var. = Inade. trained workforce	Dep. var. = female share of employment	Dep. var. = Inade. trained workforce	Dep. var. = female share of employment
	First stage	Second stage	First stage	Second stage
Regional female literacy	-0.1814*** (0.0407)		-0.1653*** (0.0418)	
Regional dummy	0.1222*** (0.0301)		0.2356** (0.0270)	
Inadequately trained workforce		-0.1194** (0.0522)		-0.1472** (0.0634)
International certification			-3.65e-04** (1.62e-04)	-6.27e-05 (4.48e-05)
Legal status			0.0068 (0.0208)	-0.0055 (0.0053)
Competition with informal sector			0.0433 (0.0539)	0.0247* (0.0139)
Electricity obstacles			0.1711*** (0.0452)	0.0327** (0.0166)
Security obstacles			0.0740** (0.0328)	0.0126 (0.0094)
Constant	18.7506*** (3.6391)	0.6235*** (0.1325)	17.3055*** (3.8024)	0.6412*** (0.1697)
Observations	468	468	444	444
R-sq	0.041	.	0.095	.
F stat.	5.20**		7.61***	
Endogeneity stat. (Durbin)		7.592		8.363
P-value of endogeneity stat		0.0059		0.0038
Sargan stat.		0.0005		0.0222
P-value of Sargan		0.9817		0.8814

Note: standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Ho test of Durin: variables are exogenous. Ho test of Sargan: Instruments are valid.

Source: author's estimates.

Overall, the findings confirm the previous results, indicating that inadequate training of the workforce negatively influences the feminization of employment in the tertiary sector in Cameroon. To assess the endogeneity of the variable 'inadequacy of workforce training' in our model, we conduct the Durbin-Wu-Hausman test. The corresponding p-values for the Durbin statistics are reported at the bottom of the table. These p-values are below the 5 per cent significance level, suggesting that our variable of interest is indeed endogenous and indicating the presence of potential simultaneity bias. Additionally, the p-values of the Sargan test indicate statistical insignificance (high p-values), affirming the validity of our instruments.

5.3 Selection bias issue

The previous results may be affected by a selection bias issue. Certain characteristics of the firms such as firm size, industry sector, or geographic location may influence the selection of firms to participate in the World Bank Enterprise Survey. If these characteristics are related to the variables of interest such as the inadequately trained workforce or female employment, it can introduce bias in the results. Additionally, regional heterogeneity could contribute to the selection bias, as firms included in the survey may be overrepresented or underrepresented in the sample, as shown in Figure 4's mapping. Furthermore, the three regions considered in the analysis have specific characteristics that differentiate them from other regions in Cameroon. These geographic differences can influence the dynamics of female employment and the inadequately trained workforce in the industries, potentially introducing geographical bias. Similarly, specific characteristics of regions not included in the sample could also impact the previous results.

To address these issues we use the propensity score matching (PSM) method, which is based on a counterfactual inference framework that associates two sets of samples using observable conditions to construct unobservable elements that can be compared with real observations (Rosenbaum and Rubin 1983). This approach has the advantage of considering causal effects based on real data while controlling for potential selection biases. Indeed, the causal effect of the inadequately trained workforce on changes in female employment is assessed by creating binary dummy variables to divide firms into a treatment group sample facing inadequacy obstacles and a control group sample without obstacles. In other words, we decompose the variable 'inadequately trained workforce' into four binary variables, taking values 0 and 1, respectively, for each level of inadequacy in the trained workforce. Thus the first variable 'minor inadequacy' takes the value 0 for no obstacle and 1 when the obstacle to inadequately trained workforce is minor. The same principle applies to the variables 'moderate inadequacy', 'major inadequacy', and 'severe inadequacy'. The two groups are matched on the basis of the probability of adopting the treatment. This probability (the propensity score) is established using a logit model as follows:

$$P(D = 1|X) = \text{Exp}(\beta X) / [1 + \text{Exp}(\beta X)] \quad (3)$$

where D is whether the firm is subjected to treatment or not, X is a matching variable representing the observed characteristics, and Y_0 and Y_1 are, respectively, the average levels of the share of female employment in the two groups considered.

Using the estimated propensity score for the level of inadequacy obstacle, firms in the treatment group are matched, and the conditional independence and common support conditions are established, i.e. $E(Y_0|D = 1, X) = E(Y_0|D = 0, X) = E(Y_0|Ci)$, in order to find potential 'counterfactual' control samples for the treatment group samples.

Based on this the difference in the average change in female employment between the two sample groups, namely the average treatment effect (ATT) of participants, is expressed by equation (4):

$$ATT = N_1^{-1} \sum_{i \in I_1} [Y_{1i} - E(Y_0|D = 0, X = X_i)] \quad (4)$$

where N_1 represents the number of firms in the matched treatment group and I_1 is the sample set of the matched treatment group. We use kernel matching, a PSM method that assigns weights to control group observations based on their similarity to treated units using the propensity score. It considers the full score distribution for weighting, resulting in smoother weighting with higher weights for closer matches. This flexible approach enhances accuracy, especially for complex score distributions (Hirano et al. 2003).

The results of the ATT are summarized in Table 7, while those of the propensity score estimation by the logit model and diagnostic tests regarding common support are reported **respectively in Table A2 and Figure A1** in the appendix. Overall, the results confirm those obtained previously. They suggest a negative causal effect of the inadequately trained workforce on the share of female employment. However, the significance of this effect is observable only when the level of inadequacy is substantial, namely moderate, major, and severe.

Table 7: Propensity score kernel matching

	Minor inadequacy	Moderate inadequacy	Major inadequacy	Severe inadequacy
ATT	-0.002 (0.099)	-0.021* (0.012)	-0.026** (0.013)	-0.026** (0.013)
Treated	132	98	96	28
Controls	346	380	382	450
Band-width	0.021	0.021	0.021	0.021

Note: robust standard errors (after 500 bootstrap) are reported in parentheses. ***, **, * imply significance at the 1%, 5%, and 10% levels.

Source: author's estimates.

The diagnosis (Figure A1 in the appendix) regarding common support ensures that, in our sample, firms with the same characteristics have a positive probability of being both treated and untreated. The matched sample (right) has only one row, as there are no large deviations. This suggests that, after the application of matching, the two groups are almost similar on average.

6 Conclusion and policy implications

This article examines how changes in Cameroon's tertiary sector employment benefited women during the period from 2009 to 2016. Using a decomposition method on firm-level data from the retail and service industries, we find a feminization pattern of approximately 6.2 per cent. Specifically, we find that retail, construction, motor and vehicle services, and wholesale have become more feminized, while the hotel and restaurant sector and transportation have been defeminized. However, the intra-industry effect has had a predominant role (14.3 per cent) in explaining this overall feminization, while the reallocation effect has been negative (-8 per cent). These results suggest that the feminization pattern in the tertiary sector is primarily determined by intra-industry factors which are generally specific to each industry. We conclude that, for a more decisive effect on (de)feminization in employment within the tertiary sector, policies should prioritize considerations specific to each industry. To further explore this we estimate an econometric model focusing on the obstacle of an inadequately trained workforce. Controlling for industry, location, and year fixed effects as well as endogeneity and selection bias issues, we find evidence of a negative effect on the share of women's employment in the tertiary sector.

However, it is important to mention that, in this article, we do not conduct an analysis of Cameroon's tertiary sector as a whole. Sub-sectors of services such as business and finance, which have experienced significant job growth in recent decades (Figure 1), were not included due to data unavailability. Similarly, although the three main regions covered in this study appear to be the most representative of Cameroon's economy, the inclusion of other regions such as the North and Far North of the country might have altered the results obtained. In these regions the population is primarily rural, with an economy focused on agriculture, livestock, and trade. Moreover, these regions of the country are more prone to socio-economic, cultural, and religious barriers that limit women's access to professional training opportunities and formal employment.

Thus, we do not claim that this study accurately portrays the pattern of feminization in the tertiary sector across Cameroon. Far from it—it simply provides evidence, based on recent facts and ongoing development strategies in the country, of the need to integrate the consequences of structural change strategies for women.

The findings of this study have implications for both empirical discussions and policy makers. In recent years there has been a debate in the literature regarding whether the global currents of economic modernization have led to social modernization, which encompasses improvements in job quality and reductions in inequalities among different groups of workers (Rossi 2013). Specifically focusing on gender differences, studies have observed (de)feminization in the context of modernizing the manufacturing sector (Saraçoğlu et al. 2018; Tejani and Kucera 2021). This study takes account of recent trends that highlight the tertiary sector as the new development paradigm for developing countries given its high employment capacity and productivity. Therefore, it offers a more profound comprehension of the patterns of (de)feminization that may arise alongside the modernization of the tertiary sector. Its aim is to ensure that women benefit fully and have equal opportunities to their male counterparts in the processes of structural change.

To achieve this in Cameroon certain measures should be encouraged. The transition of the Cameroonian economy towards the tertiary sector is generating increasing demand for specific skills in these fields. This study emphasizes the significance of workforce inadequacy for the feminization of employment as well as the rise in unemployment and underemployment. Recognizing these challenges, Cameroon's National Development Strategy, formulated in 2020 to guide the government's development policies until 2030, acknowledges the importance of ensuring workforce training adequacy as a fundamental pillar for sustaining economic growth and promoting social inclusion.

Building upon this the study highlights the need for enhancing education and training programmes with market-oriented strategies. Cameroon's education system, inherited from the colonial era, has undergone limited change since independence (Bekkouche and Dupraz 2023). Only two significant reforms have been implemented thus far: acknowledging the bilingual nature of the country due to its Franco-British co-tutelage and adopting a competency-based approach. This approach aims to empower learners by equipping them with the necessary knowledge and problem-solving skills to tackle everyday challenges effectively. In light of these findings it is recommended that initiatives aimed at improving education and training are further strengthened, aligning them with market demands.

Despite significant efforts Cameroon, like many other developing countries in Africa, continues to face numerous obstacles in providing guidance and support in specific technical fields. Women are particularly affected by these obstacles, which predominantly stem from social pressures exerted by families, communities, and society and influence their educational choices. Referring to UNESCO's statistics on student distribution by programme orientation, which aim to provide information on the orientation and capacity of educational programmes and the potential supply of skilled workers in various specializations, Cameroon had a rate of 80.5 per cent in 2021. In comparison Chad had a rate of 98.7 per cent, Benin 95.7 per cent, and Burkina Faso 96.9 per cent, and the average for sub-Saharan Africa was 93.8 per cent (UNESCO 2023). These figures highlight the disparity in programme orientation and the potential impact on the availability of qualified workers in Cameroon.

Although numerous vocational high schools have been established, the content of the training programmes has remained largely unchanged. It is necessary for the vocational training curriculum to better align with the country's specific needs, taking account of the prevailing context. For instance, in addition to the significant presence of the tertiary sector, Cameroon has a high

percentage of households engaged in agriculture (54.5 per cent, with 81.8 per cent located in rural areas), and the land is fertile (FAO 2022). Based on these observations it is crucial to recognize the importance of incorporating agricultural courses into the curriculum and even consider the creation of specialized tracks dedicated to this field from primary to secondary school levels.

While the training content is crucial, it does not encompass the entirety of the solution. It is equally important to foster collaboration between the private sector and the education sector through organizing more open days, seminars, and awareness-raising conferences in schools. The objective is to enhance individuals' awareness, especially among young people, of the diverse career opportunities that exist, including those that challenge traditional norms and gender stereotypes.

Finally, all of the aforementioned measures should consider regional disparities, particularly the skills required in the local labour market. For instance, establishing vocational schools in each region, with a focus on industries and sectors specific to each region, would help reduce disparities and address patterns of structural change characterized by significant youth migration to urban centres in search of better opportunities and improved well-being.

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Appendix

Table A1: Variable definitions

Variables	Definitions
Female employment	Total number of female permanent and full-time employees (including directors) employed by the firm at the end of the last financial year.
Female employment share	The share of female employment in the firm's total employment.
(De)feminization	The increase (respectively decrease) in female employment between two periods (in this case 2009–16).
Within effect	The difference between the growth rate of female employment and the growth rate of total employment.
Reallocation effect	The difference between the distribution of female employment in the industry and the distribution of total employment, multiplied by the growth rate of total employment in the industry.
(In)adequately trained workforce	The extent to which an inadequately trained workforce hampers the current operations of the establishment. It is calculated based on responses from participating firms to the question: 'To what extent is an inadequately trained workforce an obstacle to the current operations of the establishment?' (No obstacle, minor obstacle, moderate obstacle, major obstacle, and severe obstacle).
Age of establishment	Year establishment began operations.
International certification	Categorical variable defining whether or not the facility has an internationally recognized quality certification.
Legal status	Categorical variable defining whether or not the establishment has legal status.
Competition with informal sector	How much of an obstacle: practices of competitors in informal sector? (No obstacle, minor obstacle, moderate obstacle, major obstacle, and severe obstacle).
Electricity obstacles	How much of an obstacle: electricity to operations of this establishment? (No obstacle, minor obstacle, moderate obstacle, major obstacle, and severe obstacle).
Sampling size	The number of firms included in the sample for conducting the survey.
Firm size	The measure of the dimension or scale of the surveyed business. This variable allows businesses to be categorized into different groups based on their workforce or other measures of their economic scale (micro, small, medium, large).
Regional share of firms in the tertiary sector	The proportion or percentage of businesses operating in the tertiary sector within a specific region.
Regional female literacy	The percentage of literate women in a specific region, using the total number of literate women in that region and the total population of women in the same region.
Formal training programmes of employees	The percentage of formal training programmes for permanent, full-time employees in last fiscal year.

Note: the variables 'Regional female literacy' and 'Regional share of firms in the tertiary sector' are calculated by the author using data from NIS (2020). The remaining variables are drawn from the World Bank Enterprise Surveys (World Bank 2016).

Source: author.

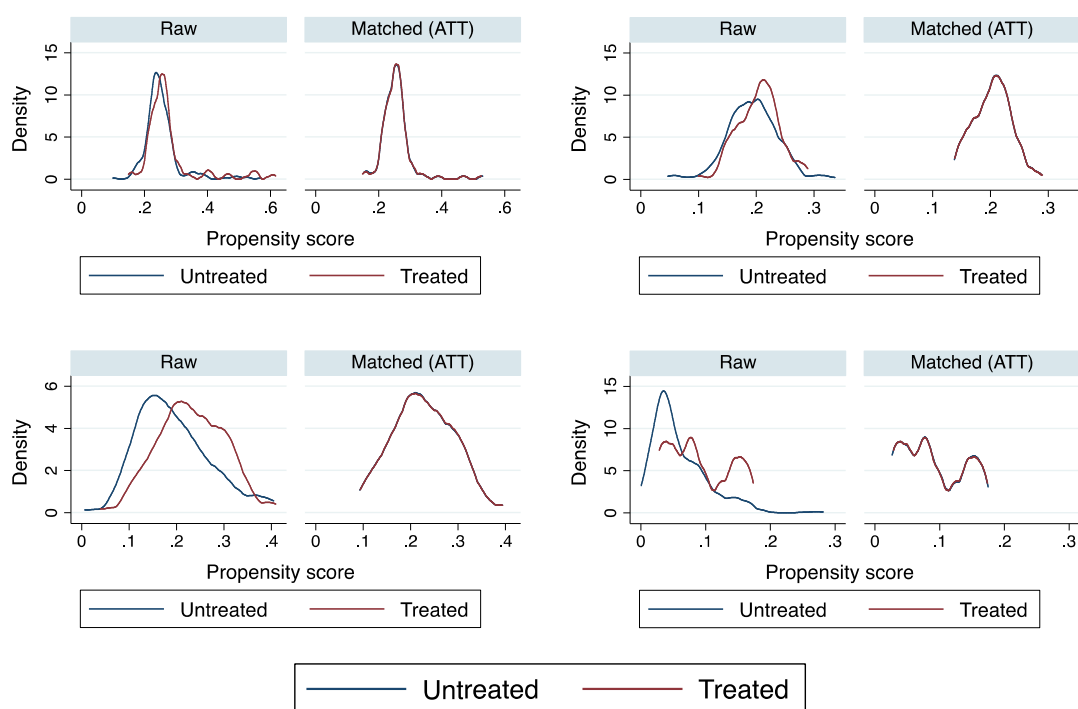
Table A2: Propensity score estimation (Logit estimates)

Variables	Minor inadequacy	Moderate inadequacy	Major inadequacy	Severe inadequacy
Formal training programmes of employees	-0.163*** (0.028)	-0.049*** (0.009)	-0.217*** (0.074)	-0.214*** (0.023)
Regional literacy rate (2016)	0.003 (0.052)	-0.095* (0.055)	-0.028 (0.057)	-0.716 (0.619)
Regional dummy	0.065* (0.039)	0.010* (0.006)	0.444*** (0.048)	3.330*** (1.067)
Constant	1.041* (0.634)	1.118** (0.570)	4.558* (2.762)	6.294* (3.814)
Log likelihood	-34.29	-46.91	-64.21	-45.07
Chi2	11.76	13.50	10.08	12.35
Prob > chi2	0.022	0.021	0.017	0.020
Pseudo R2	0.017	0.015	0.051	0.131
Observations	312	312	312	312

Note: robust standard errors in parentheses; ***, **, * indicate significance at 1%, 5% and 10%.

Source: author's estimates.

Figure A1: kernel matching densities



Source: author.