TRAGEDIES & PROMISES of Regional Conflicts of Peacebuilding
Responding to Disruptors and Enablers of MENA Development Pathway
ERF 30th Annual Conference

www.erf.org.eg

Understanding Changes in Wage Inequality in Egypt:

Evidence from Quantile Analysis

Hatem Jemmali,
Rabeh Morrar
and Fernando Rios-Avila

ECONOMIC RESEARCH FORUM 30 years
منتدى البحوث الاقتصادية

2024

ERF 30th Annual Conference -- Labor --

Understanding Changes in Wage Inequality in Egypt: Evidence from Quantile Analysis

Hatem JEMMALI
Higher Institute of Accounting and Business Administration, University of Manouba, Tunisia.
Email: hatemjemmali79@gmail.com
Tel: +216 97 753 648

Rabeh MORRAR
An-Najah National University, Nablus, Palestine.
Email: rabehmorrar@gmail.com

Fernando RIOS-AVILA
Levy Economics Institute of Bard College, Annandale-on-Hudson, New York, USA.
Email: friosavi@levy.org

Abstract

Over the past two decades, Egypt has undergone substantial economic and political transformations that have directly influenced labor market outcomes, particularly in terms of wages and earnings. In this paper, we analyze the patterns and dynamics of wage inequality in Egypt from 2006 to 2021. Real wages exhibited an upward trend over the period 2006-2016, followed by a decline subsequent to the floating of the national currency, while also experiencing a phase of stagnant inequality prior to 2016 and an overall decline over the entire period. Using an inter-temporal decomposition approach based on a generalization of the Oaxaca-Blinder decomposition method, we find evidence that the observed changes in wage inequality are mainly driven by changes in returns to demographic and labor market characteristics (wage structure effect). Detailed decomposition of the Gini coefficient reveals that, only for the pre-Arab Spring period, changes in returns to education have significantly contributed to the decline of wage inequality in Egypt. This implies that implementing improved redistributive policies, primarily focused on elevating educational levels, is crucial to sustaining these trends over an extended period. In other words, policies that specifically target educational advancement can play a key role in ensuring the longevity of these positive trends.

Keywords: Gini coefficient**,** Wage inequality, OB decomposition, Egypt

JEL Classifications: D63, I31, J31

1. Introduction

While global inequality has been declining since the 1990s, inequality within countries has been increasing, particularly in advanced economies. The majority of OECD countries have witnessed a rise in the inequality since the 1980s (OECD 2011). Income inequalities in emerging economies show a similar increasing trend, with levels higher for some countries than in the five most unequal OECD countries (Balestra et al. (2018) (Dominican Republic, Ecuador, Panama, Paraguay, Peru, and Uruguay); Lee and Wie (2015) (Indonesia); Han et al. (2012) (China); Gourdon 2011; Tridico 2010; Chao et al. 2006; Kijima 2006 (India)). This rise in inequality has been attributed to factors such as globalization, commodity price cycles,

and domestic economic policies. The increasing disparity has resulted in social discontent, weakened trust in public institutions, and undermined democratic stability in some countries.

Conversely, on average basis, income inequality in the MENA region, is believed to be relatively low in relation to the region's income per capita (Simson & Savage 2019). In a recent study, Hassine (2015), using harmonized micro-data from household surveys for 12 countries in the Arab region, identified no generalizable trend across the region, with increases in Syria, Yemen, Djibouti and Palestine and decreases in Egypt, Jordan and Tunisia. In this context, a broad literature has established a connection between income inequality and the Arab Spring uprising (Ianchovichina et al. 2015).

There is fairly compelling evidence from literature that the predominant and most influential factor driving these trends has been the inequality in wages and salaries. Explicitly, changes in wages, specifically hourly wage rates, and its differentials among people and social groups emerge as a key determinant of income inequality in most countries (55-63% on average, OECD, 2011). In this context, Castelló-Climenta and Doménech (2017) found on average, using an updated dataset on human capital inequality spanning 146 countries from 1950 to 2010, statistically significant estimated contribution of wage inequality to income inequality, exhibiting relative stability from 1980 onwards and bearing economic relevance. They found that, on average, each unit change in the Gini coefficient of wages contributes to a half-point change in the Gini coefficient for income.

Focusing on the period 1998–2012, El-Haddad and Gadallah (2021) demonstrate that equality in Egypt has consistently deteriorated, where the wealthier percentiles (top percentiles) have consistently experienced disproportionately larger positive changes in real hourly wages. While overall prosperity has increased, the growth has been disproportionately favorable for high-wage earners, particularly within the top half of the income distribution (top 50 percentiles). Throughout this period, the authors found that the Gini coefficient has risen by 21 percentage points, reaching 0.43 in 2012. Similarly, they found that the 90/10 ratio has increased by just under 13%, reaching 5.3. However, upon examining the temporal progression more closely, El-Haddad and Gadallah (2021) reveal that the later period from 2006 to 2012 is responsible for the overall increase in wage inequality during the entire span. In this later period, inequality steadily rose across the wage distribution, contrasting with the preceding period from 1998 to 2006, where wage increases remained stable across the distribution, resulting in a more or less stagnant level of inequality. Notably, during the later period, wage inequality exhibited a much higher rate of increase at the top of the distribution compared to the bottom.

Limited literature (Cho & Newhouse 2013; Roushdy & Gadallah 2011) has focused on the effects of the global economic crisis in emerging and transition economies. In this context, Said (2015) used four national labor market surveys, to investigate the patterns and dynamics of wages inequality in Egypt over 1988-2012, a period marked by economic liberalization, political crises and some social tensions. The author points some important findings, among them are: *i)* Despite overall income inequality in Egypt remaining relatively stable, there was a marginal increase over time followed by a decline in 2012. *ii)* The returns on education experienced a decline over the specified period. *iii)* Moderate increases in real wages were

insufficient to reverse the increasing trend of the share of low earners in the labor market. Finally, the prevailing wage and inequality patterns bear out the worsening conditions within the Egyptian labor market, particularly for females employed in the private sector and university graduates in the era of financial crisis and social upheaval.

In a second paper, Said et al. (2022) confirm that changes in earnings distribution have been the main contributor to the increase of income inequality in the country mainly over the period 2012-2018. During the last two decades, Egypt passed through a number of political and economic changes that have led to changes in the labor market conditions and have altered macroeconomic stability of the country. In response to these drastic changes, some policies have been implemented recently by the government such as narrowing the fiscal deficit, cutting subsidies, and floating the national currency which caused a devaluation of more than 50% and a rise of inflation (El-Haddad & Gadallah, 2018). Such policies have left their mark on salaries. Overall, the average real wages have been declining over time, while the wage inequality has been on the rise in the last decade, particularly among low-educated and those employed in the private sector (Said et al., 2022). Individuals' background characteristics are found to contribute to such rise of wage inequality, though this appears quite stable over the considered period.

The literature extensively discusses the factors contributing to the increasing wage inequality, with a special focus on education as a prominent determinant (cf. Wahba 1996; Lopez-Acevedo 2006; OECD 2011; Tansel and Bodur 2012). Studies indicate a positive correlation between higher educational attainment and corresponding remuneration. In 2012, among male wage workers, 20% were university graduates, while an equivalent proportion were illiterate. There was a significant disparity in the median real monthly wages between these two groups, with illiterates earning LE780, compared to LE1200 for university graduates (El-Haddad & Gadallah, 2018; Said, 2015). Despite a recognized wage premium for higher education in Egypt, the trajectory of educational wage premiums has witnessed a discernible decline across all groups over time (Said 2002), extending into 2012 as shown by El-Haddad and Gadallah (2021). Recognizing the importance of education as an explanatory variable, it is crucial to consider the economic sector in investigating the wage inequality in the Egyptian labor market. Within the Egypt's state-led development model, the guarantee system in the public sector created more incentives for higher education graduates to concentrate in that particular sector (Assaad 1997; El Ghamrawy and Amer 2011). This specific concentration has the potential to mitigate the impact of education on wages in the private sector.

In the current study, we attempt to explore trends in wage inequality in Egypt over the period from 2006 to 2021 by asking two main questions. First, what are the main features of the changes in wage inequality in Egypt? Second, which are the most influencing factors including gender- and sector-based wage differentials that may explain such changes in the labor income inequality? To answer these questions, the paper makes use of an inter-temporal decomposition approach based on the generalization of the Oaxaca-Blinder decomposition proposed by Firpo et al. (2007) and a comprehensive series of datasets collected in Egypt

over the period from 2006 to 2021[1]. These data drawn from the sixteen waves of the Labor Force Survey (LFS) enable us to provide a descriptive analysis of the levels of wage inequality over time. Building on this, and keeping with the equality of opportunity paradigm, the paper explores the extent to which changes in demographic and labor market characteristics can explain the observed wage inequality changes in Egypt during the recent two decades.

The Egyptian case is unique and illustrative for a number of reasons regarding the set of significant political and economic changes that began in 2011 with the fall of Moubarak's regime and the flotation of the national currency in 2016. To the best of our knowledge, this is the first paper that investigates the changes in some wage inequality statistics such as the Gini coefficient and inter-quintile differences in Egypt over the period 2006-2021 using an inter-temporal decomposition approach to better understand which factors are driving the observed changes in both the wage structure and composition effects.

The rest of the paper is structured as follows: Section 2 presents a brief analysis of the main trends in wage inequality in Egypt. Section 3 outlines the data and methods used in this study. Section 4 summarizes the main results, and Section 5 presents the conclusions along with some policy recommendations.

2. Key overall trends in wage Inequality in Egypt

Over the past decades, Egypt has implemented substantial economic policy changes in response to major global and domestic events, such as the global financial crisis in 2008, the Arab Spring in 2011, and the COVID-19 pandemic in 2020. To address these challenges, certain economic reforms were introduced as part of an International Monetary Fund (IMF) package beginning in 2014. These reforms, which included subsidy reductions, tax adjustments, and the decision to float the Egyptian pound in 2016, aimed to tackle fiscal imbalances and promote a more equitable economic environment by enhancing competitiveness. However, these reforms, along with concurrent political and economic changes, have led to considerable alterations to the labor market conditions and macroeconomic stability of the country. This is notably evidenced by a substantial increase in the inflation rate, reaching 23.3% in 2016/17 and 21.6% in 2017/18. (El-Haddad and Gadallah, 2021). Given these prevailing conditions, it is useful to understand the principal trends in the Egypt's labor market over the considered period.

Throughout the entire period from 2006 to 2021, a notable upward trend in average nominal wages is observed, with slight and brief decreases occurring during the two periods 2011-2012 and 2017-2018. Due to a relatively stable inflation rate around 10% from 2006 to 2016, except for 2008 when it rose to approximately 18%, real wages have consistently followed a comparable increasing trend (refer to Figure 1). Following the flotation of the national currency in 2016, a sharp increase in the inflation rate occurred, reaching its peak at about 30%. Consequently, average real wages experienced a significant decline until 2018, followed by a slight increase during the subsequent period, albeit at a slower pace compared to the changes in

[1] The data are publicly available from the Economic Research Forum Open Access Micro-data Initiative: www.erfdataportal.com. See Krafft, Assaad, and Rahman (2019) for more information on the different ELMPSs.

nominal wages. This deceleration can be attributed to the rising trend in the inflation rate from 2019 to the end of the period.

Figure 1 further reveals that the period of rapid wage growth, both in nominal and real terms, extended until 2016. This coincided with a relatively stable Gini coefficient, ranging between approximately 0.3 and 0.4, except for the year 2006 when the wage Gini coefficient for salaried workers reached its highest value at 0.50. A period of stable wage inequality is depicted then until 2016. Subsequent to this year, with the rapid decline in real wages and a sharp increase in the inflation rate, the Gini coefficient dropped below 0.3 and remained low throughout the remaining period. This decrease in the Gini coefficient may be interpreted as a reduction in wage inequality during this period.

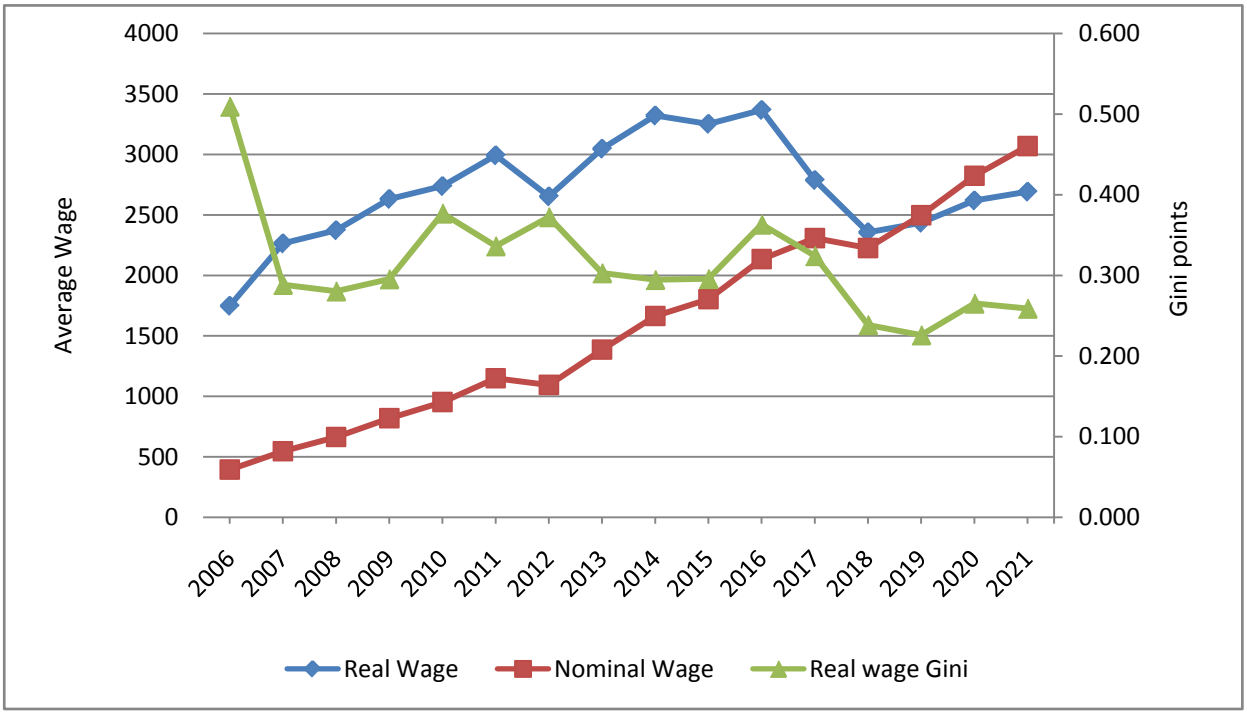

Figure 1. Nominal and real wage and Gini inequality trends.
Notes: Real wages are deflated using 2018/2019 as the base year.
Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

Figures 2a and 2b depict the dynamics of nominal and real wage percentiles in the Egyptian labor market from 2007 to 2021, with 2007 serving as the base year. A thorough analysis of these trends offers a nuanced perspective on the changing wage landscape in Egypt. Notably, Figure 1a illustrates a general uptrend in wages across all percentiles over the considered period. However, distinct variations emerge in the pace of wage growth among different percentiles, particularly becoming pronounced after 2016. The Figure indicates that the bottom 75% of wages experienced a similar upward trajectory in wage growth. In contrast, wages at the upper end of the distribution demonstrated comparatively lower growth over the same period.

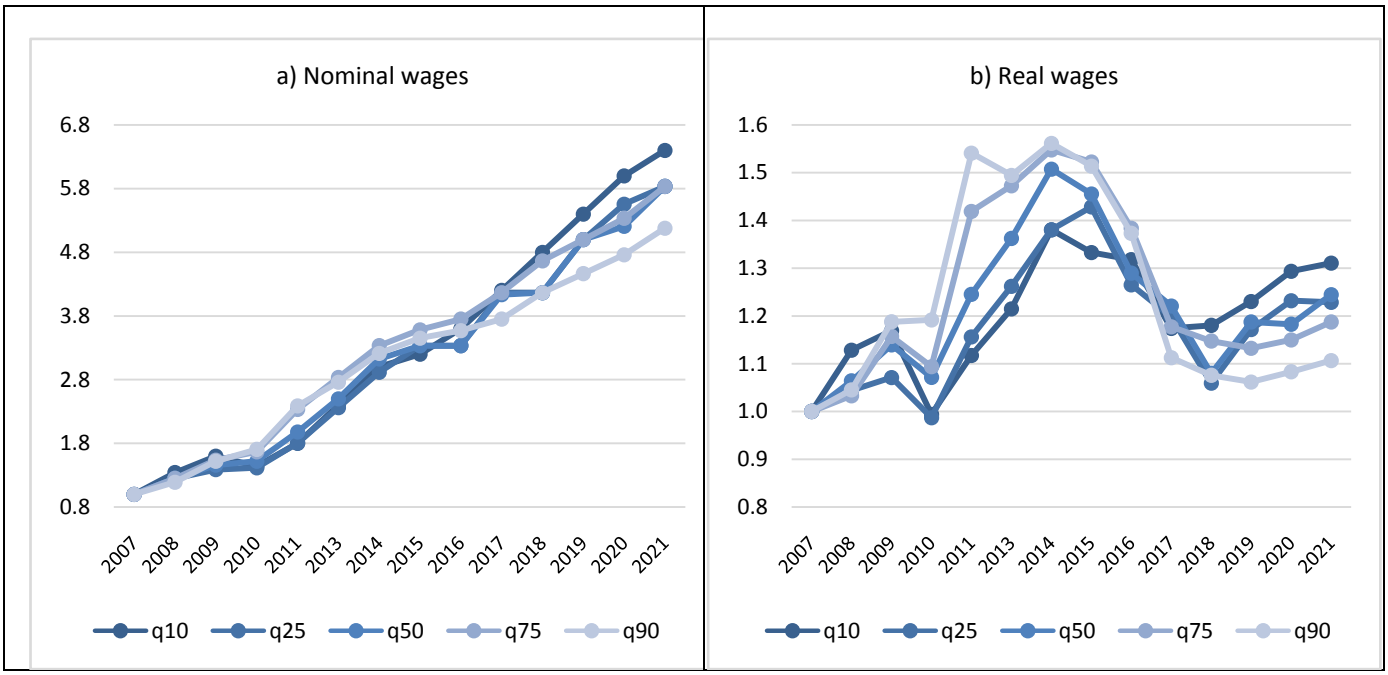

Figure 2. Trend of nominal and real wages, cumulative growth since 2007, for selected percentiles.
Notes: Real wages are deflated using 2018/2019 as the base year.
Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

Figure 2b show fluctuating patterns in real wage growth over the specified period. Initially, from 2007 to 2009, there is a general increase in real wages across percentiles. However, in the subsequent years, a diverse pattern emerges as most percentiles experience fluctuations, occasionally undergoing declines and increases in real wages, reaching their peak between 2011 and 2016 (the post-revolution period), primarily influenced by the fluctuating inflation pattern. Starting in 2018, The Figure shows an overall increase in wage levels, with the most significant growth seen in the lower half of wage distribution, especially the bottom percentile, while the top percentiles tended to experience a smaller increase. Notably, the 90th percentile shows the least change during this period. Overall the two Figures reveal that while nominal wages consistently increased (as seen in Figure 2a), the real wage growth depicted in the Figure 2b provides a more nuanced perspective, considering inflation and changes in the cost of living. These Figures, together, facilitate a comprehensive understanding of wages in both nominal and real terms, offering valuable insights into the distributional shifts within the labor market.

3. Data and Methodology

3.1. Data

This paper makes use of publicly accessible and nationally representative Labor Force Surveys[2] conducted yearly by the Central Agency for Public Mobilization and Statistics (CAPMAS) for the years 2007–2021. Despite variations in sample design, sample size, and survey structure over the years, the available information remains applicable for making inferences at the national level. To ensure a representative sample of the national labor force and enhance comparability across years, we refined the sample by including adults aged 15 to 64 classified as wage or salary workers in their primary jobs. Individuals who are self-employed or employers are not included in our analysis, and income from capital, land, and entrepreneurship is not considered.

Following a number of studies on labor market dynamics in Egypt (Said et al., 2022; El-Haddad and Gadallah, 2021; Said, 2012, and others), we focus specifically on log hourly wages rather than overall income or total earnings due to their significant contribution to overall earnings inequality (Haddad and Gadallah, 2021). Notably, variations in hourly wage rates emerge as the predominant factor influencing the magnitude of gross earnings inequality among workers in numerous countries. On average, these fluctuations explain between 55% and 63% of the observed earnings inequality (OECD 2011).

Table 1 presents a statistical summary of demographic and labor market characteristics across different year groups. The analysis reveals notable changes in the composition of the labor force. Female labor force participation increased over time, rising from 16.7% in the early years to 23% in the middle period, then slightly declining to 19.4% in the latest period. Although the age structure of the labor force showed minor changes, there is a discernible trend indicating a slight aging compared to the first period. Furthermore, the average education level, as proxied by years of schooling, witnessed a clear upward trend, particularly in the last period, where the average reached 11.21 years.

On average, approximately 61.4% of the labor force was initially enrolled in social security, with an increase to 75.1% in 2013/2016, followed by a decrease to around 60% in the latest period. A similar pattern is observed in the share of workers in public sector, which increased from about 6.3% to 8.6% in the middle period and decreased to approximately 5% in the latest period. Another significant consideration is the rising percentage of full-time workers, exhibiting an upward trend from about 71.2% in the first period to approximately 90% in the latest period.

[2] Labor Force Surveys (LFS) were conducted from 2006 to 2022 to analyze employment outcomes. The surveys in Egypt have been ongoing since 1957 and were initially conducted quarterly, biannually, and annually by the Central Agency for Public Mobilization and Statistics (CAPMAS). In 2006, improvements were made, focusing on using panel samples to monitor dynamic labor market changes and enhancing the questionnaire for better characterization of household members' relationships to the labor force. The survey's primary goals include measuring the size of the Egyptian labor force, assessing national employment rates, and understanding the distribution of employed and unemployed individuals based on various characteristics such as gender, age, education, occupation, economic activity, and sector. The data has been cleaned and harmonized by the Economic Research Forum (ERF) as part of a project that started in 2009.

Table 1. Statistical summary

	2007/2008	2009/2011	2013/2016	2017/2019	2020/2021
Age	36.784	37.930	39.513	40.018	38.615
Gender					
Male	97,079 (83.3%)	115,113 (79.2%)	139,186 (77.0%)	101,617 (78.9%)	64,630 (80.6%)
Female	19,508 (16.7%)	30,215 (20.8%)	41,650 (23.0%)	27,238 (21.1%)	15,527 (19.4%)
Schooling	9.323	10.912	11.138	10.931	11.210
Tenure in the main job	13.124	13.468	13.710	12.792	11.283
Sector of employment					
Government	47,731 (40.9%)	71,991 (49.5%)	85,123 (47.1%)	54,593 (42.4%)	29,710 (37.1%)
Public sector	7,304 (6.3%)	9,822 (6.8%)	15,528 (8.6%)	8,421 (6.5%)	4,001 (5.0%)
Private sector	61,552 (52.8%)	63,515 (43.7%)	80,185 (44.3%)	65,841 (51.1%)	46,446 (57.9%)
Employment Status					
Part time	33,519 (28.8%)	15,926 (11.0%)	18,191 (10.1%)	10,962 (8.5%)	7,850 (9.8%)
Fulltime	83,068 (71.2%)	129,402 (89.0%)	162,645 (89.9%)	117,893 (91.5%)	72,307 (90.2%)
Social security					
Enrolled	71,527 (61.4%)	106,916 (73.6%)	135,743 (75.1%)	84,717 (65.7%)	47,940 (59.8%)
Not enrolled	45,060 (38.6%)	38,412 (26.4%)	45,093 (24.9%)	44,138 (34.3%)	32,217 (40.2%)
Urban/Rural					
Rural	60,944 (52.3%)	67,797 (46.7%)	83,248 (46.0%)	63,010 (48.9%)	40,098 (50.0%)
Urban	55,643 (47.7%)	77,531 (53.3%)	97,588 (54.0%)	65,845 (51.1%)	40,059 (50.0%)
N	116,587	145,328	180,836	128,855	80,157

Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

3.2. Methodology

In order to assess and decompose changes in wage inequality in Egypt over time, we applied an inter-temporal decomposition method following Canavire-Bacarreza and Rios-Avila (2017). This method, based on the generalization of the Oaxaca-Blinder decomposition approach (Blinder 1973; Oaxaca 1973) introduced by Firpo, et al. (2007), extends the decomposition analysis to statistics beyond the mean, such as the Gini coefficient and inter-quintile differences. It is structured in two consecutive steps. The first one encompasses constructing an appropriate counterfactual distribution, facilitating the comparison of wage distributions across time while mitigating the influence of changes in individual and market characteristics (Canavire-Bacarreza and Rios-Avila (2017). Afterwards, the constructed counterfactual wage distributions are employed to conduct a decomposition of the changes in the specified inequality statistic (q) into two components: one explained by measured differences in individual and market characteristics (denoted "*composition*" effect) and the second explained by differences in the coefficients or "returns" on those characteristics (denoted "*wage structure*" effect).

Given the inability to directly observe the counterfactual wage distribution, Firpo et al (2007) illustrate that, under the assumptions of ignorability (conditional on measured covariates) and the overlapping support of the covariates, a counterfactual wage distribution could be constructed. This distribution would be observed if the individual living in period t_0 had experienced the wage structure observed in period t_1. Upon identification of the counterfactual statistic (q) and the set of explanatory variables (denoted X), the overall wage decomposition can be estimated as follows:

$$\Delta q = q_{t_1} - q_{t_0} = \{q_{t_1} - \hat{q}_{t_{0,1}}\} + \{\hat{q}_{t_{0,1}} - q_{t_0}\} \quad (1)$$

where Δq represents the overall inter-temporal difference in the distributional statistic q. The terms q_{t_1} and q_{t_0} correspond to the statistics of observed wage distributions at time 1 and time 0, respectively, while $\hat{q}_{t_{0,1}}$ denotes the estimated statistic of the counterfactual wage distribution, with characteristics fixed to time t_0, and wage structures observed at time t_1.

In the second step we use of the newly developed and well-known "*recentered influence function*" (RIF) regression[3] to get an approximation of the contribution of each of the observable covariates to both the composition and wage structure effects as follows:

$$E(RIF\ (w_i; q)|X) = X'\gamma \quad (2)$$

Where w_i denotes the log real hourly wage of individual i. Three set of parameters are then estimated as:

$$\hat{\gamma}_t = \left(\sum_{i\in t} X'_{i,t} X_{i,t}\right)^{-1} \sum_{i\in t} X'_{i,t} \widehat{RIF}(w_{i,t}; q_t)\ for\ t = t_0, t_1 \quad (3)$$

$$\hat{\gamma}_c = \left(\sum_{i\in t} \hat{\omega}_c(X_{i,t_1}) \times X'_{i,t_1} X_{i,t_1}\right)^{-1} \sum_{i\in t} \hat{\omega}_c(X_{i,t_1}) \times X'_{i,t_1} \widehat{RIF}(w_{i,t_1}; q_c) \quad (4)$$

Where $\hat{\omega}_c(X_{i,t_1})$ denotes an implicit inverse probability weight estimated using a Probit model [4].

In spirit to an Oaxaca decomposition for any statistic q, we perform a detailed decomposition of the two components, wage structure and composition effects, using the estimated parameters in Eq. 3 and 4, as follows:

$$\Delta S_q = \bar{X}'_{t_0}(\hat{\gamma}_{t_1} - \hat{\gamma}_{t_0}) \text{ and } \Delta X_q = (\bar{X}'_{t_1} - \bar{X}'_{t_0})\hat{\gamma}_{t_1} \quad (5)$$

Where the left-side term represents the "wage structure" effect, which is attributed to differences in coefficients, and the right-side term represents the "composition" effect, which is attributed to differences in endowments.

4. Results

[3] While RIF regression is quite similar to standard OLS regression, it differs by using, instead of the traditional dependent variable directly, the recentered influence function of the statistic of interest. Conceptually, the RIF can be defined as a first-order approximation of the aggregate contribution that each observation makes to the estimation of the statistic of interest.

[4] $\hat{\omega}_c(X) = \hat{p}(X) / 1 - \hat{p}(X)$ where $\hat{p}(X)$ denotes the estimated probability (propensity). The propensity score is estimated through a Probit model, where the dependent variable is a binary variable with a value of 0 if the individual was observed in the initial period t_0 and 1 if the individual was observed in a subsequent period t_1.

As mentioned earlier, the RIF regression decomposition method is applicable to the analysis of any statistic describing changes in wage distribution, including the Gini coefficient, quintiles, and inter-quintiles. In line with the focus of this study on examining changes in wage inequality over time, we applied the RIF procedure to investigate changes in different statistics. While the first one, the widely-used Gini coefficient, offers an overview of change in wage distribution, the inter-quintiles provide a more detailed understanding of variations in wage inequality throughout the distribution.

4.1. Unconditional Quantile Regressions

To understand changes in the wage structure in Egypt over time, Table 2 below presents unconditional quintile regressions for the Gini coefficient, along with selected quintiles and inter-quintiles, comparing the initial and final periods. The coefficient estimates from RIF-OLS regressions, explained as the marginal effects of covariates on the corresponding unconditional quantiles of log wages, provide some important insights regarding the trends and patterns of returns on different characteristics.

The parameters associated with *age* indicate a decline in returns over time in each regression, especially for individuals in the top wage distribution. Notably, returns have decreased, such as from 0.019 to 0.007 among high-paid workers. The *tenure* returns, serving as a proxy for experience, demonstrate a negative and significant impact on the considered explained variables, particularly in the Gini, top quantile, and inter-quantiles regressions, primarily during the initial period. Conversely, for the first and second quantiles, the returns are positive and relatively stable.

In terms of gender, the Gini regressions reveal a small and decreasing contribution of gender variable over time. Looking at different wage levels in the quantile regressions, the gender pay gap, although still large, has decreased a bit across the wage distribution and over time. Specifically, for lower wages, the estimates from the first quantile indicate a meaningful and significant decrease in the gender pay gap over time. However, this decrease is not as much for wages in the middle and upper parts of the wage distribution. Overall, there's been a notable improvement in the gender pay gap, especially for lower earners, though challenges remain for those earning more. This implies that the narrowing gender wage gaps may be attributed to the proactive measures the government has taken to combat discrimination, especially gender-based discrimination among low-paid earners.

Moreover, Table 2 highlights some significant changes in the magnitudes of coefficient estimates for education.. While Gini regression indicates a low return, the quantiles and inter-quantiles regressions reveal a distinct and significant pattern in education returns over time and across the wage distribution. These returns increase for individuals at various points in the wage distribution but decrease over the years. Progressing through the wage distribution is associated with a rise in the magnitude of education returns, reaching its peak at the top end of the wage distribution (3.1% during the initial period). This implies a substantial earnings advantage for individuals with higher education, particularly among high-wage earners in the Egyptian labor market. However, examining changes in this educational premium over time and across wage levels reveals a decline, particularly in the middle and high parts of the

distribution. The most significant decreases in education returns over time are observed for those at the top wages, dropping from 3.1% to 1.7% at the 90th quantile.

In terms of labor market characteristics, a similar pattern is almost observed for the returns of working in the public sector, decreasing considerably over time and increasing across the wage distribution. The highest wage premium is among the high earners, equal to 24.7%, indicating that at the top end of the wage distribution, working in the public sector is highly profitable compared to Government (base category), with substantial returns. However, in the last period, these returns become insignificant. The wage premium associated with full-time employment is more pronounced among high-paid workers, being 2.4% during the first period and becoming in favor of part-time employment to reach 5.4% during the last period. In terms of its impact on wage inequality, the full-time employment covariate shows a nuanced effect. While it contributes to narrowing wage inequality over time in the lower part of the wage distribution, it has a controversial impact among high-paid earners. During the first period, it contributes to widening the wage gap by 5.8%, whereas in the last period, it contributes to narrowing the gap by 6.3%. This suggests that the relationship between full-time employment and wage inequality varies across different wage levels, highlighting the need for targeted policy measures to address disparities.

The wage premium of being enrolled in social security shows important and increasing contribution for lower and middle wages. The estimates reveal that between the two period, it has been practically increased for low and middle wages, while it becomes negative for the first period and not statistically significant for wages at the top of the distribution. This emphasizes the key role of social security coverage in reducing the wage inequality mainly among low and middle wage earners.

Table 2. Unconditional quantile regressions, Gini and selected quintiles and inter-quintiles

	Gini		Q10		Q50		Q90		IQR1050		IQR5090	
	2007/2009	2020/2021	2007/2009	2020/2021	2007/2009	2020/2021	2007/2009	2020/2021	2007/2009	2020/2021	2007/2009	2020/2021
Age	0.003***	0.001	0.003***	0.001*	0.008***	0.003***	0.019***	0.007***	0.005***	0.002**	0.011***	0.004***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Tenure	-0.003***	-0.001	0.013***	0.009***	0.007***	0.008***	-0.003***	0.009***	-0.006***	-0.001*	-0.010***	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Female	0.049***	0.038***	-0.418***	-0.325***	-0.127***	-0.118***	-0.104***	-0.036*	0.291***	0.207***	0.023*	0.081***
	(0.004)	(0.011)	(0.013)	(0.022)	(0.006)	(0.008)	(0.011)	(0.018)	(0.013)	(0.021)	(0.010)	(0.017)
Schooling	0.005***	-0.000	0.018***	0.018***	0.021***	0.014***	0.031***	0.017***	0.004***	-0.004***	0.010***	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Relation to HH												
Spouse	-0.070***	-0.030*	0.372***	0.125***	0.084***	0.062***	0.014	0.090***	-0.288***	-0.063**	-0.070***	0.027
	(0.005)	(0.012)	(0.014)	(0.023)	(0.007)	(0.010)	(0.014)	(0.024)	(0.014)	(0.023)	(0.013)	(0.023)
Son/daughter	0.027***	-0.009	-0.121***	-0.128***	-0.055***	-0.039***	0.055***	-0.007	0.067***	0.089***	0.110***	0.032*
	(0.003)	(0.013)	(0.008)	(0.014)	(0.005)	(0.007)	(0.008)	(0.014)	(0.008)	(0.014)	(0.008)	(0.013)
Other	0.017**	-0.006	-0.055**	-0.037	-0.054***	-0.014	0.060***	0.002	0.000	0.023	0.115***	0.016
	(0.006)	(0.037)	(0.021)	(0.040)	(0.010)	(0.018)	(0.018)	(0.037)	(0.020)	(0.039)	(0.017)	(0.035)
Sector												
Public sector	0.065***	0.035***	0.075***	-0.041**	0.110***	0.024*	0.247***	0.015	0.035***	0.065***	0.137***	-0.009
	(0.006)	(0.007)	(0.008)	(0.015)	(0.006)	(0.010)	(0.015)	(0.026)	(0.009)	(0.016)	(0.014)	(0.026)
Private sector	-0.004	0.060***	0.132***	0.030**	0.034***	-0.066***	0.027***	-0.051***	-0.097***	-0.096***	-0.008	0.015
	(0.003)	(0.011)	(0.007)	(0.011)	(0.004)	(0.006)	(0.008)	(0.014)	(0.007)	(0.011)	(0.008)	(0.014)
Fulltime	-0.001	-0.018	0.007	0.142***	-0.033***	0.009	0.024***	-0.054***	-0.040***	-0.133***	0.058***	-0.063***
	(0.002)	(0.014)	(0.009)	(0.019)	(0.004)	(0.008)	(0.006)	(0.015)	(0.008)	(0.018)	(0.006)	(0.014)
Social Security	-0.010***	-0.071***	0.180***	0.318***	0.022***	0.131***	-0.051***	0.003	-0.158***	-0.187***	-0.074***	-0.128***

	(0.003)	(0.014)	(0.009)	(0.011)	(0.005)	(0.006)	(0.007)	(0.012)	(0.008)	(0.012)	(0.007)	(0.012)
Urban	0.037***	0.052***	-0.185***	0.016	-0.088***	0.067***	0.019***	0.105***	0.097***	0.051***	0.107***	0.038***
	(0.002)	(0.008)	(0.005)	(0.009)	(0.003)	(0.004)	(0.006)	(0.009)	(0.005)	(0.009)	(0.006)	(0.009)
Constant	0.132***	0.228***	2.676***	2.795***	3.286***	3.579***	3.482***	4.074***	0.611***	0.784***	0.195***	0.495***
	(0.008)	(0.027)	(0.017)	(0.034)	(0.010)	(0.016)	(0.019)	(0.035)	(0.017)	(0.033)	(0.019)	(0.034)
Observations	163055	52982	163055	52982	163055	52982	163055	52982	163055	52982	163055	52982

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

4.2. Decomposition

Figure 3 provides an initial examination of wage changes decomposition over time. The first Panel A presents the overall decomposition of wage changes between the two group of years 2007/2009 and 2010/2011. An inconsistency in real wage changes across the distribution is illustrated in this panel, showing a decrease of less than 0.15 log points in the wage level at the bottom of the distribution, and an increase of 0.05 log points and 0.25 log points, respectively, at the middle and at the top. The aggregate decomposition reveals that changes in the returns to characteristics (unexplained part) have had a considerable impact on wages for most of the distribution, resulting in the consistent pattern of wage disparities across the bottom and top of the wage distribution between 2007/2009 and 2010/2011. The same trajectory across the wage distribution is illustrated in the figure for both overall differences and returns differences. The change in endowments (explained part), however, have had little if any effect on wages throughout most of the distribution.

Compared to all other periods, there are only two periods when wage inequality increased throughout the wage distribution: between 2010/2011 and 2013/2015, and between 2018/2019 and 2020/2021. Such increases are driven mainly by the wage structure changes (Panel B and Panel E) similarly to all others changes occurred between different periods (See the entire Figure 3). Changes in individual characteristics explain only a small part of the overall changes across the distribution. While both Panels B and E show an increasing trend in wage inequality over the considered periods, they reveal different patterns throughout the wage distribution. Panel B indicates that increasing wage inequality is more pronounced among bottom and middle wage earners, while Panel E shows that this increasing wage inequality is more pronounced among the bottom and top parts of the wage distribution, following a U-shaped pattern.

Panel C in Figure 3 shows a similar U-shaped pattern, but it notably indicates a persistent decline in wage inequality between the two periods 2013/2015 and 2016/2017. With the exception of the first quantile, this decline is mainly driven by changes in the wage structure. A closed examination of these changes across the wage distribution reveals that Panel C highlights the most significant decline occurring is at the middle part, with a decrease of more than 0.1 log points between the two periods. Towards the tails of wage distribution, the decline approached zero, with only a slight increase of 0.1 log points observed at the first quantile. It's evident from the figure that changes in individual characteristics exhibit a slightly increasing trend.

The aggregate decomposition between the 2016/2017 and 2018/2019 periods (Panel D) indicates that, while the wage structure changes have remained to be the driving factor increasing wage

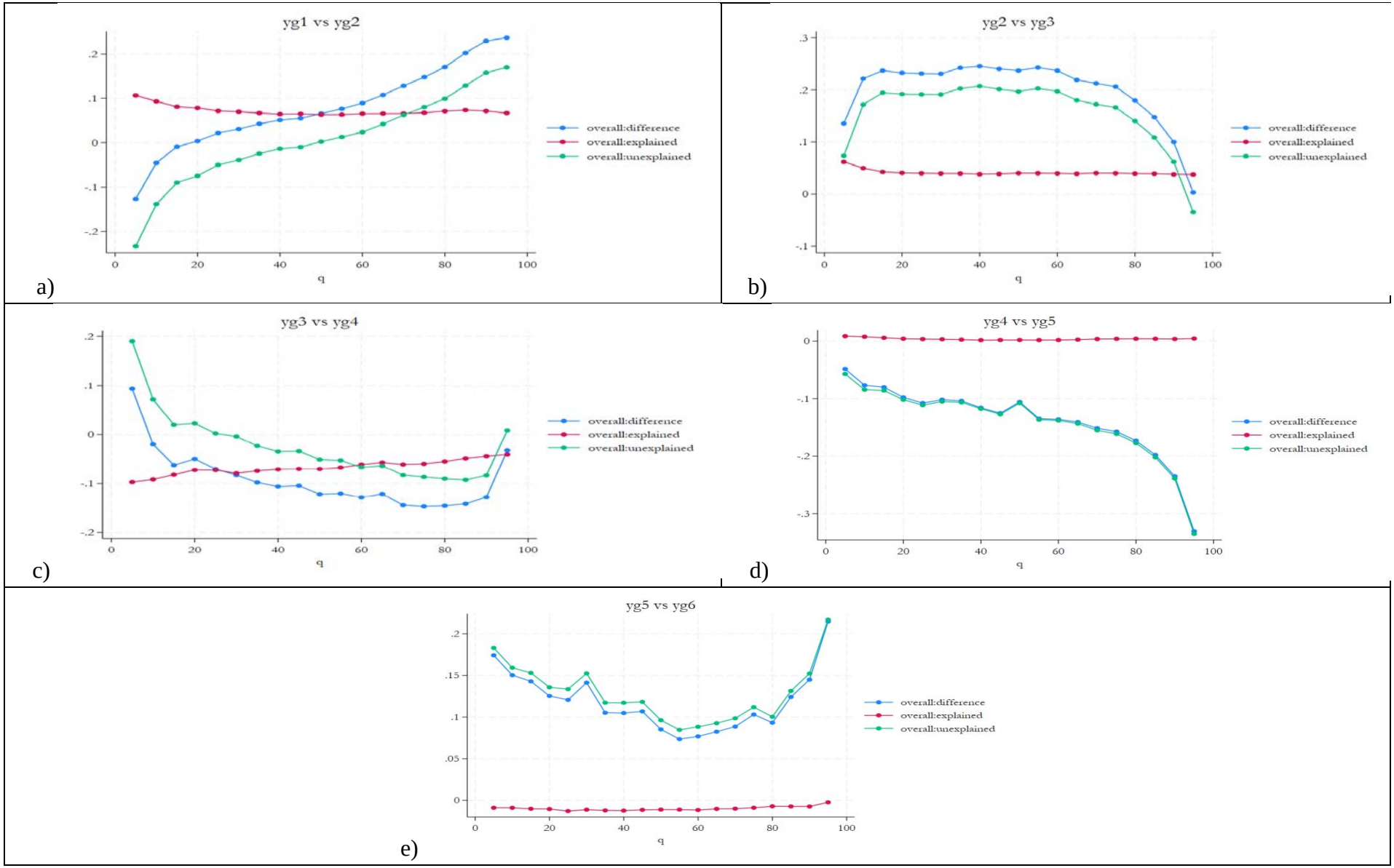

Figure 3. Aggregate quintile wage decomposition

inequality in Egypt, the impact of changes in characteristics, approximately 0 log points, has been the less effective than in previous periods in reducing wage inequality. In this Panel D, there's a specific trend of decreasing wage inequality throughout the wage distribution. The decline in wage inequality for the bottom half of the distribution is around 0.1 log points, while at the upper tail of the distribution, it reached about 0.35 log points. This leads to the conclusion that, during the considered period, there was a significant decrease in wage inequality among high-paid workers over time.

Overall, the Figure 3 reveals some interesting insights from with the most important being the dominance of changes in wage structure changes in explaining the overall wage differences over time. The changes in individual characteristics are found to have a slight effect on such differences. Another notable remark is the heterogeneous pattern of changes in wage inequality over time and throughout the wage distribution. In certain periods, a U-shaped pattern emerges, while in others, Panels show both decreasing and an increasing trends, which aligns with the patterns in Figure 2.

Instead of examining changes in wage inequality at each individual quintile, it's more informative to implement decomposition on some inequality statistics such as the Gini coefficient and inter-quintiles differences (Table 3), for a more accurate and in-depth analysis of the driving factors of wage inequality over time, following Canavire-Bacarreza and Rios-Avila (2017). As indicated by the results of Gini decomposition, there was varied change in wage inequality during the entire period, revealing an increase in inequality during the first (2007 to 2011), third (2013 to 2017) and last (2018/2021) periods. The changes in the Gini coefficient, being positive during these periods, show a decreasing trend over time from 0.07 log points in the first period to about 0.03 log points in the last period. Conversely, for the second (2010 to 2015) and fourth (2016 to 2019) periods, the results indicate a decrease in the Gini coefficient, signaling a decline in wage inequality during these periods. The most significant decline occurred in the fourth period with a decline of about 0.116 log points in the Gini coefficient.

Looking at the estimations of inter-quantile differences for the initial period (2007/2009 and 2010/2011), the estimates reveal that all the inter-quantile gaps increased, with the most notable rise observed for the 90/50 inter-quantile gap, which increased by 0.275 log points during this period. Subsequent periods commonly show a decline in wage inequality over time. In the last period (between 2018/2019 and 2020/2021), inter-quantile results indicate an increase in the gap at the bottom of the distribution, with the 50/10 inter-quantile gap increasing by 0.06 log points. In contrast, at the upper end of the distribution, there is a slight, and statistically insignificant reduction in gap differences (−0.005 log points). Similarly to the Gini decomposition results, the largest portion of the wage inequality changes, about 90%, is explained by the changes in water structure. In terms of the aggregate decomposition of Gini coefficient and different inter-quantiles, changes on the wage structure (unexplained part) seemed to have the significant impact on changes of wage inequality, while changes in characteristics (the explained part) have played a minor, albeit statistically significant in some periods, role in influencing overall changes in wage inequality over time.

Table 3. Wage inequality decomposition, selected inequality statistics.

	Gini				
	2007/2009 vs 2010/2011	2010/2011 vs 2013/2015	2013/2015 vs 2016/2017	2016/2017 vs 2018/2019	2018/2019 vs 2020/2021
Year 1	0.361***	0.298***	0.349***	0.233***	0.261***
	(0.003)	(0.001)	(0.013)	(0.001)	(0.004)
Year 0	0.290***	0.361***	0.298***	0.349***	0.233***
	(0.001)	(0.003)	(0.001)	(0.013)	(0.001)
Overall change	0.071***	-0.062***	0.050***	-0.116***	0.028***
	(0.003)	(0.003)	(0.013)	(0.013)	(0.004)
Change on characteristics	0.001	0.000	0.010	-0.001**	0.007***
	(0.001)	(0.000)	(0.007)	(0.000)	(0.001)
Change on wage structure	0.070***	-0.062***	0.041***	-0.115***	0.021***
	(0.003)	(0.003)	(0.007)	(0.013)	(0.004)
			q10–q90		
Year 1	0.770***	0.785***	0.684***	0.655***	0.589***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Year 0	0.658***	0.770***	0.785***	0.684***	0.655***
	(0.002)	(0.004)	(0.004)	(0.005)	(0.004)
Overall change	0.111***	0.015**	-0.102***	-0.029***	-0.065***
	(0.004)	(0.005)	(0.006)	(0.006)	(0.005)
Change on characteristics	-0.030***	-0.010***	0.021***	-0.006***	-0.002
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Change on wage structure	0.141***	0.025***	-0.123***	-0.023***	-0.063***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
			q10–q50		
Year 1	0.827***	0.689***	0.683***	0.554***	0.614***
	(0.004)	(0.003)	(0.004)	(0.003)	(0.005)
Year 0	0.663***	0.827***	0.689***	0.683***	0.554***
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Overall change	0.164***	-0.137***	-0.006	-0.129***	0.060***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Change on characteristics	0.008***	-0.002*	0.026***	0.002	0.004***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)

Change on wage structure	0.156***	-0.135***	-0.032***	-0.131***	0.056***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
			q50–q90		
Year 1	1.596***	1.475***	1.367***	1.208***	1.203***
	(0.005)	(0.004)	(0.006)	(0.004)	(0.006)
Year 0	1.321***	1.596***	1.475***	1.367***	1.208***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.004)
Overall change	0.275***	-0.122***	-0.108***	-0.158***	-0.005
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Change on characteristics	-0.022***	-0.012***	0.047***	-0.004*	0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Change on wage structure	0.297***	-0.110***	-0.155***	-0.154***	-0.007
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)

Notes: The sample includes wage/salary workers. Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

For a more comprehensive understanding of the potential factors influencing the observed changes in wage inequality primarily driven by changes of wage structure, Table 4 provides a detailed decomposition of the Gini coefficient with respect to the set of worker and market characteristics. Among other covariates, the systematic decline in returns on education, measured by the years of schooling, has been one of the most important factors contributing to the decline of the Gini coefficient during the first period (2007/2009 to 2010/2011). Our results show for this period that changes on returns to education have significantly contributed to a decline of wage inequality by 0.035 Gini points.

The detailed Gini decomposition shows, further, that the increase in the wage associated with working in the public sector has the most significant observed contribution in increasing wage inequality over time during the first and last periods with almost 0.018 Gini points, while for the second period, it contributes significantly to the reduction of the inequality with 0.018 (see Table 4). The full/part-time wage gap has been one of the most significant contributors to the decrease of the wage inequality for the first and second period with respectively declines of 0.038 and 0.026 Gini points. Regarding the impact of social security on the wage structure in Egypt, the evidence shown from the detailed Gini decomposition indicates that across time, the changes in social security wage premiums have had a small and insignificant effect on wage inequality except for the second period. The changes observed during this period between 2010/2011 and 2013/2015 appear to have a considerable and significant impact decreasing wage inequality by about 0.034 Gini points). Finally, the urban wage premium have had non-statistically significant effects on wage inequality except for the last period, when the effect is around 0.018 Gini points of increase of wage inequality between 2018 and 2021.

Table 4. Wage inequality, detailed decomposition (Gini)

	2007/2009 vs 2010/2011		2010/2011 vs 2013/2015		2013/2015 vs 2016/2017		2016/2017 vs 2018/2019		2018/2019 vs 2020/2021	
Overall changes	0.071***		-0.062***		0.050***		-0.116***		0.028***	
	(0.003)		(0.003)		(0.013)		(0.013)		(0.004)	
	Composition	Wage Structure	Composition	Wage Structure	Composition	Wage Structure	Composition	Wage Structure	Composition	Wage Structure
Changes	0.001	0.070***	0.000	-0.062***	0.010	0.041***	-0.001**	-0.115***	0.007***	0.021***
	(0.001)	(0.003)	(0.000)	(0.003)	(0.007)	(0.007)	(0.000)	(0.013)	(0.001)	(0.004)
Age	0.002***	-0.026	0.004***	0.027	-0.007	0.089	0.001***	-0.178	-0.000	0.002
	(0.000)	(0.024)	(0.000)	(0.025)	(0.004)	(0.131)	(0.000)	(0.126)	(0.000)	(0.023)
Tenure	0.001***	-0.013	-0.002***	0.005	0.004	0.019	0.001***	-0.002	0.001	0.009
	(0.000)	(0.008)	(0.000)	(0.008)	(0.002)	(0.017)	(0.000)	(0.014)	(0.000)	(0.007)
Sex (1 =Woman)	0.002***	0.001	0.001***	-0.001	0.000	-0.008	-0.002***	0.011	-0.001**	-0.004
	(0.000)	(0.002)	(0.000)	(0.003)	(0.000)	(0.007)	(0.000)	(0.007)	(0.000)	(0.002)
Schooling	0.002*	-0.035***	0.000**	-0.005	0.000	-0.016	-0.000**	-0.001	-0.000	0.008
	(0.001)	(0.006)	(0.000)	(0.007)	(0.001)	(0.022)	(0.000)	(0.021)	(0.000)	(0.011)
Relation to HH	-0.001***	-0.005	-0.000***	0.003	0.009	-0.011	0.000	0.005	0.000	-0.001
	(0.000)	(0.006)	(0.000)	(0.006)	(0.005)	(0.015)	(0.000)	(0.010)	(0.000)	(0.008)
Sector (1=Public)	0.002***	0.018***	0.001***	-0.018***	-0.002	0.003	-0.001***	0.001	0.003***	0.019***
	(0.000)	(0.003)	(0.000)	(0.003)	(0.002)	(0.004)	(0.000)	(0.005)	(0.001)	(0.003)
Full time worker	-0.005***	-0.038***	-0.002***	-0.026***	0.001	0.054*	-0.001***	-0.003	0.000	0.005
	(0.001)	(0.007)	(0.000)	(0.008)	(0.001)	(0.023)	(0.000)	(0.023)	(0.000)	(0.013)
Social Security	-0.001**	-0.005	-0.002***	-0.034***	0.007*	0.001	0.002***	0.015	0.003***	-0.019*
	(0.000)	(0.005)	(0.000)	(0.005)	(0.003)	(0.023)	(0.000)	(0.020)	(0.001)	(0.008)
Urban	0.001***	-0.006	0.000	-0.001	-0.000	0.003	-0.000***	-0.007	0.000	0.018***
	(0.000)	(0.003)	(0.000)	(0.004)	(0.000)	(0.010)	(0.000)	(0.010)	(0.000)	(0.004)
Constant		0.180***		-0.013		-0.092		0.045		-0.017
		(0.020)		(0.020)		(0.085)		(0.085)		(0.025)

Notes: Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' own calculations based on 2007-2021 Labor Force Surveys.

5. Conclusion and Policy Implications

Since the 1980s, cross-country studies have consistently indicated a widening wage gap in many high- and low/middle-income countries, characterized by increased wages for high-skilled workers and slower growth, declines, or stagnant earnings for low-skilled workers. In contrast to this prevailing global trend, Egypt has exhibited, on average, a decline in wage inequality over the past two decades (2006-2021), particularly evident before the Arab Spring. Using the methodology of RIF regression and the inter-temporal decomposition analysis we were unable to identify a consistent pattern in wage inequality changes over time across the wage distribution. Notably, in the pre-Arab Spring period, the trend in wage inequality revealed a decrease at the bottom, an increase in the middle, and a substantial increase at the top of the distribution. Conversely, results indicated an increase in wage inequality during the most recent period across the entire wage distribution.

Further exploration through Gini decomposition results uncovered fluctuations in wage inequality over the entire period, with increases observed in specific phases and an overall decreasing trend. These findings highlight the complexity of wage inequality dynamics in Egypt, where the patterns appear to deviate from the broader global trends. The decomposition analysis of Gini Coefficient shown further that most of the earnings inequality changes have been driven by changes in the wage structure or returns to characteristics of workers. Among various factors, our findings reveal that both education and full-time employment significantly contribute to the reduction of wage inequality, particularly during the first period. Conversely, employment in the public sector is identified as a positive contributor to the increase in wage inequality, particularly during the first and last periods. These results emphasize the importance of conducting an inter-temporal decomposition analysis to identify the primary contributors to the observed changes in wage inequality.

In light of these findings, we propose some key policy implications for Egyptian authorities seeking to mitigate the persistent wage inequality over the last two decades. Specifically, there is a need for targeted interventions, such as encouraging individuals to pursue higher education in alignment with employment demands, to address the role of education in influencing wage inequality dynamics. To tackle the substantial impact of education on reducing wage inequality over time, Egyptian policymakers should prioritize comprehensive investments in education, with an emphasis on accessibility to quality programs and alignment of curricula with evolving industry needs. Initiatives promoting higher education through scholarships and vocational training, along with tailored skills development programs for high-demand industries, can enhance workforce capabilities and narrow the skills gap. Public awareness campaigns should underscore the integral link between education, skills development, and income improvement, fostering a culture of continuous learning. Collaborative efforts between educational institutions and the private sector, supported by initiatives like internships and apprenticeships, ensure that educational offerings align with employer demands. The implementation of inclusive education policies and the establishment of support mechanisms for lifelong learning contribute to sustained wage growth and reduced wage inequality, ultimately fostering a more equitable and resilient labor market in Egypt.

References

Assaad, R. (1997). The effects of public sector hiring and compensation policies on the Egyptian labor market. *The World Bank Economic Review*, *11*(1), 85-118.

Assaad, R., Krafft, C., & Rahman, W. K. (2019, October). Introducing the Egypt labor market panel survey 2018. In *Economic Research Forum (ERF), Working Paper* (No. 1360).

Balestra, C., Llena-Nozal, A., Murtin, F., Tosetto, E., & Arnaud, B. (2018). Inequalities in emerging economies: Informing the policy dialogue on inclusive growth. OECD publishing.

Blinder, A. S. (1973). Wage discrimination: reduced form and structural estimates. *Journal of Human resources*, 436-455.

Canavire-Bacarreza, G., & Rios-Avila, F. (2017). On the determinants of changes in wage inequality in urban Bolivia. *Journal of Human Development and Capabilities, 18*(4), 464-496.

Castello-Clement, A., & Domenech, R. (2017). Human capital and income inequality: new facts and some explanations. *Accessed July*, *29*, 2017.

Chao, C. C., Hazari, B. R., & Yu, E. S. (2006). Rising wage inequality in developing economies: Privatization and competition. *Journal of International Trade & Economic Development*, *15*(3), 375-385.

Cho, Y., & Newhouse, D. (2013). How did the great recession affect different types of workers? Evidence from 17 middle-income countries. *World Development*, *41*, 31-50.

El Ghamrawy, T., and Z. Amer 2011. "The Public Wage Premium in Egypt: Mirage or Reality?" Cairo: Egyptian Centre for Economic Studies.

El-Ghamrawy, T., & Amer, Z. (2011). *Public wage premium in Egypt: Mirage or Reality?*. ECES Working Paper # 164. Egyptian Center for Economic Studies.

El-Haddad, A., & Gadallah, M. M. (2021). The informalization of the Egyptian economy (1998–2012): a driver of growing wage inequality. *Applied Economics*, *53*(1), 115-144.

Firpo, S. (2007). Efficient semi-parametric estimation of quantile treatment effects. *Econometrica*, *75*(1), 259-276.

Firpo, S., Fortin, N., & Lemieux, T. (2007). Decomposing wage distributions using recentered influence function regressions. *University of British Columbia (June)*.

Gourdon, J. (2011). Wage inequality in developing countries: South–South trade matters. *International Review of Economics*, *58*, 359-383.

Han, J., Liu, R., & Zhang, J. (2012). Globalization and wage inequality: Evidence from urban China. *Journal of international Economics*, *87*(2), 288-297.

Hassine, N. B. (2015). Economic inequality in the Arab region. *World Development*, *66*, 532-556.

Ianchovichina, E., Mottaghi, L. and Shantayanan Devarajan, S. (2015). Inequality, Uprisings, and Conflict in the Arab World. *MENA Economic Monitor*. Washington, DC: World Bank.

Kijima, Y. (2006). Why did wage inequality increase? Evidence from urban India 1983–99. *Journal of Development Economics*, *81*(1), 97-117.

Assaad, R., Krafft, C., & Rahman, W. K. (2019, October). Introducing the Egypt labor market panel survey 2018. In *Economic Research Forum (ERF), Working Paper* (No. 1360).

Lee, J. W., & Wie, D. (2015). Technological change, skill demand, and wage inequality: Evidence from Indonesia. *World Development*, *67*, 238-250.

Lopez-Acevedo, G. (2006). Mexico: Two decades of the evolution of education and inequality. *World Bank Policy Research Working Paper*, (3919). doi:10.1016/j.worlddev.2014.10.020.

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International economic review*, 693-709.

Organization for Economic Co-operation and Development (OECD). (2011). *Divided we stand: Why inequality keeps rising*. Paris: OECD publishing. https://doi.org/10.1787/9789264119536-en

Roushdy, R., & Gadallah, M. (2011, October). Labor Market Adjustment during the World Financial Crisis: Evidence from Egypt. In *Economic Research Forum Working Papers* (No. 643).

Said, M. (2012). Wage differentials during economic reform and crisis: Evidence from Egypt and Jordan. *Comparative Economic Studies*, *54*, 65-101.

Said, M. (2015). Wages and inequality in the Egyptian labor market in an era of financial crisis and revolution. In Krafft, C., & Assaad, R. (Eds.). *The Egyptian labor market in an era of revolution*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198737254.003.0003

Said, M. (2002). A Decade of Rising Wage Inequality? Gender, Occupation, and Public-private Issues in the Egyptian Wage Structure. In R. Assaad, R. (Eds.). *The Egyptian Labor Market in an Era of Reform*, 65–95. American University Press.

Said, M., Galal, R., & Sami, M. (2022). Evolution of Wages, Inequality, and Social Mobility in Egypt. In Krafft, C., & Assaad, R. (Eds.). *The Egyptian Labor Market: A Focus on Gender and Economic Vulnerability*. Oxford University Press.

Simson, R., & Savage, M. (2020). The global significance of national inequality decline. *Third World Quarterly*, *41*(1), 20-41.

Tansel, A., & Bodur, F. B. (2012). Wage inequality and returns to education in Turkey: A quantile regression analysis. *Review of Development Economics*, *16*(1), 107-121.

Tridico, P. (2010). Growth, inequality and poverty in emerging and transition economies. *Transition Studies Review*, *16*, 979-1001. doi:10.1007/s11300-009-0116-8.

Wahba, J. (1996). Earnings and regional inequality in Egypt. In *Working paper series/Economic Research Forum; 9613*. Economic Research Forum, Cairo, EG.