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Working Paper No. 1478

August 2021

I am grateful to Farhad Mehran and Hashem Pesaran for helpful comments and suggestions on an earlier draft of the paper. I am responsible for remaining errors and omissions. I am also grateful to Jalaleddin Jalali for sending me the household survey datafiles.

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First published in 2021 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

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Abstract

We examine the impact of minimum wages on the distribution of earnings in Iran. Specifically, we show that minimum wages have played a critical role in the distribution of earnings and the distribution of household income. We identify a perverse relationship between minimum wages and distribution of earnings, which is contrary to the observed relationships in other developed and developing countries. To explain this anomaly, we investigate the role of minimum wages in the overall wage-setting institutions in the country and conduct decomposition analysis by reweighting methods that separate the effect of individual attributes from wage structure effects. The paper concludes by highlighting some of the broader implications of our findings for future research on inflation, unemployment and competitiveness in oil economies like Iran.

Keywords: minimum wages, labour market institutions, inequality, rentier economies.

JEL Classifications: J3, J4, J5, D30, D33.

1. Introduction

In this paper we investigate the impact of labour market institutions, particularly wage-setting institutions, on the distribution of earnings in Iran during 1997-2013. A number of studies on the personal distribution of income in Iran exist, but the role of the earnings distribution in the overall income distribution has not been examined.² Wages account for about a third of the overall household income in urban areas in Iran. This is not as high as in the industrialized countries such as the US where wages form more than 80 percent of household income (see, e.g., Atkinson 2008), but it is still a sizable component and therefore necessary for the understanding of the dynamics of income distribution. As we show in this paper the dynamics of earnings distribution have had a noticeable effect on the changes in the distribution of income in recent decades in Iran. The study of earnings distribution, however, is also an important topic in itself, as it necessitates an understanding the operation of the labour markets, with critical implications for wide range of other macro- and micro-economic issues such as inflation, unemployment, productivity, and competitiveness.

Our starting point in the paper is the observation of an apparently perverse relationship between minimum wages and distribution of earnings in Iran. In the next section we start by a brief review of the literature on the impact of minimum wage on the distribution of earnings in developed and developing countries. This forms the background against which we highlight the anomalies in the relationship between the minimum wage and the distribution of earnings in Iran in section 3. The impact of the minimum wages on earnings distribution can be understood only in the context of prevailing labour relations and wage bargaining institutions in the country. In section 4 we discuss labour market institutions with a focus on collective bargaining and wage setting processes in Iran since the promulgation of the 1990 labour code. This section highlights the central role of the government, not only in setting the minimum wages, but also in regulating relative wages for a large part of the economy. Section 5 discusses the data and the definition and measurement of the variables. Section 6 discusses descriptive statistics and puts forward some preliminary hypotheses regarding the dynamics of wage inequality suggested by the data. In section 7 we further substantiate the preliminary hypotheses by decomposing the overall change in inequality into those associated with changing labour attributes and pure wage structure effects. Section 8 reviews our conclusions and their possible implications for a number of macro- and micro-economic issues, highlighting the weaknesses and lacunae of the data with suggestions for future research.

2. Minimum wages and distribution of earnings

A voluminous literature exists on the economic impact of minimum wages. This section does not seek to provide an exhaustive review this literature but rather to draw on the literature in order to highlight some of the stylized facts regarding the impact of minimum wages on earnings distribution, against which we set our investigation of the impact of minimum wages in Iran. The

² See Mehran (1975a, 1975b), Pesaran (1976), Tabibian (2000), Assadzadeh and Paul (2004), Salehi-Isfahani (2006, 2016), Emami *et.al* (2016).

origins and evolution of minimum wages in different countries have been varied depending on the overall labour market institutions and the political economy of each country.³ In some countries minimum wages are set at sectoral or national level as an outcome of collective bargaining processes; in others they are set at the national, sectoral, or regional level by government legislation. The level and coverage of minimum wages has therefore varied depending on the broader labour-market institutions and structures, and the monitoring systems that can be practical within the institutional arrangements. Overgeneralizations based on country experiences during particular times without taking into account the differences in broader labour relations is therefore hazardous.

Minimum wages are used as redistributive measures to raise the wages of low paid workers with weak bargaining power, and as such their pros and cons should be judged in relation to other possible redistributive measures (Freeman 1996). Much of the literature on the economic impact of minimum wages has focused on its employment effects.⁴ The employment impact would of course have important implications for the effect of minimum wages on poverty and the distribution of income across households as well. In this paper we are mainly focused on the impact of minimum wages on the distribution of earnings of the employed. This limited focus would help us understand the role of the minimum wages within the wage setting institutions in Iran, which would be important for any future study of its broader impacts on employment, poverty, and income distribution across households. The impact of the minimum wages on earnings distribution has been less controversial than its employment impact and appears to exhibit some basic common features across the countries studied in the literature.

The literature that has appeared on the impact of minimum wages on earnings distribution in the OECD countries (mainly based on studies on the US, UK, and Canada since the 1980s) appear to reach a number of common conclusions. Firstly, minimum wages that are set to protect the earnings of the low-paid workers reduce wage inequality by condensing wage dispersion at the lower part of the distribution. Secondly, binding minimum wages create a spike at the vicinity of the minimum wage but do not spill-over to higher wage quantiles.⁵ By implication, minimum wages would have small effects on average wages or the median or higher wage quantiles, and have negligible inflationary impact.

In the case of developing countries, where a large part of the labour force is engaged in the informal sector, the impact of minimum wages on earnings distribution depends on the level of the minimum wage and enforcement mechanisms in place (Freeman, 2008, 2009). Many studies indicate that

³ Levine-Waldman (2016) provides a detailed account of the evolution of minimum wages in different OECD countries from the late 19th Century up to the present, with a useful annotated bibliography.

⁴ See, Card and Krueger (1995), Brown (1999), and Neumark and Wascher (2008), and the sources quoted there.

⁵ See, Card and Krueger, 1995, Ch.5, Freeman 1996, Lee, 1999, Dinardo et al. 1996, Tuellings 2003, Autor, et al. 2010, Butcher et.al 2012, Brochu, et.al 2015.

minimum wages have more or less similar effects on earnings distribution as in the advanced countries, despite the wide variety of wage setting institutions and labour relations in these countries. The study by Neumark et.al (2006) on Brazil over the 1996-2001 period shows that the impact of the increase in minimum wages on earnings of the formal and informal sector wage earners was mainly concentrated in the bottom two deciles with the effect on wages of the third and higher deciles being zero or even negative. This was the case when the informal sector workers were included – the exclusion of the informal workers makes the increase in wages resulting from the minimum wage rises concentrated in the first decile. Similar results in the case of Brazil are found by Lemos (2007), showing wage compression for both public and private sectors in the bottom half of the distribution, but also evidence of spill-overs to higher wage deciles but with lower and declining intensity, leading to reduction in overall inequality. Chun and Khor (2010) report similar results in the case of Indonesia, where minimum wage increases were associated with wage compression in the bottom of the distribution with no spill-over effects in higher wage deciles. According to the evidence summarized in Belser and Rani (2015), minimum wages are associated with reduced wage dispersion in the bottom end of the wage distribution and reduced overall inequality in countries such as India, Mali, Philippines, South Africa, Turkey and Viet Nam.

In sum, this evidence echoes the conclusion reached by Freeman in his survey of the impact of labour market institutions; ‘minimum-wage laws raise pay at the bottom of the distribution and are generally associated with lower dispersion of earnings’(Freeman, 2008, p.20). These conclusions are of course based on a number of preconditions. Firstly, minimum wages should be aimed at raising the wages of the low paid workers in the country, industry, or a region, depending on the type of minimum wage legislation. Secondly, minimum wages should be binding, with adequate enforcement mechanisms. This is particularly important in developing countries where a large part of the labour force works in the informal sector which is difficult to monitor. Finally, the distributional impact of minimum wages depends on the wage setting institutions in the country. If the minimum wages are set centrally as a component of the overall wage indexation system, their distributional impact is likely to be lower.

3. Apparent anomalies in the Iranian case

To fix ideas and to highlight some of the paradoxical phenomena that this paper attempts to explore, it would help to start with a look at the relationship between minimum wages, average wage trends and indicators of wage distribution in Iran. Minimum wages are set once a year in March, on the eve of the Iranian new year for the next calendar year. Figure 1 shows the trends in real minimum wage indices along with the mean and median real wages for full-time workers during 1997-2013⁶. Minimum wages show a remarkable sustained increase between 1997 and

⁶ The figures relate to monthly wages of full-time workers between ages 16 and 65. All the indicators, unless otherwise specified, are measured by applying sampling weights provided in CSO surveys. Further details of the data and definitions are discussed in section 5 below.

2007 and an equally remarkable decline in the subsequent period in real terms. Average wages closely follow the minimum wage trends for both male and female wage workers, during both the upswing and the downswing in minimum wages. The correlation coefficient between minimum and median wages is 0.94 for men and 0.96 for women. This indicates a strong spill-over effect of minimum wages across the wage distribution, which sharply contrasts with the observed effects of minimum wage in other countries.

The significant correlation between minimum and average wages are also observable in the relationship between minimum wages and wage distribution indicators such as the variance of log wages, the Gini and Theil indices. Wage dispersion according to all the measures shown in Table 1 also follows the movements in minimum wages, increasing during the period of rapid growth of minimum wages and declining with the fall in real minimum wages. This is another anomaly as compared to other countries where minimum wage increases are normally associated with more equal distribution of earnings, and the erosion of minimum wages over time have been shown to be associated with increased wage dispersion.

The same phenomenon can be also observed in other indicators of inequality such as the trends in log wage differentials in the 10-50 and 50-90 deciles, shown in Figure 2. The period of the uptrend in minimum wages during the 2000s appears as one of increasing wage dispersion and wage distribution appears to get more compressed in the subsequent period when minimum wages decline. These changes are particularly noticeable in the lower part of the distribution, the 10-50 decile range. A distinct aspect of wage distribution in Iran, as compared for example with the OECD wage differentials in recent decades, is the much higher differentials in the lower part of the distribution – a phenomenon to which we shall return below. A further anomaly in contrast to the other countries is that a major part of change in wage dispersion, both in the upswing and the downswing phases, is explained by the changes in bottom half of the distribution. The 10/50 log wage differentials increased by over 0.2 between 1997 and 2007 and declined by 0.28 in the 2007-2013 period for male workers. During the same periods, the log wage differentials for 10/50 deciles in the case of female workers increased by 0.46 and then declined by 0.39 points.

This evidence does not necessarily imply a causal relationship between minimum wage and the distribution of earnings. Wage distribution is affected by other factors such as demographic and technological changes and structural changes in the economy affecting productivity and pay for various types of labour and wages for different skills. What also may be of interest in this respect is that the two periods identified above with respect to wage distribution trends roughly correspond with two distinct political periods, the first one corresponds to the oil boom years during the second term of Khatami presidency, and the period of declining wage inequality falls into Ahmadinejad's presidency with his populist policies and anti-middle-class rhetoric. It would be of interest to see if any changes in government policies in the two periods, apart from the minimum wage policies, have affected the observed trends in wage distribution. A particularly notable fact in this regard

is the decoupling of minimum wage and average wage during the first term of Ahmadinejad presidency, when the continued growth in minimum wage coincided with a decline in average wages. This gap was rapidly closed in the second phase of his presidency when the minimum wages and average wages converged once again (see Figure 1).

The sharp reversal of wage distribution patterns following the fall in real minimum wages conveys the impression that minimum wage policy should be considered as an important aspect of government policy affecting wage distribution. This effect, however, appears to be contrary to the effect of minimum wages in theory and in comparison with the empirical evidence in other countries. The effect of minimum wages can be only discerned once the influence of the myriad of other factors referred to above are also considered. More importantly, the effect of minimum wages can be properly understood only in the context of broader wage setting institutions of the country. In the next section we review labour market institutions since the 1990s in Iran, particularly focusing on institutions of collective bargaining and minimum wage determination.

4. Labour Market Institutions and Determination of Minimum Wages in Iran.

Labour market institutions and their impact on wage dispersion and employment have been studied in relation to; 1. Employment protection laws; 2. Unemployment insurance and other types of workers welfare provisions; 3. Unionization and institutions of collective bargaining; and 4. Minimum wage legislation and other forms of wage regulation such as wage indexation. In the case of Iran there have not been many studies of the impact of labour-market institutions on employment and wages. A good starting point would be the 1990 labour code that provides the legal framework for labour market institutions in the country. The labour code was the product of a decade of factional struggles in the post-revolution period and was formed in an atmosphere where the formal sectors of the economy were by and large under the control of the government and when the general expectations in the aftermath of the Iran-Iraq war were high.

Of the four aspects of labour market institutions enumerated above, the last two, namely institutions of collective bargaining and the minimum wage setting institutions are of direct relevance to question of wage dispersion being studied here. However, the other two aspects can also play a significant role as they influence the nature of labour market segmentation and the possibility of the enforcement of labour market regulations. In relation to labour protection laws, e.g., severance terms and national insurance burden on employers, the 1990 labour code has been criticized for being too restrictive and costly for employers. Over the years, however, supplementary laws have somewhat weakened the coverage of the law. Many of the stipulations of the 1990 labour code only cover employees in establishments of more than ten employees, and many of the articles of the labour code do not cover the various free trade zones that have proliferated since to encourage private business activities. More importantly, the labour code only covers employers under formal contracts. Under the Iranian civil code, following the Islamic contract law, temporary work contracts are recognized with terms agreed between the employer

and worker without any limitations on the period of work or the repetition of short term contracts with the same employer (see, Abasi and Poorengar, 2012). Such temporary work contracts fall outside the 1990 labour code. The ‘contract workers’, employed under temporary labour contracts, are not only confined to small establishments – the so-called informal sector. Large enterprises in the corporate sector have over time increasingly resorted to the use of temporary contracts, often by creating subcontracting units, hence bypassing the stipulations of the 1990 labour code.

The formation of workers associations at the firm level in the case of large enterprises, and at industry level in case of small firms, is in principle recognized by the 1990 labour code. But the law also specifies that only one of the three types of labour associations, namely, the ‘Islamic labour councils’, ‘workers representatives’, and ‘guild societies’ can represent workers in any one workplace. The Islamic labour councils are formed in enterprises with more than 35 employees. Workers representatives and guild councils are supposed to represent smaller enterprises and industry-level representations. In each of these three labour-organization types, workers can elect their representatives only with the consent of the employers and they also need to be approved by the Ministry of Labour and Social Affairs. This practice hence rules out independent trade unions and free collective bargaining at firm or industry level. The law also stipulates that any collective agreement between representatives of workers associations and the employers must be first ratified by the Ministry of Labour before it can be implemented. Though the 1990 labour law recognizes collective agreements between workers and employers at enterprise or industry level (Article 141), in practice wage agreements for workers covered by the labour law are set at national level by the Supreme Labour Council (SLC).

The SLC is a tripartite organization chaired by the Minister of Labour and consists of three representatives from the Islamic labour councils, three from the employers’ associations and three appointed by the government. One of the main tasks of the SLC is the setting of minimum wages which is announced by the Ministry of Labour and Social Affairs annually. According to the labour code (section 41) the minimum wage should be fixed in relation to the rate of inflation and ‘shall be sufficient to meet the living expenses of a family, whose average number of members shall be specified by the appropriate authorities’, and should cover all the wage and salary workers in the country. Table 2 shows the monthly minimum wages for 1996-2015 in nominal terms and relative to different absolute and relative poverty lines, along with indicators of consumer price inflation. The Iranian government does not have an official poverty line, but the figures in Table 2 based on the available measures of absolute poverty, as well as relative poverty as defined by half of the median per capita expenditure, indicate that the minimum wages have indeed been kept at a level commensurate with that necessary for the upkeep of a 3 to 4 member household at the basic levels of expenditure. The attempt at the preservation of one breadwinner families is in this way strongly pursued by the Islamic Republic government⁷.

⁷ See Karshenas (1999) and Karshenas and Moghadam (2000), for a discussion of the relationship between wage setting institutions and female labour force participation in the MENA region.

However, although the law suggests protection of minimum wages against inflation, in practice there is no automatic inflation indexation at work, and the relationship between inflation rate and the minimum wage is weak and rather erratic. A simple Granger causality test indicates that it is in fact the minimum wage that leads inflation in a significant way and not the other way round. Figure 3 shows trends in real minimum wages along with the oil export revenues, indicating that minimum wages have indeed followed the trends and cycles in oil export revenues very closely. The phenomenal increases in real minimum wages following the oil price rises during the 2000s shown in the figure are difficult to justify on any rational economic grounds. The costs are magnified in view of the fact that minimum wages were set at above 80 per cent of the median wage, and the fact that, as we shall observe below, the minimum wage affected the overall structure of wages in the country.

At the time of the announcement of the minimum wage the Ministry of Labour also issues circulars containing detailed wage and salary scales as agreed by the SLC meeting for wages above the minimum wage. These relate to detailed job classifications based on education and years of experience drawn by the labour ministry, with similar percentage increases as the minimum wage applied to all the salary scales each year. The circulars also specify the amount of increases in other benefits to be paid by the employer such as child benefit, housing benefit, and consumption subsidies that are normally specified in lump sums to be received by all the workers. The increases in wages and benefits are required to apply to all workers, with temporary or permanent contracts that fall under the labour law, in both private and public sectors, and they required to be implemented at the beginning of the new year. In establishments where salary scales do not exist, percentage increases in minimum wages are required to apply to all workers.⁸ These arrangements, which appear to impose a very rigid structure on the distribution of wages, in fact clarify one of the paradoxes discussed in section 1, that is, the close association of median and mean wages with the minimum wage.

In practice, however, various additional factors affect wage structures. The law allows employers to introduce productivity related bonuses to individual workers or groups of workers above the announced wage scales, but only with the approval of the ministry of labour. Furthermore, the labour law and hence the stipulated wage scales do not cover workshops with less than ten employees. The issue of monitoring the compliance of wages with the law in establishments with less than 35 employees, where Islamic labour councils or other forms of organized labour institutions may not exist, can be also problematic. In addition, the wages of contract labour that fall beyond the labour law can introduce large discrepancies between the remuneration schemes agreed by the SLC and the actual outcomes. Hence, though the distribution of public sector pay is likely to follow the pay structures set by the law and the composition of labour in the sector

⁸ The texts of the circulars by the Ministry of Labour and Social Affairs related to minimum wages and wage increases according to job classifications can be found on www.IranAccNews.com

itself, the situation in the private sector which employs the larger majority of workers is likely to be much more complex. Such complexities are the subject of the analysis of wage distribution in the following sections of this paper.

Even in situations where pay structures are set exactly according to the government's pay scales, the distribution of earnings can change due to the changes in the demographic mix of the labour force. Hence in the following sections of the paper we attempt to disentangle the effects of the changing composition of the labour force, the changes in remuneration of labour with different skills, as well as the effect of labour market institutions such as minimum wages. We start with a discussion of the nature of the available data, the possibilities and constraints that they present, and the methodologies we adopt to analyze the distribution of wages.

5. Data and definition of variables

The household budget surveys conducted by the CSO are the main source of micro-data on wages and salaries in Iran. The urban surveys used in this paper contain samples of about 8-12 thousand wage and salary earners records. The surveys also contain similar size rural sector samples, but the rural labour markets can be very different from the urban sector and they need a separate study of their own before one can conduct an integrated national level study. Here we focus on urban labour markets only. A major problem with the use of the CSO household surveys in the study of labour markets is that prior to 2005 the surveys do not contain any information regarding the hours and days worked by individual workers. For this reason, the rest of the paper examines the 2005-2013 period only. We first need to investigate how this issue affects the indicators shown in Figures 1 and 2 and Table 1 in the first section of the paper.

All the surveys, going back to the 1980s, report the annual and monthly wages and salaries, both net and gross, with regular and irregular earnings also separated. We use the net total wages, including both regular and irregular payments. Inspection of the data reveals that data on gross wages may not be very accurate – there are wide discrepancies in implied taxes between public and private sectors, and the implied taxes in public sector also look too low up to the 95th percentile of wage distribution.⁹ It is reasonable to assume that workers reporting their monthly wages have a more accurate idea of their net take home pay. We have also restricted our sample to adult workers between the ages of 16 and 65 who are in full time employment.

⁹ Income tax system in Iran is rather simple. There are only two income tax bands of 10 and 20 percent, and tax threshold is quite high, for example it was at 1.6 times the minimum wage and well above median wage in 2015. The workers in the formal sector, with wages above the minimum wage, in addition pay 7 percent social security tax (employers share is 23 per cent). These arrangements indicate very low taxes on income but at the same time very high taxes on employment – a topic that falls beyond the confines of this study. The data on gross and net monthly pay reported in the household surveys indicates that the workers in the private sector seem to overestimate their taxes while the public sector workers up to the very top deciles under-estimate their tax deductions.

The CSO surveys do not provide data on hours and days worked for the years before 2005, which makes it difficult to identify full time employees in those earlier years. The data on wage distribution presented in section 1 of this paper are constructed on the basis of the assumption that full time employees work more than ten months a year – that is, their annual net wages are more than ten times their monthly reported wages. The problem with this procedure is that it would rightly exclude casual or seasonal workers, but it does not exclude part time workers who work throughout the year on a part-time basis. However, assuming the share and composition of the part-time workers included in the data remains relatively stable, the average trends shown in Table 1 and Figures 1 and 2 may be reasonable approximations to those of full-time workers. But such an assumption is not appropriate for a more detailed analysis of the changes in wage distribution. In the rest of this paper we therefore focus on years 2005-2013 where days and hours worked in a week are also reported. To obtain a sample of permanent workers we drop the observations where days worked per week are less than five and drop observations with the ratio of annual to monthly wages are less than ten. To avoid errors connected to hours of work we use the net monthly wages, rather than hourly wages, in investigating the changes in the distribution of wages. In the surveys, wages are reported on a monthly basis, and minimum wages for most years in Iran are also announced for daily and monthly pay rather than hourly pay. The results discussed below, using monthly wage data, are however similar to the results obtained using hourly wages as long as the sample remains the same.¹⁰ We only report the monthly wage results here but would also comment when the use of hourly wage data makes a significant difference in the results.

Figure 4 shows the trends in the mean and median real wages together with the real minimum wage, which exhibits the same trends as in Figure 1. Given the discussion of the wage-setting system in the previous section such close association between the minimum and average wages are no longer surprising. The decoupling of the relationship between minimum wages and average wages during the 2006-2010 period that was observed in Figure 1 is also present in Figure 4. By 2013, as observed above, the average wages converge to their long-term levels that shadow the minimum wages.

The trends in the variance of log mean wages also follows the same trends as the data for the larger sample in section 3 (Table 3 as compared to Table 1). With the restricted and more homogeneous observations, however, the variances in Table 3 are lower than those in Table 1, but the trends are the same as in Table 1. The fall in minimum wages coincide with the decline in wage dispersion. The same trends are observed if instead of monthly wages we measure the dispersion in hourly

¹⁰ It would be interesting to see the results for a much larger sample size, including both permanent and part-time workers using hourly wages. In this paper we have preferred to keep things simple by focusing on permanent workers.

wages.¹¹ The perverse relationship between minimum wages and wage dispersion remains a puzzle in need of explanation. {Figure 4 and Table 3 here}

6. Some preliminary hypotheses and results

One hypothesis that can be formed in the light of the discussion of wage-setting institutions in section 4 is that the entire wage structure in the public sector, and in large establishments in the private sector with Islamic labour councils and under government regulations, follow the centrally established pay scales that change annually in proportion to the minimum wages. This effect can be clearly seen in Figure 5 in the case of public sector wages. The Figure shows the kernel density functions for private and public sectors separately, along with minimum wages for the years 2005 to 2013. As shown, the minimum wages have a strong effect on public sector wages, as they shift the entire public sector wage distribution relative to the minimum wage. This would have been expected from the discussion of wage setting system in the public sector in earlier sections.

The figure also shows that minimum wages have a strong bite in the case of wage density of the private sector, as indicated by the spike in private wage density at the minimum wage. This, in the case of the OECD countries is normally associated with reduced dispersion of wages in the lower part of the distribution, as minimum wages are expected to increase the wages of the lowest paid relative to the higher wage deciles. In the case of Iran, however, minimum wages are over 80 per cent of the median wage in the private sector and at that level between 25 and 30 per cent of private sector workers receive wages below the minimum (in the case of females close to 50 per cent of private sector workers receive wages below the minimum wage). At such high levels the effect of the minimum wages is likely to be reduced wage dispersion at the upper part of the wage distribution. The relatively high levels of minimum wages, combined with the wage setting institutions discussed in the previous section, can help to partially explain one of the anomalies identified in Section 3 of the paper, namely, the highly condensed wage dispersion in the upper part of the distribution in Iran in contrast to the OECD countries.

This however, does not necessarily imply that minimum wage increases lead to a reduced overall wage dispersion in Iran. Depending on the correlation between the wages of those who receive below minimum wage and those in the above-minimum wage deciles, the outcome could be in any direction. In a segmented labour market where such a correlation is very low the effect of increasing minimum wages can be increased wage dispersion. This effect is not so readily discernible from Figure 5. The segmentation of the labour market and the relationship between minimum wages and wage distribution in the private sector can be better observed in Figure 6 with the help of time series data. Panel (a) in Figure 6 shows the remarkably uniform association

¹¹ The variance of log hourly wages declines from 0.434 in 2005 to 0.253 in 2013 for male workers, and for female workers it starts at 0.502 in 2005, increases to its peak of 0.638 in 2009, and then declines to 0.430 in 2013, following exactly the same trends as for monthly wages.

between minimum wages and public sector pay across all the wage deciles – with minimum wages uniformly shifting the distribution of public sector pay. In the private sector shown in Panel (b) of Figure 6, however, this association clearly breaks down for observations below the minimum wage. It should be noted that in the case of the private sector, minimum wages are very close to the median wage in all the years in the figure and hence the 5th decile is a good demarcating line for wages just above the minimum wage in Panel (b) of Figure 6.

The cascading effect of minimum wages on upper wage quantiles – that is, on wages of workers who benefit from the government wage legislation both in the private and the public sectors – is in accordance with the wage setting institutions discussed in earlier sections of the paper. The effect of this system on wage dispersion amongst the workers who benefit from the government wage legislation can be similar to the wage dispersion effect of unionization on unionized workers in OECD countries – that is a reduction of wage dispersion amongst the unionized workers. However, the change in wage inequality in Iran is more likely to be dominated by the effect of minimum wages on the distance between wages of private sector workers who receive wages below the minimum and the rest of the ‘unionized’ workers. A rise in minimum wages in that case is likely to lead to the perverse result of increased wage dispersion. The changes in wage dispersion over time, however, are also influenced by a myriad of other factors relating to the demographic composition of workers, their skills, activities, occupations, and other attributes. The tentative conclusions in this paragraph, therefore, are no more than plausible hypotheses that need further substantiation in the next section.

In order to disentangle such complexities a useful starting point would be to examine the characteristics of labour in different segments of the labour market in Iran. Table 4 shows summary statistics on different segments of the labour market for male and female workers separately for the years 2006 and 2013. We shall focus on the years 2006 and 2013, because of their distance both in terms of time and labour characteristics as well as the minimum wage, and also as discussed above these two years are more ‘normal’ years in terms of the relationship between minimum wages and average wages. The more anomalous years between 2006 and 2010, during the first period of Ahmadinejad’s presidency when average wage trends substantially diverged from minimum wage trends raise interesting political economy issues which fall beyond the confines of the present paper.

As Table 4 shows, the reduction in the overall log wage variance between 2006 and 2013 is repeated within each of the private, public and low wage segments as well, but at different rates. The decline is particularly noticeable within the private sector, and specially within women workers in the private sector. The table also shows that there has been a considerable change in the distribution of labour between these sectors. The share of public sector fell from just over 40 per cent to about 31 per cent, more or less equally affecting the male and female shares. Total share of labour with below minimum wages fell from 17 per cent in 2006 to 15.8 per cent in 2013.

This was entirely due to the fall in the share amongst male workers, with the share of women working below minimum wage increasing from 19.8 per cent to 23.4 per cent. The overall share of women workers, however, was 13.6 per cent in 2006 and only slightly increased to 13.7 per cent in 2013 – hence implying a much smaller impact of the female segment on the overall wage inequality trends than the male segment.

Other important changes in the composition of workers shown in the table relate to education and work experience. Average years of schooling increased by about one year between the two dates with similar increases across different segments. Average age and years of experience also increased uniformly, with the exception of below minimum wage workers where there was a larger increase in average age than other segments. The variation of average educational attainment across the segments are however very uneven in both years. Women have higher levels of educational attainment than men in all the segments in both years, but their age and years of experience are lower. In both years about 40 per cent of women working with below minimum wages have higher education degrees compared to men. Public sector workers are on average older and have higher levels of education and work experience in both years. Such variations indicate that the changing composition of labour between 2006 and 2013 may have had an important effect on changing wage dispersion.

The disentanglement of the effect of the changes in various characteristics of labour from the effect of the change in relative wages on earning distribution is attempted in the next section.

7. The composition and wage structure effects

In this section we begin by following the reweighting method proposed by Dinardo, Fortin and Lemieux (1996) (DFL method hereafter) to distinguish between the effect of observed labour characteristics (the composition effect) and the effect of the change in relative wages (wage structure effect) between 2006 and 2013. Consider the joint density function of wages w and its various covariates such as education, experience, gender, occupation, etc. x_t in period t as $f^t(w, x_t)$. The unconditional density of wages can be expressed as the integral of the conditional density of w over the distribution of covariates x_t :

$$f^t(w) = \int f^t(w|x) f^t(x) dx \quad (1)$$

In the case being studied here t takes values 1 for the year 2006 and 0 for 2013, with two observed wage distributions as $f^1(w)$, and $f^0(w)$. The decomposition methodology investigates various counterfactual distributions $f_c(w)$ that can result from keeping all or some of covariates as in year 1 (or 0) under the wage structure of year 0 (or 1), denoted by $f_{c/1}^0(w)$ (or $f_{c/0}^1(w)$). For example the distribution of wages that would result from individual characteristics as in 2006 under the wage density of 2013 would be $f_{c/1}^0(w)$. Considering any distributional statistic such as the variance, gini coefficient or interquartile range, denoted as $v(f(w))$, DFL use the counterfactual distributions to decompose the observed change in $v(\cdot)$ as:

$$V(f^0(w)) - V(f^1(w)) = [V(f^0(w)) - V(f_{c/1}^0(w))] + [V(f_{c/1}^0(w)) - V(f^1(w))] \quad (2)$$

That is, the change in the distribution index is decomposed into one resulting from the change in individual characteristics keeping wage structure as in 2013 (the first term in square brackets, referred to as the composition effect), and the wage structure effect keeping attributes as in 2006 (in the second square brackets). The counterfactual distribution can be identified under the ‘ignorability’ or ‘unconfoundedness’ assumption, that is, assuming that the conditional distribution of any unobserved covariates should be independent of the year (see, e.g., Firpo et.al, 2018). An additional assumption is that wage structures are independent of the hypothetical attributes used in measuring the counterfactual. In other words, the general equilibrium effects of the hypothetical changes in attributes on relative wages are ignored. In this paper we consider the decomposition exercise as an accounting framework that helps us detect the influence of minimum wages on earnings inequality.¹² Various methods have been proposed to derive the counterfactual distributions based on equation (1).¹³ Here we use the DFL’s reweighting method to estimate the counterfactual distribution. The counterfactual density $f_{c/1}^0(w)$, that is the hypothetical density that has the wage structure of 2013 and individual attributes of 2006 can be written as:

$$f_{c/1}^0(w) = \int f^0(w|x)f^1(x)dx$$

The DFL approach is to express this counterfactual density as a weighted function of $f^0(w)$:

$$f_{c/1}^0(w) = \int f^0(w|x)\theta(x)f^0(x)dx$$

Where $\theta(x) = \frac{f(x|t=1)}{f(x|t=0)} = \frac{\Pr(t = 1|x) / \Pr(t=1)}{\Pr(t = 0|x) / \Pr(t=0)}$. Kernel density functions are used to approximate the actual distributions $f^0(w)$ and $f^1(w)$ using sampling weights, and reweighted kernel density for the counterfactual distribution by multiplying the sampling weights with $\theta_i(x)$. The reweighting coefficients $\theta_i(x)$ are the ratio of the probability of an individual with attributes x belonging to period 1(2006) over probability of belonging to period 0 (2013), which we here estimate by a probit model of the year dummy variable over the pooled sample for both periods. The model is $\Pr(t=1/x)=\Omega(x\beta)$, where t takes value of 1 in 2006 and 0 in 2013, $\Omega(\cdot)$ is the cumulative density of the normal distribution, and x is a set of covariates consisting of years of schooling, years of experience, six educational degree categories and five potential years of experience categories together with their interactions, a marriage dummy variable, ten occupational and thirteen industry dummy variables.

An important obstacle in using this methodology to investigate the impact of minimum wages on earnings distribution is that there is only one national minimum wage for each year and therefore we

¹² The literature refers to the effect of various covariates as policy effect (see, e.g., Firpo et.al, 2009, 2018, Chernozhukov,et.al, 2013, Firpo and Pinto, 2016). In this paper we use the decomposition methodology as an accounting framework that can help us understand the effect of minimum wages (our main policy instrument of interest that cannot be treated as a covariate).

¹³ See for example, Machado and Mata (2005) and Melly (2005) who estimate marginal densities based on conditional quantile regressions. For a review of the different methods see Fortin et al. 2010.

cannot rely on the variations across individuals or groups of individuals to test the minimum wage effect. This problem could be overcome by forming pseudo panels and extending the time series component of the data, but this falls beyond the confines of the present study. However, since minimum wages are a part of the official wage setting process that affects different segments of the labour market differently, the minimum wage effect may be investigated as ‘unionization’ effect as discussed in the previous section. This approach has its own limitations for the case of Iran due to the coverage of data that will be discussed below. However, as observed in the previous section the official wage schedules fully cover the public sector employees, and therefore a good starting point would be to apply the decomposition methodology to the public and private sectors separately.

The counterfactual kernel density for public sector employees is plotted along with the actual densities for 2006 and 2013 in Figures 7. The wage structure and composition effects are plotted for different quantiles of government wage distribution in Figure 8. The total change in wages across the different quantiles is almost flat, with slight downward trend for the first decile and upward tendency in the last decile. The composition effect lifts earnings in all the quantiles uniformly, with the exception of mild equalizing influence for the first decile and relatively sharp upward effect in the top decile. The sharp increase in the composition effect for the top decile could be due to genuine increase in the share of older and more educated employees between the two years, or the promotion and fast tracking of the regime sympathizers in middle management jobs during the Ahmadinejad’s presidency – most probably both. The wage structure effect shows the sharp decline in real wages in all quantiles between the two years, and indicates a mildly equalizing influence in the top half of the distribution, particularly noticeable in the case of the last decile. Though inequality measures such as the variance that are sensitive to the tails of the distribution may register noticeable changes in inequality within the public sector, the flat shape of the total change indicates little change in within public sector wage inequality.

The decomposition of the changes in the private sector wage distribution changes is shown in Figures 9 and 10. The remarkable sensitivity of the wage densities in both years to the minimum wage is clearly shown in Figure 9. Comparison of the considerable change in the wage distributions in the vicinity of the minimum wage with the marginal effect of the counterfactual distribution in Figure 9, clearly highlights the significance of the minimum wages for the distribution of earnings in Iran. The composition effect increases all wages for different quantiles moderately, and it has a mild downward trend indicating a very small contribution to the overall change in inequality (Figure 10). There is a sharp decline in inequality below the median wage, almost fully concentrated below the minimum wage (the 0.24th quantile in 2013 and 0.27th for 2006), and almost totally explained by the wage structure effect. In the segment above the minimum wage, compared to the government sector one can notice a hump in the total change and wage structure effect that continues into higher quantiles but on a sliding scale. We shall discuss the significance of this phenomenon in more detail in relation to the overall wage distribution below.

The overall wage inequality statistics such as the variance of log wages are the outcomes of the mixing distributions of private and public sectors and the behaviour of wages below and above minimum wage. In the semi-parametric approach followed above one needs to estimate the entire counterfactual distribution first, and then estimate the composition and wage structure effects for each statistic based on equation 2. The decomposition formula in equation (2) focuses on the overall change in attributes between 2006 and 2013, leaving the wage structure effect to be estimated as the residual. In order to be able to directly estimate statistics of interest without first estimating the entire counterfactual distributions we next extend the reweighting methodology by using the recentered influence function (RIF) regression method introduced by Firpo et.al, (2009). They express the unconditional functionals of distribution $f^t(w)$, $v(f(\cdot))$, as a linear approximation of the expected value of the recentered influence function of that statistic:

$$v(f^t(w)) = E_x[E[RIF(w; v, f^t(w))|X]] \approx E_x(X|t)\gamma_t ; \quad t=0, 1$$

RIF(w;v) is a transformation of the wage variable based on the influence function of the particular functional $v(f(w))$, e.g., statistics such as variance, gini coefficient, quantiles, etc. The linear approximation allows the marginal effect of covariates on $v(f(w))$ to be estimated by linear regression of RIF(w;v) on the attributes. It also allows the estimation of the average of marginal effects $\bar{X}_t\hat{\gamma}_t$ to be able to conduct the decomposition exercise in formula (2) above in a form that is similar to the standard Oaxaca-Blinder (OB) decomposition of the mean in linear regression (Firpo et.al., 2018, hereafter FFL 2018). Denoting $\hat{v}(f^0(w)) = \bar{X}_0\hat{\gamma}_0$ and $\hat{v}(f^1(w)) = \bar{X}_1\hat{\gamma}_1$ as estimates for a particular statistic for the years 0 and 1, the OB decomposition of the change in this particular statistic would be,

$$\Delta\hat{v}_{OB} = \hat{v}(f^0(w)) - \hat{v}(f^1(w)) = (\bar{X}_0 - \bar{X}_1)\hat{\gamma}_0 + \bar{X}_1(\hat{\gamma}_0 - \hat{\gamma}_1)$$

The first term is the composition effect and the second term is the wage structure effect. This decomposition would be appropriate if the OB assumptions of linearity and independence of the marginal effects from the distribution of X hold. Since linearity is used as an approximation to the functionals that are clearly non-linear, FFL (2018) suggest using the reweighted counterfactual distribution for the decomposition exercise. This also ensures that the results are in conformity with the non-parametric approach above. In that case the decomposition formula would be:

$$\begin{aligned} \Delta V = V(f^0(w)) - V(f^1(w)) &= [V(f^0(w)) - V(f_{c/1}^0(w))] + [V(f_{c/1}^0(w)) - V(f^1(w))] \quad (4) \\ &= [(\bar{X}_0 - \bar{X}_c)\hat{\gamma}_0 + \bar{X}_c(\hat{\gamma}_c - \hat{\gamma}_0)] + [\bar{X}_1(\hat{\gamma}_c - \hat{\gamma}_1) + (\bar{X}_c - \bar{X}_1)\hat{\gamma}_c] \\ &= [\text{Composition Effect}] + [\text{Wage Structure Effect}] \end{aligned}$$

The composition effect in this formulation consists of two terms. The first term, $(\bar{X}_0 - \bar{X}_c)\hat{\gamma}_0$, which is referred to as pure composition effect by FFL (2018), and the second term, $\bar{X}_c(\hat{\gamma}_c - \hat{\gamma}_0)$, which they refer to as the specification error resulting from the linearity assumption. If all the assumptions of the standard OB decomposition hold, including the linearity assumption, the specification error will be zero as in that case $\hat{\gamma}_c = \hat{\gamma}_0$.

The wage structure effect also consists of a pure wage structure effect, $\bar{X}_1 (\hat{\gamma}_c - \hat{\gamma}_1)$, and a reweighting error $(\bar{X}_c - \bar{X}_1)\hat{\gamma}_c$. With large sample sizes the mean of X_c in reweighted sample in 2013 should approach the 2006 mean and the reweighting error should go to zero. The reweighting error indicates the quality of the reweighting (FFL, 2018).

Quantile Effects

We start by first reproducing the quantile decomposition results reported in Tables 8 and 10 using the RIF regression method. In the case of quantiles the RIF is:

$$\text{RIF}(w_i, q_\tau, f^t) = q_\tau + (\tau - \mathbf{1}[w_i \leq q_\tau]) / f^t(q_\tau) ; \text{ for the } \tau^{\text{th}} \text{ quantile for } t = 0, 1, \text{ and } c \quad (3)$$

RIF_i is estimated for each observation using sample quantile estimates for q_τ and kernel density estimates for $f^t(q_\tau)$ for the observed distributions and the counterfactual.¹⁴ In the second stage, following the FFL procedure, we estimate unconditional marginal quantile effects using linear regression. The decomposition results for various wage quantiles using the RIF regression method the government and private sectors are shown in Figures 11-14. The estimates were obtained by first estimating the dependent variable RIF_i for different observations for 2013, 2006, and the counterfactual sample, using the same weights as in the semiparametric method discussed above. In the second stage we run two separate sets of RIF linear regressions and perform OB type decompositions – one comparing the 2013 and the counterfactual sample to estimate the composition effect and the specification error, and the second one comparing the 2006 and the counterfactual sample to estimate the wage structure effect. The independent variables consist of six educational degree categories, five years of experience categories, age, and marriage dummy variables, ten occupation and thirteen industry dummy variables. The STATA program's rifvar subroutine was used for generating RIF quantile estimates, and oaxaca routine by Jann (2008) was used for combined RIF regression and decomposition estimation.

Figures 11 and 14 show a similar picture as the semiparametric decomposition results above, but they are less smooth. The specification errors in both cases do not show any trends and stay close to zero. The reweighting error in the case of the private sector shows an upward trend for the last two deciles but the magnitude remain small. The hump in the private sector results beyond the minimum wage quantile, particularly for the 4 to 7 quantiles is more pronounced in Figure 13 than in Figure 10.

The decomposition results for the overall sample, combining the private and public sector workers is shown in Figure 15, with the associated specification and weighting errors shown in Figure 16. The shape and the trends in total quantile wage differentials between 2006 and 2013 is again dominated by the wage structure effect. The steep slope of the wage structure effect in the 10-50 per cent segment of the distribution indicates that the largest decline in inequality took place in that segment, and particularly in the segment below the minimum wage. The composition effect increases all earnings without a significant contribution to overall inequality, as shown in the

¹⁴ The formulae for the Influence Function for various distribution statistics can be found in Essama-Nssah and Lambert (2011) and Firpo et.al, (2018).

almost horizontal shape, with the exception of the negative slope for the first decile and the increase in the last quantile. The specification and weighting errors in Figure 16 are relatively small and do not change these conclusions. As can be seen the specification error is close to zero for much of the distribution with the exception of the first decile, but it does not exhibit any systematic trends. The reweighting error is significantly different from zero for most quantiles above the median and seems to have an upward trend, but its value is relatively small.

The comparison of the overall results in Figure 15 with the private sector decomposition results in Figure 13 once more highlights the visible hump in the wage structure effect in the private sector between the third and the sixth deciles. Despite the rapid fall in real wages in the official wage schedule along with the minimum wage, it appears that in this group of intermediate wage earners working in small enterprises that fall outside the government pay scales, wages have been less sensitive to the official wage schedules and the minimum wage. At the higher end of the distribution, beyond the sixth decile that are likely to belong to the organized sectors, the wage structure effect follows the official wage schedule. The ripple effects of the minimum wage at the higher quantiles therefore seem to be stronger than in the vicinity of the minimum wage. Unfortunately the household surveys in Iran do not provide any information on the size of the enterprises to allow a direct testing of this phenomenon. But it would be plausible to assume that smaller enterprises with more flexible wage setting arrangements, where the enterprise is productive enough to award wages above the minimum wage, at least in the downturn of the economic cycle when minimum wages decline due to the high inflation rates the employers choose to reward workers according to productivity than the rigid official wage schedules. This effect can be asymmetric, in the sense that in the upturn of the cycle when government wage schedule is moving rapidly upwards in real terms as a result of the fast oil revenue increases this section of the workforce may witness much smaller wage increases in conformity with their productivity growth and the amount of oil rents that the small enterprises may be able to capture. The hypothesis remains to be tested by examining episodes of real minimum wage growth for different years in future research.

The overall estimates of variance of log wages for male workers in both private and public sectors, based on decomposition exercise in Figure 15 are reported in Table 5 along with the means, variances, and log wage differentials between different deciles.¹⁵ The decline in variance of earnings between 2006 and 2013 due to the wage structure effect accounts for over 86 per cent of the fall in inequality. Since the variance is highly sensitive to the changes in the tails of the distributions, considering the constancy of the composition effect for the middle 8 quantiles of the composition effect in Figure 15, even the 14 per cent of the change in variance explained by the composition effect may be an overestimate of the influence of the composition effects. Much of the decline in interquantile wage differentials is explained by the fall in 50-10 deciles at the lower end of the distribution, and here again attributes contribute a small share, almost negligible for the

¹⁵ Note that the actual cases in Table 5 are based on kernel estimates and can be slightly different from their counterparts reported in Table 4.

50-90 and 10-90 interquartiles. The decline in wage dispersion between 2006 and 2013 appears to be largely due to the wage structure effect.

Variance decomposition results

We next examine the overall distribution indexes starting with variance of log wages. Since minimum wages are clearly significant in demarcating the distribution into two segments with distinct distributional properties, we start with variance decomposition for groups of workers with below and above minimum wages. The variance decomposition results in Table 8 are based on total variance formula applied to two groups, $\text{Var}(w) = E(\text{Var}(w/A_j)) + \text{Var}(E(w/A_j))$, where A_j refers to two groups of above- and below-minimum wage workers. This is empirically estimated by $\text{Var}(W) = [s.v_1 + (1-s)v_2] + s(1-s)(u_1-u_2)^2$. Where v_1 and v_2 are within group variances and s is the share of group one in total population. We refer to the terms within the square brackets as the Within effect. Group means are u_1 and u_2 , and we refer to the second term as Between group effect. Variance decomposition was performed on the counterfactual distribution as well as the observed distributions in 2013 and 2006 in order to decompose the variance for the wage structure effect in addition to the composition effect. However as we have observed above the composition effect does not explain much of the change in earnings inequality between the two years. As seen in Table 5, the composition effect only explains about 14 per cent of the change in variance. In Table 6 we have therefore reported the overall variance decomposition, keeping in mind that about 85 per cent of the change in variance is due to the wage structure effect. This would also allow us to use the actual data (rather than the estimates based on kernel densities), with sampling weights used to mimic population distributions.

As the table shows, the variance in the above-minimum wage group changes only by -0.05, while the variance for the below minimum wage group declines by 0.11 which is a 100 per cent decline between the two years. Nevertheless, as the share of the population in the below-minimum wage group is relatively small, the contribution of this group to the overall variance change is only 14 per cent. The combined within group contribution to the change in variance is 39 percent, while the between group contribution is much larger at 61 percent. The main influence of the minimum wages on distribution of earnings seems to be through the change in the distance between average wages of workers earning below- and those earning above-minimum wage.

Table 6 reveals a number of important aspects of the wage setting system which makes the minimum wage an important influence on the distribution of earnings. Firstly, as minimum wages increase the wages of those in the vicinity of the minimum wage, this leads to an increase in the disparity of earnings for workers who earn below the minimum wage. The reverse is true in the case of the minimum wage decline which reduces wage dispersion amongst the workers working below the minimum. This is of course the peculiarity of the Iranian wage setting system where the minimum wage cannot be monitored for a relatively large section of the labour force. To the extent that high wages in the organized sector increases the number of workers in the non-monitored sector this effect would be magnified.

Secondly, the wage setting system reduces wage dispersion in the organized sector, as well as reducing the change in wage dispersion in the organized sector over time and particularly over the economic cycle. This relatively rigid wage setting system in the organized sector, however, leads to perverse distributional effects of minimum wages as the increase in minimum wages leads to increased wage dispersion by increasing the distance between workers below- and above the minimum wage. The reverse is the case when minimum wages decline. This is due to another peculiarity of the Iranian wage setting system where the entire wage structure in the corporate sector is linked to the minimum wage with full ripple effect in all wage quantiles above the minimum wage.

The RIF regression method allows detailed investigation of the effect of covariates on various wage dispersion statistics such as interquintile range, variance, gini coefficient etc. Such detailed investigation falls beyond the confines of this paper. It would be worth, however, to consider one result of such a detailed investigation with regard to the variance of log wages, in order to examine the plausibility of our conclusions so far. Table 7 shows the estimated effects of groups of covariates on the variance of log wages. The RIFVAR module in STATA was used to estimate the recentered influence functions for variances for the years 2006 and 2013 and for the counterfactual distribution. As in the case of the quantile decompositions above, the Oaxaca command in STATA was used for the detailed decompositions. As expected from the analysis so far, the composition effect on the variance is small (-0.020) relative to the wage structure effect at -0.121 (z-ratio -11.52) explains close over 85 per cent of the decline in the variance of log wages. Since the composition effect is small and insignificant, in Table 7 we have reported the detailed decomposition results only for the wage structure effects. The wage structure effect is explained by changes in returns to attributes $\bar{X}_1 (\hat{\gamma}_c - \hat{\gamma}_1)$ and the reweighting error $(\bar{X}_c - \bar{X}_1)\hat{\gamma}_c$ as discussed in equation (4) above. Attribute groups consist of education, occupation, sector of activity, and 'other' composed of factors such as age, marital status and experience.

The education group consists of six categorical variables with primary education as the base category. Occupation group consists of ten categorical variables with managers as the base category. Sector consists of thirteen categories with education and health services taken as the base category. The 'other' category consists of a categorical variable for marital status, an age variable and six categorical variables for potential work experience, with 5-10 years category as the base variable. The coefficients of the groups that consist of categorical variables in such decomposition exercises are sensitive to the choice of the base category. But it is significant to note that the coefficients of education and occupation categories do not significantly affect the distribution of earnings between 2006 and 2013, but the sector group is significant in explaining the decrease in earning dispersion. Changing the base category for the education variable or adding years of schooling variable to the education group does not change this conclusion. The fact that sectors are the main significant variables in explaining the change in wage dispersion in Iran lends further support to the conclusion that the change in wage dispersion is dominated by the rigid pay structures of the government that change annually along with the minimum wage. This needs to be further investigated with respect to other measures of inequality such as the change in interquartile wage differentials and more detailed study of conditional and unconditional quantile

effects of individual covariates in future work. The evidence presented in this paper, however, clearly highlights the importance of the minimum wages and the official wage setting process in Iran in changing distribution of earnings. The minimum wage in the case of Iran is the floor of wages paid in the organized sector, which explains the perverse relationship between the minimum wage and distribution of earnings.

7. Implications and conclusions

The focus of the paper has been on the distribution of earnings and its perverse relationship with minimum wages. This is an important topic in itself, as earnings distribution in Iran accounts for a third of the overall income inequality in urban areas. The other two thirds are accounted for by self-employed and property income and income transfers. Over the 1980s, 1990s, and 2000s decades income distribution in Iran was the most unequal amongst the Middle Eastern countries, with the gini coefficient for per capita income hovering around 0.41-0.42 until 2006. From 2006 the gini index started to fall and by 2013 it had declined to 0.35-0.36 range. Much of the literature on the dynamics of income inequality in Iran has been focussed on the impact of fiscal policy, and in particular the impact of the cash subsidy transfer program of 2010-11 on income distribution (see, e.g., Salehi Esfahani 2016 and Emami et.al 2016). However, the decline in income inequality started well before 2010. According to the estimates by the Central Statistical Office of Iran (CSI) (Markaze Amar, 2020), the gini coefficient declined by 0.0315 between 2006 and 2010 before the energy subsidy cash transfer program, and by 0.0329 between 2010 and 2013 when the cash transfer was program operating. During the latter period there was also a precipitous decline in real minimum wages. Figure 17a shows the close association between the change in the real minimum wages and the change in the gini coefficient of household expenditure. The correlation coefficient between the two variables is 0.67 and is statistically significant. The role of earnings inequality in the distribution of income is an important aspect of income inequality in Iran which has been neglected in the literature and needs to be understood better.

We have argued that the perverse relationship between the minimum wage and income inequality in Iran is closely connected to its highly centralized and rigid wage setting institutions. Labour attributes play an insignificant role in the changes in earnings inequality during the period under study. The restrictions on independent labour associations and wage bargaining makes the wage setting process in the corporate sector highly politicized and rigid. The employers in the corporate sector who may deem appropriate to adjust relative wages either due to changing external conditions or due to their internal efficiency considerations, are required to get the permission of the Ministry of Labour before diverging from the official pay scales for fear of fomenting labour disputes. At the same time the inability of workers in smaller enterprises – or those without formal contracts working for large enterprises – to form their free labour associations makes them unable to benefit from any of the stipulations of the labour law including the minimum wage. The former condenses the variation of wages in the upper part of the distribution, and the latter increases wage dispersion in the lower half of the distribution which is a distinct characteristic of Iranian wage

distribution and its dynamics. Another consequence is that earnings inequality increases during the boom years when the rents from the oil sector allow the government to introduce generous wage increases for workers in all grades and all activities in the corporate sector irrespective of productivity considerations. This process is reversed in crisis years when real wages in the corporate sector fall as a result of external shocks such as oil price collapses, sanctions, exchange rate collapses with the resulting inflation neutralizing nominal wage increases, as was the case during the 2006-2013 period examined in the paper.

The impact of the wage setting institutions goes beyond earnings distribution and has other important micro- and macroeconomic implications as well. At the macro level two important characteristics of the Iranian economy have been double digit inflation combined with high unemployment rates. The inflation rate during the 1990s averaged about 24 per cent and during 2000-2015 it averaged 17.1 per cent, and it remained in double digits during the entire period. Strictly speaking wages were not inflation indexed, but given the highly politicised nature of the wage setting process and the central role of the government in setting wages, the cost of living has always been a consideration. During the 1990s the average of the annual minimum wage growth rates was 32.5 percent and during 2000-2015 it was 20.5 percent. As shown in Figure 17, during 1990-2015 period minimum wage growth was below the inflation rate in only six years, all of them coinciding with some economic crisis and high inflation rates and wage increases of more than 20 per cent. Considering that minimum wage growth within the Iranian wage setting process implied the growth of the wages in the entire government and corporate sectors, once the minimum wages were announced at the beginning of each financial year, they would set the stage for the domestic component of inflation in the next year – the external component is linked to the exchange rate and imported inflation. The double digit inflation rates in Iran are often explained in relation to lax monetary policy by the central bank. However, with the announcement of the double digit wage inflation by the government at the beginning of each year, and its implementation immediately in the first month of the new year, any monetary policy designed to combat inflation would lead to the closure of many formal enterprises and severe disrupt of the investment process in the country. Under these conditions monetary policy, at least at the beginning of each financial year when much of the wage increases take place has to be accommodative. The role of the wage setting institutions in the inflationary process needs to be examined in more detail in future research.

Another aspect of the Iranian economy in this period has been its high unemployment rates. Since the early 1990s male unemployment rates have been fluctuating between 9 to 10 per cent, and female unemployment rates between 15 to 20 per cent. The difference between male and female unemployment rates is common to developing countries like Iran where a relatively large part of the labour force works in the informal sector in low-productivity low-wage activities, and where the conditions of work in such activities are less amenable to women's work. In the absence of unemployment benefits the workers who cannot find a job in the organized sector are forced to join these low paid activities to eke out a living. This also explains the fact that the male

unemployment rates in Iran have remained steady despite sharp macroeconomic fluctuations during the 1990-2015 period. The low-productivity low-wage informal sector works as a shock absorber; during the years with strong demand for labour it releases labour to be employed in the formal sector, and during the periods of falling demand for labour it absorbs the unemployed with the official unemployment rates remaining relatively stable.

The size of the labour force employed in the low-wage informal sector therefore changes according to the balance between two opposing forces. On the one hand, during the boom years, which in the Iranian context coincide with years with growing oil revenues, the increase in economic activity increases demand for labour in the corporate sector and tends to reduce employment in the informal sector. On the other hand, during the boom years the official wage increases in the corporate sector can reduce demand for labour and lead to the increase in the size of the informal sector. Figure 18, shows the relationship between the percentage of workers with wages below the minimum wage, against the growth of real average wages in the corporate sector (those with wages above the minimum, for the years that show positive wage growth) during 1997-2013 for male workers. The figure clearly indicates that the real wage effect overshadows the demand side effect – the share of employment in the low-wage low-productivity sectors (proxy for unemployment) increases during the boom years when real wages in the corporate sector register positive growth. High rates of inflation combined with high rates of unemployment appear to be closely linked to the outcomes of the wage setting institutions in Iran.

The combination of high inflation and unemployment as the outcomes of a highly centralized wage setting process in Iran may appear surprising. The centralized wage bargaining processes prevalent in Nordic countries such as Sweden up to the 1980s were extolled precisely on the grounds that they could bring about better unemployment and inflation outcomes compared to more decentralized wage bargaining processes (Calmfors and Driffil, 1988, Soskice, 1990). The case of Iran, however, differs from the Nordic model in two important respects. The Iranian tripartite wage setting process, as we have observed, is not a process of bargaining between independent labour unions and employers with the state as the arbiter, but rather it is a highly politicized process with the government at the helm. Secondly, in the case of Sweden wages were negotiated by the main blue color workers union with employers in the export industries setting the wages to maintain competitiveness in the World markets, with workers and employers in the services and protected industries accepting such wage bargains (Freeman and Gibbons, 1995). In the case of Iran, as we have seen, it appears that oil revenues of the government played a key role in the wage setting process, with little connection to productivity growth and competitiveness in the non-oil sectors. Figure 19 shows the trends in average real wages and productivity of labour during 1990-2020 period. Productivity is measured as the non-oil GDP per worker. As the Figure shows there is a widening gap between wages and productivity which is particularly pronounced during the oil boom periods. The survival of the protected non-oil sectors in periods of fast rising oil prices has been an important component of the inflationary process in Iran. Large government

subsidies and overcapitalization of production processes have been other means of dealing with the wage / productivity gap.

The literature on rentier economies such as Iran is normally concerned with average wages as determined by supply and demand for labour – as for example in the Dutch Disease literature where the expenditure of oil rents works its way through the product markets to the labour markets leading to increase in average wages, overvaluation of the exchange rate, and reallocation of labour in the economy. Such processes imply a tight labour market with unemployment as a transitory phenomenon, which is not the case in Iran with its persistent unemployment even during the periods of oil booms. One of the findings of this paper is that the transmission mechanism in the case of Iran is largely initiated in the labour markets through the wage setting institutions and subsequently transmitted to the product markets. In addition to its implications for inequality which has been the focus of our paper, this phenomenon also has important implications for the study of inflation, unemployment, productivity growth and competitiveness which needs to be followed in future research.

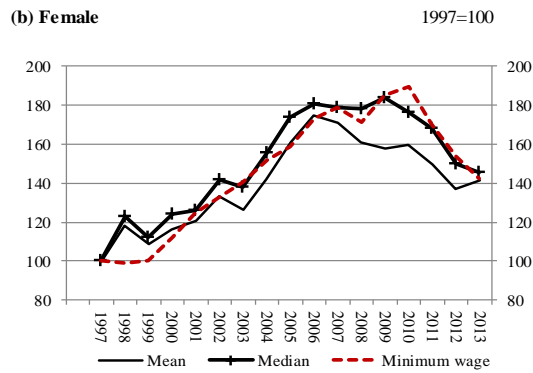
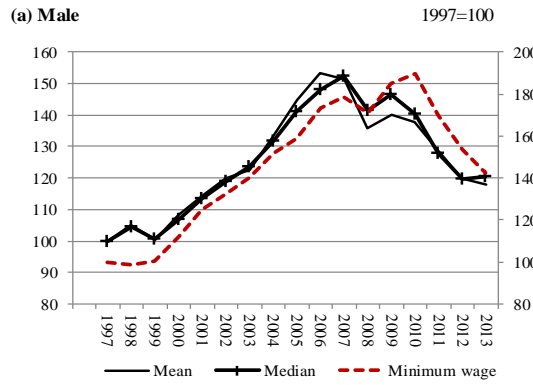
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Figure 1, Trends in Mean, Median, and Minimum wages, 1997-2013



Notes: Right axis is minimum wage

Figure 2, Trends in log wage differentials for 10-50 and 90-50 deciles

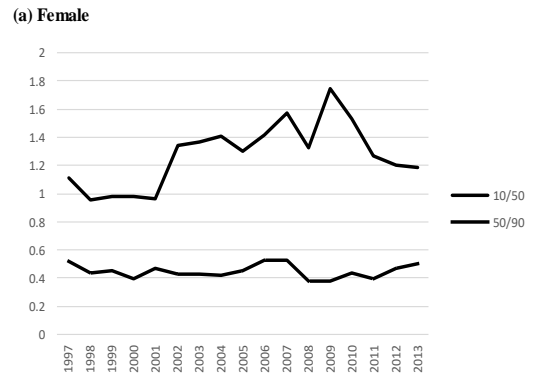
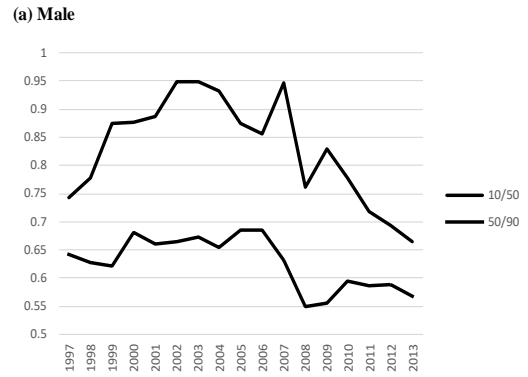


Table 1, Wage Inequality Measures, 1997-2013

Year	Variance of Log Wages	Gini Coefficient	Theil Index	Interquantile range of Log Wages 25-75	Number of Observations
Male					
1997	0.508	0.302	0.173	0.650	5792
1998	0.523	0.316	0.181	0.692	4347
1999	0.564	0.331	0.223	0.707	6611
2000	0.536	0.326	0.186	0.693	6305
2001	0.568	0.335	0.199	0.741	6268
2002	0.586	0.328	0.187	0.762	7740
2003	0.586	0.331	0.193	0.787	5819
2004	0.538	0.322	0.184	0.749	6143
2005	0.557	0.329	0.193	0.773	6761
2006	0.582	0.332	0.198	0.703	7387
2007	0.559	0.320	0.184	0.684	7865
2008	0.468	0.292	0.151	0.660	9996
2009	0.487	0.300	0.159	0.605	9205
2010	0.409	0.291	0.153	0.584	9143
2011	0.379	0.284	0.146	0.625	9089
2012	0.395	0.282	0.145	0.571	8894
2013	0.368	0.280	0.149	0.578	9192
Female					
1997	0.420	0.276	0.133	0.574	908
1998	0.456	0.275	0.144	0.603	730
1999	0.443	0.272	0.143	0.569	1103
2000	0.431	0.257	0.121	0.537	1002
2001	0.429	0.275	0.144	0.624	1022
2002	0.520	0.284	0.144	0.601	1277
2003	0.584	0.306	0.166	0.842	993
2004	0.566	0.301	0.164	0.751	965
2005	0.592	0.310	0.172	0.835	1104
2006	0.616	0.326	0.192	0.839	1214
2007	0.683	0.343	0.203	0.974	1298
2008	0.561	0.287	0.150	0.746	1642
2009	0.750	0.309	0.176	1.039	1344
2010	0.641	0.303	0.170	0.831	1411
2011	0.525	0.269	0.130	0.626	1385
2012	0.537	0.293	0.148	0.758	1366
2013	0.540	0.294	0.152	0.653	1303

Table 2, Trends in Minimum Wages and inflation

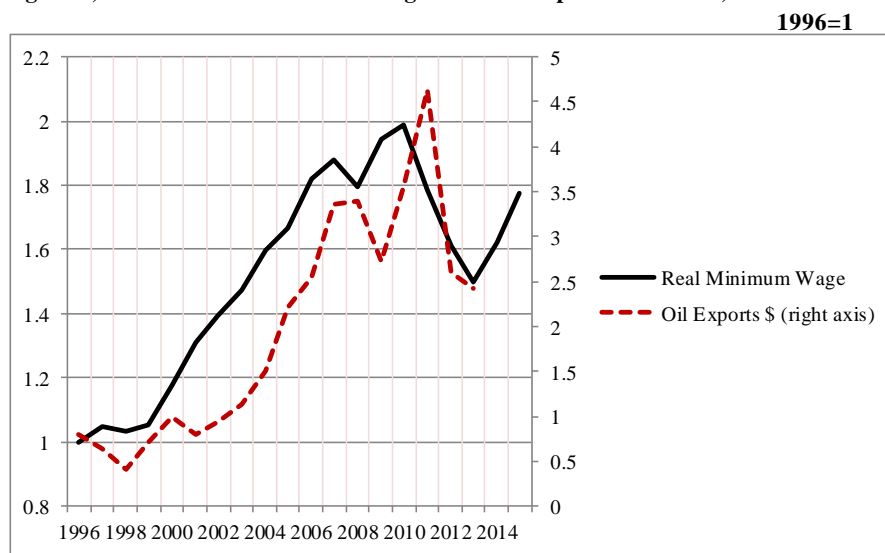
	Minimum wage		Inflation rate, CPI	Minimum Wage / poverty line			
	Rial / month	% change		Line 1	Line 2	line 3	Line 4
1996	207210	25.3	23.2	2.7	2.4	2.5	2.7
1997	254460	22.8	17.2	2.8	2.5	2.5	2.8
1998	301530	18.5	18.1	2.7	2.5	2.5	2.5
1999	361830	20.0	20.1	3.2	2.5	2.6	2.3
2000	458010	26.6	12.6	3.0	2.8	2.7	2.5
2001	567900	24.0	11.4	3.3	3.1	3.0	2.6
2002	698460	23.0	15.8	3.5	3.3	3.3	2.5
2003	853380	22.2	15.7	3.7	3.5	3.5	2.6
2004	1066020	24.9	15.2	4.0	3.8	3.7	2.6
2005	1266784	18.8	10.3	4.2	4.0	3.8	2.6
2006	1500000	18.4	11.9	4.6	4.4	4.1	2.8
2007	1830000	22.0	18.4	4.7	4.5	4.5	2.7
2008	2196000	20.0	25.4	4.5	4.3	4.6	2.7
2009	2635200	20.0	10.8	4.9	4.7	4.4	3.0
2010	3030000	15.0	12.4	5.0	4.8	4.5	3.0
2011	3303000	9.0	21.5	4.5	4.3	4.4	2.7
2012	3897000	18.0	30.5	4.1	3.9	4.3	2.5
2013	4871250	25.0	34.7	3.8	3.6	4.1	2.4
2014	6089060	25.0	15.6	4.1	3.9	3.8	2.5
2015	7124250	17.0	11.9	4.3	4.1	3.8	..

Notes: Poverty line 1 based on 2100 calories and line 2 based on 2300 cal per day.

Poverty lines 4 is half median household expenditure per head, and line 3 is half median expenditure in 1996 extrapolated to other years using consumer price index.

Sources: Poverty lines 1, 2 and 4 based on Khodadad Kashi, et al. (2002) extended to later years using consumer price delator for urban areas.

Figure 3, Trends in Real Minimum Wages and Oil Exports Revenues, 1996-2015



Source: Based on Bank Markaz Iran, Time Series Database

Figure 4, Trends in Mean, Median, and Minimum wages, 2005-2013
2006=100

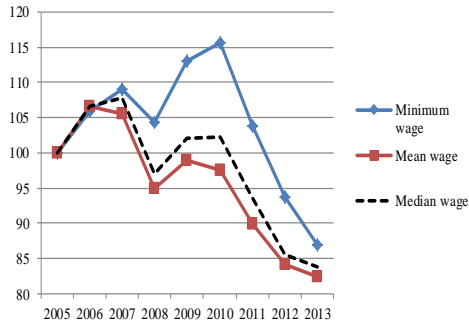


Table 3, Variance of log wages and number of observations, 2005-2013

	Male		Female	
	Variance	N	Variance	N
2005	0.353	5606	0.395	871
2006	0.358	6117	0.474	940
2007	0.329	6510	0.456	975
2008	0.290	8148	0.345	1264
2009	0.284	7308	0.481	1041
2010	0.248	7243	0.406	1100
2011	0.253	7347	0.326	1114
2012	0.228	7026	0.315	1036
2013	0.210	7224	0.328	1019

Figure 5, Minimum wages and kernel density of log real wages, 2005-13

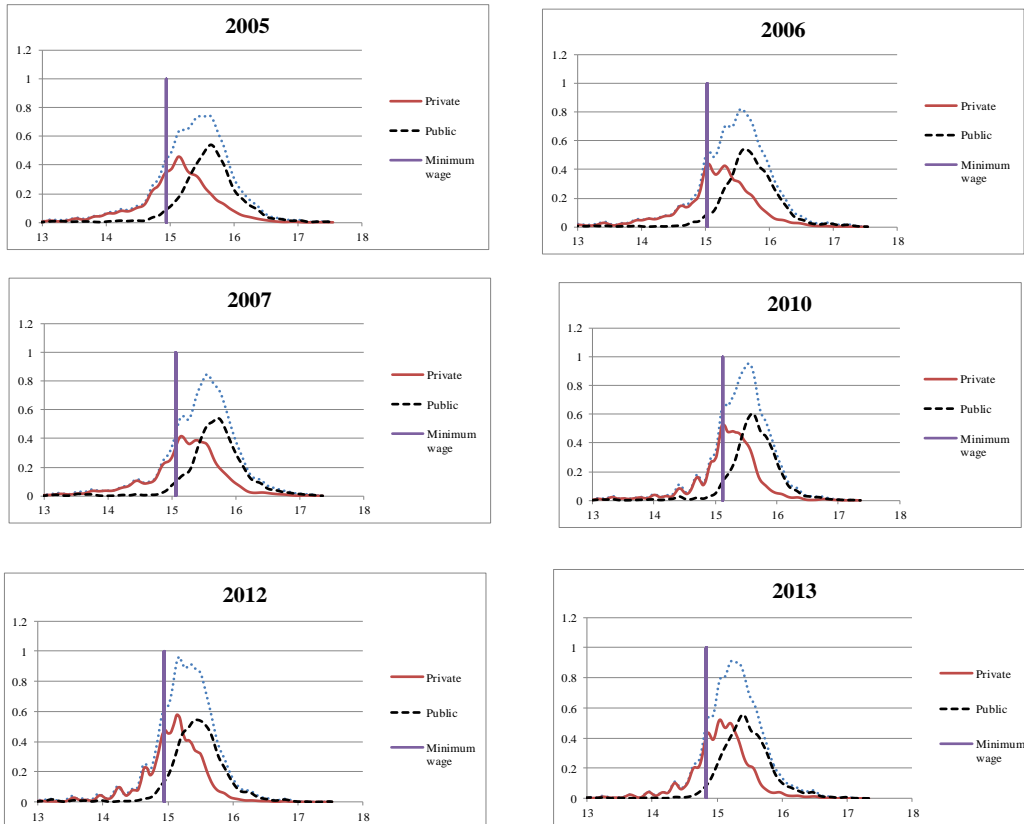


Figure 6, The relationship between minimum and log wages across wage deciles, 2005-2013

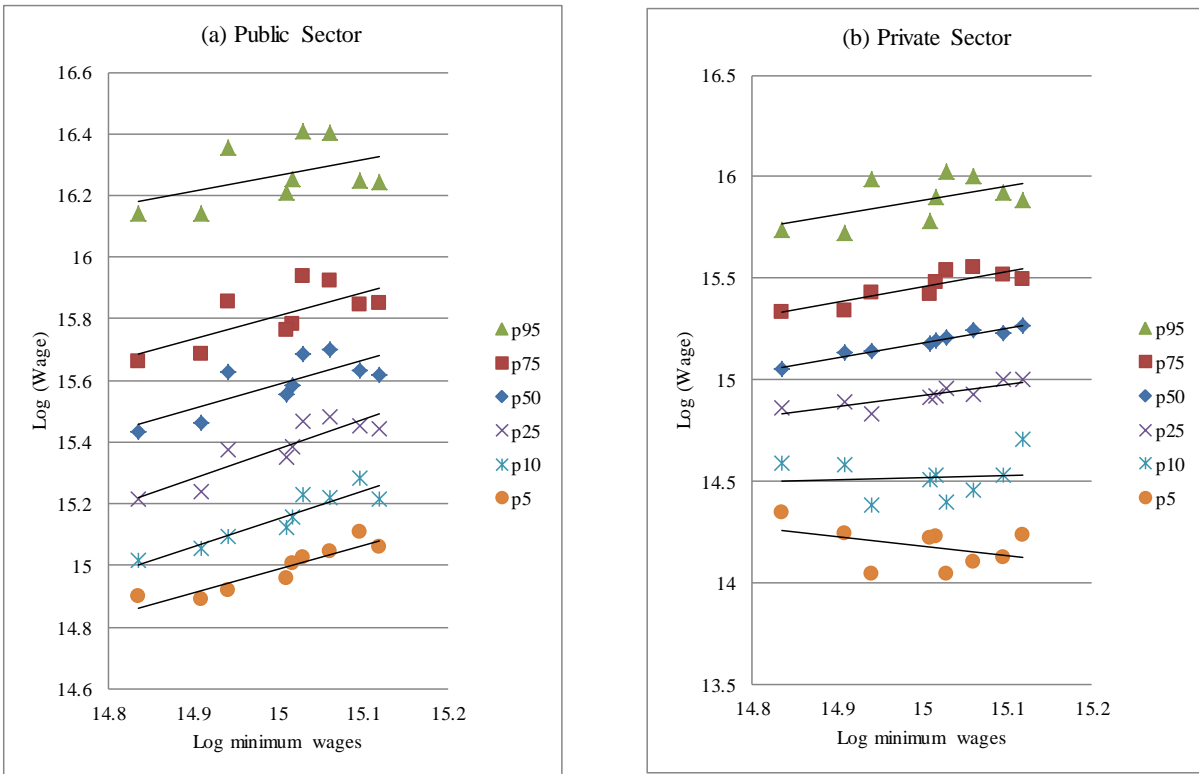


Table 4, Characteristics of workers in public and private sectors in 2006 and 2013

	Male and Female				Male				Female			
	Total	Public	Private	below Minimum wage	Total	Public	Private	below Minimum wage	Total	Public	Private	below Minimum wage
2006												
Log wage	15.380	15.692	15.170	14.463	15.408	15.753	15.207	14.519	15.200	15.460	14.789	14.167
Variance of log wage	0.375	0.236	0.359	0.229	0.354	0.228	0.317	0.195	0.474	0.198	0.632	0.305
Education (years)	10.2	12.4	8.8	8.1	9.9	12.1	8.5	7.7	12.6	13.3	11.4	10.2
Education (percent)												
Primary and less	25.0	9.7	35.3	39.0	27.7	11.4	37.3	42.0	7.7	3.3	14.6	23.5
Lower secondary	30.2	19.8	37.1	40.7	32.0	21.9	37.9	43.5	18.6	11.9	29.1	25.9
Upper secondary	15.5	18.7	13.4	9.9	15.4	18.8	13.5	9.5	15.8	18.0	12.4	11.8
Higher education	29.4	51.8	14.2	10.4	24.8	47.9	11.3	5.0	58.0	66.8	44.0	38.7
Age (years)	35.3	38.7	33.0	29.1	35.5	39.3	33.3	29.2	33.8	36.2	29.9	28.3
Experience (years)	19.0	20.3	18.2	14.9	19.6	21.2	18.7	15.4	15.2	16.8	12.5	12.1
Married (per cent)	75.4	86.9	67.6	49.9	77.8	90.4	70.5	53.2	59.8	73.4	38.4	32.3
Male (per cent)	86.4	79.2	91.2	84.1								
Share of labour (%)	100	40.2	59.8	17.0	100	36.8	63.2	16.6	100	61.2	38.8	19.8
2013												
Log wage	15.182	15.449	15.061	14.478	15.204	15.481	15.096	14.537	15.044	15.339	14.723	14.248
Variance of log wage	0.227	0.175	0.203	0.129	0.207	0.188	0.173	0.094	0.328	0.114	0.362	0.198
Education (years)	11.0	13.5	9.9	9.0	10.6	13.3	9.6	8.5	13.4	14.3	12.5	10.9
Education (percent)												
Primary and less	18.7	5.0	25.0	33.4	20.5	5.6	26.4	36.4	7.4	2.9	12.3	22.0
Lower secondary	21.2	7.5	27.5	29.0	23.8	9.3	29.5	33.8	4.8	1.5	8.3	10.8
Upper secondary	21.9	18.6	23.4	20.8	22.9	21.0	23.6	19.5	15.8	10.2	21.8	25.9
Higher education	38.1	69.0	24.0	16.7	32.8	64.1	20.5	10.4	72.1	85.3	57.6	41.4
Age (years)	36.9	40.0	35.6	33.4	37.1	40.3	35.9	33.7	35.8	38.8	32.5	32.4
Experience (years)	19.9	20.5	19.7	18.4	20.5	21.0	20.3	19.2	16.4	18.5	14.0	15.5
Married (per cent)	78.4	86.4	74.8	58.7	82.3	90.9	79.0	65.3	53.6	70.9	34.9	32.8
Male (per cent)	86.3	77.2	90.5	79.7								
Share of labour (%)	100	31.3	68.7	15.8	100	28.0	72.0	14.6	100	52.1	47.9	23.4

Figure 7, Actual and Counterfactual densities, 2006, and 2013, Public Sector

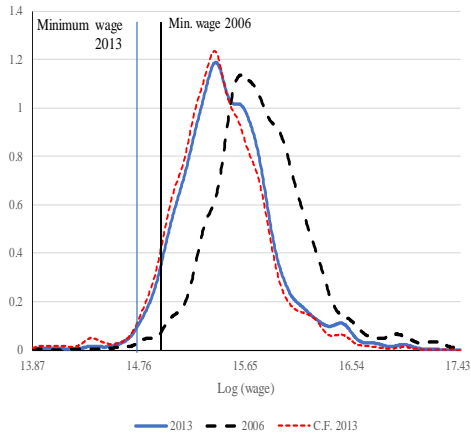


Figure 9, Actual and Counterfactual densities, 2006, and 2013, Private Sector

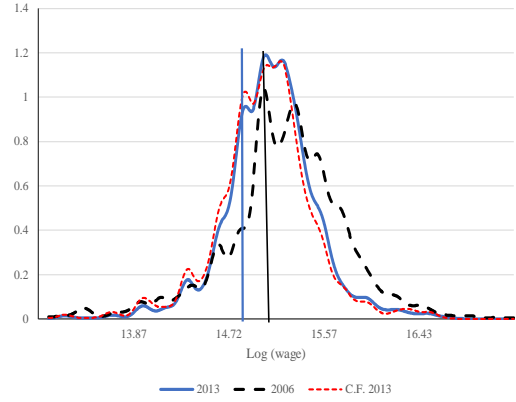


Figure 8, Change in log wages 2013-2006, Public Sector

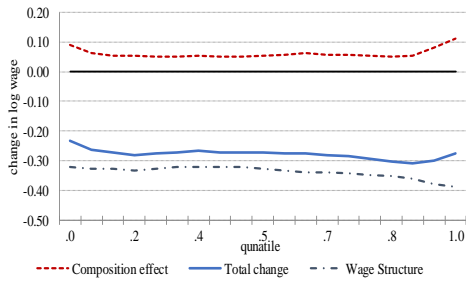


Figure 10, Change in log wages 2013-2006, Private Sector

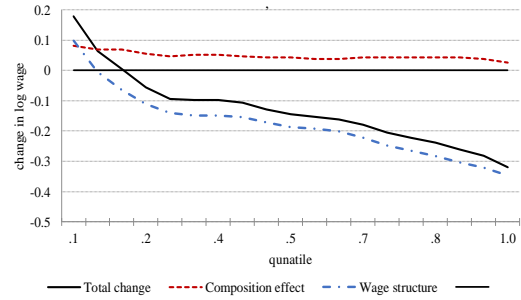


Figure 11, Change in log wages 2013-2006, Public Sector Workers

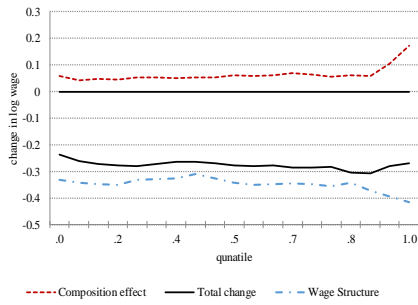


Figure 13, Change in log wages in the Private Sector 2013-2006, Private Sector

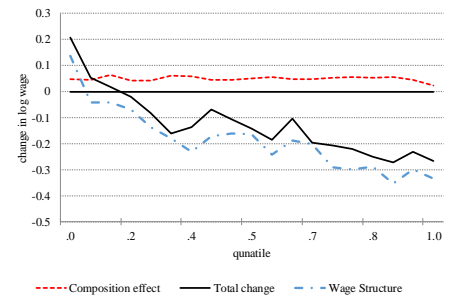


Figure 12, Specification and Weighting errors

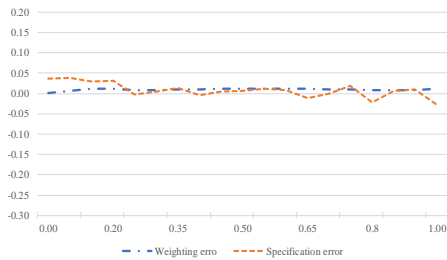


Figure 14, Specification and Weighting errors

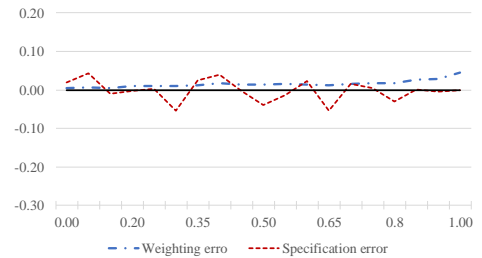


Figure 15, Change in log wages 2013-2006, overall sample

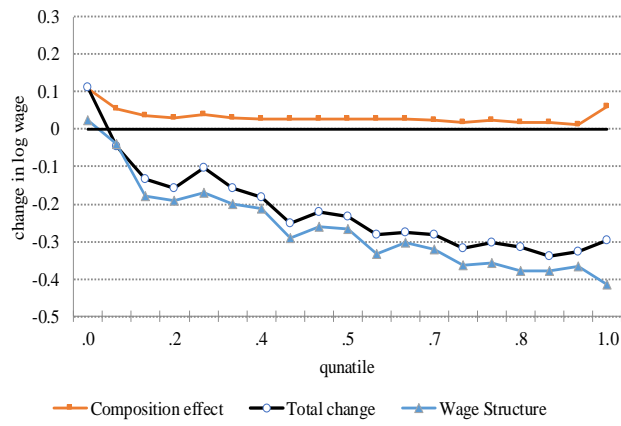


Figure 16, Specification and Weighting errors

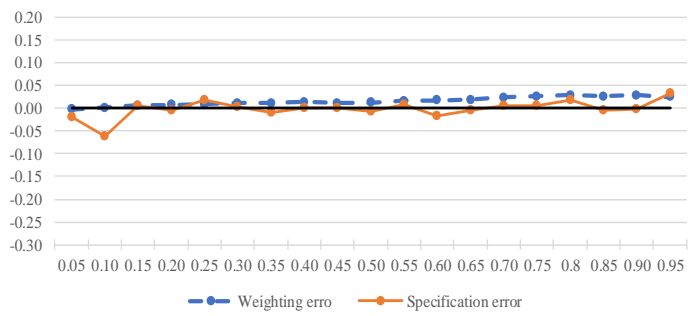


Table 5, Actual and counterfactual distribution indicators, 2006-2013

	Mean	Variance	Log wage differences by decile		
			10-50	50-90	10-90
2006 Actual	15.40	0.346	0.712	0.637	1.349
2013 Actual	15.20	0.205	0.494	0.539	1.033
2013 Counterfactual	15.17	0.225	0.543	0.548	1.091

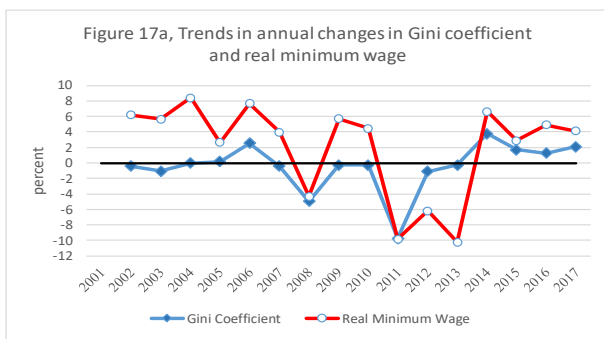
Note: The counterfactual assumes 2013 distribution keeping attributes the same as 2006.

Table 6, Variance decomposition of log Wages

2006	Above	Below	Total
	Minimum	Minimum	
Share	0.83	0.17	1.00
Variance	0.17	0.22	0.346
Mean	15.6	14.5	15.4
2013			
Share	0.85	0.15	1.00
Variance	0.12	0.11	0.205
Mean	15.3	14.5	15.2
Change 2006-13			
Variance	-0.05	-0.11	-0.14
Mean	-0.27	0.01	-0.21
Contribution to total Variance chage			
Within	-0.035	-0.020	-0.056
(%)	25	14	39
Between	--	--	-0.085
(%)			61
Total			-0.141

Table 7, Variance Decomposition by Detail, Composition and Wage Structure Effects, 2006-2013

	Variance	z
Total Change	-0.141	-13.91
Composition Effect	-0.020	-2.56
Wage Structure Effect	-0.121	-11.52
Wage Structure Effect		
Education	-0.024	-0.98
Occupation	0.027	0.48
Sector	-0.190	-2.96
Other	0.131	1.37
Constant	-0.078	-0.62
Weighting Error	0.011	3.95



Notes: Gini coefficient of consumption expenditure at national level.
Source: Markaz Amar (CSI) 2020 for Gini coefficients.

