An empirical study of the minimum wage in Mauritius: pre-COVID19 estimates

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In January 2018, and for the very first time, Mauritius implemented a statutory minimum wage system that covers all wage employees in the country. Since then, the level of the minimum wage has been regularly adjusted on an annual basis (January of 2019, 2020 and 2021). Using quarterly data from 2017 to 2019 – *the Continuous Multipurpose Household Survey (CMPHS)* – this report provides an empirical analysis of how the newly implemented policy, and its subsequent adjustments, might have impacted on key labour market outcomes as well as evaluating the effective implementation of the policy, i.e., the level of compliance in the population. After a brief introduction that reviews the economic context of Mauritius in section 1, section 2 provides a description of real wage growth in the country alongside changes in other labour market outcomes, particularly changes in wage and income inequality that are important from a policy point of view. Section 3 follows with a battery of tests that aim at empirically identifying the effect of the minimum wage on employment by comparing wage employees at or below the minimum wage to wage employees that would not have been affected by the minimum wage. Whenever possible, the analysis considers comparing outcomes between women and men, as well as formal and informal employment. These report reviews data before the outbreak of the COVID-19 pandemic (i.e. quarterly data from 2017 – the pre-policy period – to 2019), while in a second report – forthcoming in the first quarter of 2022 – quarterly data from 2020 will be analysed to identify the impact of the minimum wage at the time of COVID-19 in Mauritius.[1]

[1] Data from 2020 has been supplied to the ILO at a much later stage compared to quarterly data from 2017 to 2019. Therefore, the analysis at the time of COVID19 is relegated to a complementary report that should be produced at the beginning of 2022.

Executive Summary

On January 1st 2018 Mauritius implemented a universal statutory minimum wage system to cover all wage employees in the country. Although the level of the minimum wage varied according to some of the worker's characteristics (see Appendix 2) no group was excluded from the policy providing a floor that ranged from about 28 Rupees per hour (part-time watchperson) to about 43.6 Rupees per hour for a full-time worker in a non-exporting enterprise. Since the minimum wage was first implemented it has been regularly adjusted every 1st of January of each year, including in January 2021.

The Mauritius National Wage Consultative Council (NWCC), a tripartite consultative body linked to the Ministry of Labour, asked the International Labour Organization (ILO) for technical assistance to provide an impact assessment of the minimum wage in the country. This report has been produced in response to such a request and provides a comprehensive set of estimates that aim at describing multiple outcomes after the implementation of the minimum wage (section 2) and to test the effect of the minimum wage on the employment outcome among wage employees (section 3).

The data used for the analysis is the Continuous Multipurpose Household Survey (CMPHS) considering the year 2017 as the pre-policy period, the year 2018 as the post-policy period and the year 2019 as the (first) post-adjustment period. The data, which is representative at each quarter of the year, has been provided by the Mauritius National Statistics Office.

Unconditional estimates: a positive picture

The unconditional estimates in section 2 reveal that, overall, there has not been an adverse effect of the minimum wage among wage employees or for the outcome of wage employees (workers in general) in the population. The proportion of wage employees – relative to the working age population – increased from about 49 percent in 2017 to about 52 percent in 2019. Comparing the relative share of women and men the estimates show no statistical difference between 2017 and 2019: women accounted for about 40 percent of wage employees in 2017 and are observed to account for 41 percent in 2019. However, considering only women – of working age – there has been a significant increase in their representation as wage employees. Thus, whereas in 2017 only 39 percent of working age women were wage employees, this share has increased to 41 percent in 2019.

The data shows that there has also been a real increase in both hourly wages and monthly earnings. In the case of hourly wages these increased by 8.8 percent in real terms, from 102 to 111 Rupees per hour between 2017 and 2019. Monthly earnings also increased in real terms, in this case by 5.9 percent between 2017 and 2019 reaching 17,933.2 Rupees per month on average in 2019. The increase in real earnings was different between women and men: in the case of

women real hourly wages increased by 12.1 percent from 93.4 to 105.3 Rupees per hour between 2017 and 2019, whereas in the case of men the increase was smaller (6.1 percent) but starting from a higher hourly wage of 107.6 Rupees per hour in 2017 to reach 114.2 on average per hour in 2019. Considering that women are more likely than men to be located at the low end of the wage distribution – 54 percent of wage workers at or below the minimum wage in 2017 were women, despite the fact they only amount to 40 percent of wage employees – the observed higher wage increase in the period 2017-2019 would indicate they are likely to be the group that has benefited the most from the implementation of the minimum wage. The higher increase in real earnings for women relative to men has also brought about a decline in the gender pay gap: various estimates show the hourly wage gender pay gap has declined from about 15 in 2017 to about 11 percent in 2019.

Another indicator that points to the positive effect of the minimum wage in contributing to the real increase in the average hourly wage and average monthly earnings is that of a decline in wage inequality. The Palma Ratio, which measures the share of monthly earnings of the top 10 percent wage earners divided by that of the bottom 40 percent, shows a decline from 1.91 in 2017 to 1.51 in 2019. This means that whereas in 2017 the top 10 percent earned on aggregate 91 percent more than the bottom 40 percent, in 2019 this distance had dropped to 51 percent. The estimates show that almost half of the bottom 40 percent of wage employees in 2017 were in fact receiving wages at or below the minimum wage. It could be stated that thanks to the minimum wage there has been a decline in wage inequality in the country. Considering that wages income amount – on aggregate – to about 68 percent of total household income in Mauritius (taking 2017 as reference year) it is very likely that the minimum wage, through increasing the earnings of wage employees at the bottom end of the wage distribution, will have reduced household income inequality in the country.

The estimates seem to indicate the presence of ripple effects among wage employees above but in the neighborhood of the minimum wage. Thus, after the implementation of the minimum wage in 2018, the data shows a shift of those below the minimum wage towards the range of values at which the minimum wage is defined, as one would expect. However, there is also a shift of workers in deciles above but close to the minimum wage to become located at higher deciles. Among those that shift to higher locations there are probably wage employees that were previously earning the minimum wage. As they see their relative earnings decline – relative to other wage employees in the same enterprise, industry or sector – it is likely that they aim at negotiating higher wages to keep up the wage scale with other co-workers. According to the estimates (see appendix 3) the ripple effect zone goes from about 45 Rupees per hour to about 80 Rupees per hour.

Despite the positive outcomes observed after the implementation of the minimum wage (in 2018) and during its first adjustment (2019), the data continues to show a fraction of wage employees whose earnings are below the minimum wage in the third quarter of 2019 – almost two year after the implementation of the law. Considering the full population – women and men

– in total about 14 percent of wage employees were earning below the minimum wage in 2019. However, more women compared to men still earn below the minimum wage: 20 percent of women (among women) and 9.1 percent of men (among men) are earning hourly wages below the minimum wage. This percentage is greater if estimated among wage employees in informal employment. Among these, 23 percent of women (among women) and 11 percent of men (among men), earn below the minimum wage. Having said this, it is important to highlight that although informal employment remains high in Mauritius (43 percent among women, 44 percent among men), the data does not detect a major increase in informal employment neither after the implementation of the minimum wage nor after it was first adjusted in 2019. Thus, whereas in 2017 informal employment among wage employees was about 42 percent, the estimates show these percent to have increased to 44 percent in 2019.

Conditional estimates: uncertainty considering the panel structure

Unconditional estimates provide a good measure of what *actually* happened, but do not necessarily measure what happened *as result of the minimum wage*. For that it is important to produce model-based estimates that can distinguish how the minimum wage impacted among those affected by the policy – i.e. those who were observed at or below the minimum wage in the pre-policy period – in comparison to those wage employees that would not have been impacted by the minimum wage – i.e., those wage earners with outcomes affected by the same economic context, but with earnings well above the minimum wage and, therefore, not affected by the implementation of the policy.

These model-based estimates require the use of panel data, that is, observing the same individual in two distinct points in time: one before the implementation of the policy (e.g., in any of the quarter of 2017) and one after the implementation of the policy (e.g., in any of the quarter of 2018, preferably in the same quarter as observed in 2017 to control for seasonal effects). Although the CMPHS provides a panel structure, the procedure leading to the match of households and individuals between quarters (between 2017 and 2018, or between 2018 and 2019) is not ideal. The result of the match shows that only about 54 percent of the matched sample are one year old in the post policy period – thus 46 percent show ages that are not congruent with the matching process. For example, about 12 percent of the match sample are such that their ages vary between the two adjacent years in the order of 10 to 19 years. Likewise, a checking of the congruency of the variable 'gender' shows that about 17 percent of the panel declare a different gender in consecutive interviews. According to our investigations, it seems that the code that are given to interviewed members within a household (number 1, 2, 3, etc.) is not kept in subsequent periods. In other words, it is not possible to use this code to find out who is who in the next round of interviews unless the code is used with variables that help pin down true matches between periods. Considering only those individuals that are congruently declaring gender and age between interviews, the remaining sample in the match panel drops to about 40 percent. The report refers to this sample as the 'congruent panel sample'

The report considers these congruent panel sample to provide model-based estimates to identify the effect of the minimum wage on wage employment in 2018 (impact of the minimum wage) and in 2019 (adjustment of the minimum wage). Accordingly, the estimates would suggest that there has been a modest negative impact of the minimum wage among those that would have been affected by the minimum wage. Thus, considering these conditional estimates, allowing for employees in the ripple effect zone and taking 2018Q4 as reference quarter, there would have been an *overall* wage employment decline equal to 1.6 percent; 0.4 percent increase *among men*; 2.8 percent decline *among women*; no percent *change detected among* wage employees with *formal employment* and 0.3 percent decline *among those in informal employment*. The estimates, therefore, would imply a modest decline in wage employment as result of having implemented the minimum wage. However, since there are doubts about the construction of the panel structure, it is important to review these model-based estimates against the unconditional trends presented in section 2. Using the latter shows that the fraction of wage employees among the working are population were almost identical at 50.5 percent in 2017Q4 and 2018Q4. Considering that the size of the working age population and the size of wage employees has remained almost constant between each of the quarter of 2017 and 2018, this would suggest that the estimate of a 1.5 percent decline in wage employment in the overall population is probably an imprecise estimate that results from the restricted congruent sample that remains in the panel between periods. The estimates that reflect the impact of the adjustment period (2018 versus 2019 panel structure) are similar in nature and magnitude as those obtained when estimating the impact of implementing the minimum wage (2017 versus 2018).

As a final exercise, the report estimates – once more, using the congruent panel structure – the distribution of wage employees observed in the pre-policy period (2017) in their labour market outcome as observed in 2018. After all, the impact evaluation – or the unconditional outcomes – can only provide information on wage employment versus non-wage employment, but are not informative on what happens to those who were observed as wage employees in 2017 and are no longer observed as such in 2018. Likewise, the unconditional estimates or the model-based estimates may show a decline in wage employment among informal wage employees after the minimum wage, but is not informative about the status 'formal' or 'informal' among those who remain in wage employment. Thus, the final empirical evidence in section 3 shows the distribution between labour market status in each quarter of 2018 of individuals observed as wage employees in 2017, separating formal and informal employment and comparing outcomes between those impacted by the minimum wage those who were not impacted by the minimum wage. The comparison is complemented with a statistical contrast (a test) to estimate if there are significant differences in the change of labour market status between the two samples – those affected and those not affected by the minimum wage. These estimates are presented for each of the quarters in 2018. For example, 89.9 per cent of wage employees observed at or below the minimum wage in formal employment in 2017 were still wage employees in the first quarter of 2018 (2018Q1) – 77.6 percent in formal employment and 12.3 percent in informal employment. In the case of those earning above the minimum wage, the percentage who were still wage employees in 2018Q1 were 94.4 percent – 84.5 percent in formal employment and 9.9 percent

in informal employment. Thus, comparing the two samples in the panel shows that among the lowest paid 2018Q1 there were 4.5 percent fewer wage employees than among the highest paid (not affected by the policy). This difference, however, is not statistically significant: the sample is too small – therefore the variance in estimation potentially too large – to assume that the 4.5 difference is a significant difference between the two samples. This is in part an inherited problem from the panel structure which remains congruent between periods, but too small to make reliable policy inferences.

Overall, the estimates in this last empirical exercise shows that the difference between the distribution of the two samples – affected and not affected by the minimum wage – as observed in 2018 is not statistically significant. Among formal wage employees (as observed in 2017) both groups finish the period (2018Q4) with a similar fraction of wage workers in 2017 observed as continuing to be wage workers in 2018 (80.4 and 84.6 percent, respectively). Based on this evidence it cannot be concluded that the minimum wage caused a shift of those wage workers most affected by the policy (at or below the minimum wage) towards non-wage employment since both groups show declining shares in wage employment that are not statistically different one year after the minimum wage was implemented.

In the case of informal employment (from the point of view of 2017), and compared to the higher earners in the sample, there are fewer wage employees in the low earning sample that remain as wage employees in the post policy period: among those at or below the minimum wage here are about 70 to 75 percent that hold on to wage employment across 2018 whereas in the higher earning sample the estimate is around 90 percent across quarters. But again, the t-values show that the data is too small to conclude that the differences (between quarters) are statistically different. One very interesting observation is that among those that would have been affected by the minimum wage and who were in wage informal employment in 2017 and comparing with higher wage earners also in informal employment, there is a greater chance to switch towards formal employment in the post policy period. For example, 19.3 percent of those at or below the minimum wage in informal wage employment in 2017 are observed in formal employment in 2018Q4; among the higher earners in informal wage employment in 2017 only 10.8 percent managed to switch to formal wage employment in 2018Q4. Again, the t-values that contrast the difference in shares between samples would suggest that there is no statistical difference. However, just looking at those who would have been more impacted by the minimum wage the evidence would suggest that the implementation of the minimum wage has not played an adverse role in the formalization of those with informal employment and who, at the same time, were observed as low paid wage employees in the pre-policy period.

Some concluding remarks

The empirical estimates in this report – more significantly considering the unconditional estimates – do not provide evidence that the implementation of the minimum wage, and its subsequent adjustment, have impacted adversely in the employment outcome among wage employees in the population. The evidence does suggest that the minimum wage have contributed to the improvement in the working conditions of women in wage employment, with

a significant increase in their participation, the increase in their wages and monthly earnings and the subsequent drop in the gender pay gap. The evidence also points to the effect of the minimum wage at declining wage inequality – with the potential impact this can have at reducing household income inequality. These positive outcomes are part of the gains and must be considered when evaluating the achievement at country level of having implemented a statutory minimum wage.

The evidence also points to aspect that need reinforcement. According to the unconditional estimates, there is still a relatively large proportion of wage employees that remained at or below the minimum wage after two years of its first implementation (fourth quarter of 2019). Reinforcing labor inspections, together with information campaigns to raise awareness among workers in the population can help reduce the incidence of non-compliance with the minimum wage legislation. Policies directed to the productivity of small size enterprises could also help at reducing non-compliance with the minimum wage (see ILO, 2020). At the same time, informal employment remains high among wage employees (about 44 percent in the fourth quarter of 2019). The implementation of the minimum wage among wage employees in informal employment may be a vehicle that provides a step towards the formalization of the informal economy. Hence the importance of labor inspection and rising the productivity of small size enterprises where informality is often higher. The effective implementation of the minimum wage, together with tools that promote the formalization of the informal economy, can reduce inequality at country level, thus increasing social cohesion.

It is important to also highlight the shortfalls associated with the panel structure. The implementation of a minimum wage and its subsequent adjustments require the construction of solid empirical evidence that can be used equally by authorities and social partners, thus promoting a healthy and productive social dialogue among social partners or in a tripartite setting. Therefore, recognizing all the difficulties and challenges at hand, we would encourage the Mauritius National Statistics Office to pursue their valuable efforts to address those data issues that that would contribute to an even more solid analysis of labor market outcomes. The ILO can provide technical advice in this very important matter.

1 Background

1.1 The social and economic context in Mauritius

The economy of Mauritius

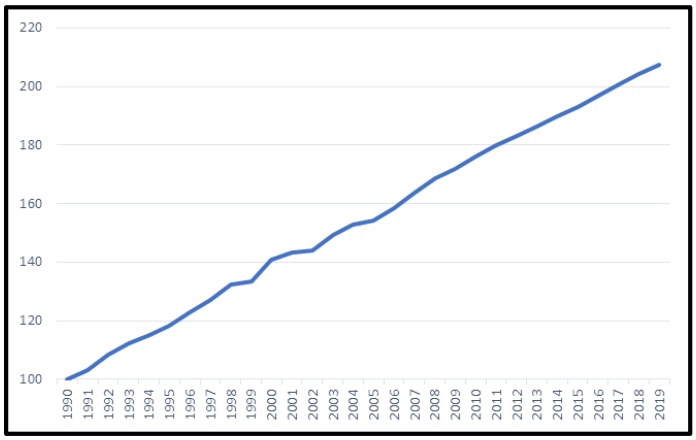
Mauritius is an African island state, with a population of 1.3 million in 2019, located in the Indian Ocean, close to Madagascar and the French island of Reunion. At the moment of its independence in 1968, the small nation island was facing many challenges that were foreseen to compromise its economic development, including its geographical location, its distance from the world market, its cultural and ethnic diversity, an economy based on the sole sugar production, the absence of mineral resources, and a high population growth (Meade, 2012). However, thanks to an impressive institutional stability combined with good governance (Transparency International, 2021)[2] and sound economic policies, Mauritius has achieved since its independence, what some have called an "economic miracle" characterized by a sustained and significant economic progress. This has permitted the country to be classified among upper-middle-income countries for many years and to become a high-income country in 2020.[3] Indeed, over the period 1990-2019, Mauritius GDP per capita has more than doubled, cumulating an increase of 107.3% (Figure A).

Such an economic prowess has been partly favored by the country's very advanced level of demographic transition, whose population growth has fallen sharply since independence, and particularly over the last three decades thanks to a combined relatively low fertility and mortality rates. Indeed, before independence, the country's population growth rate was above 2% and around 3% in the 1960s. However, this rate has been steadily decreasing, falling below 1% from the 2000s onwards, and then falling below 0.5% from 2010. On average, between 1990 and 2019, the Mauritian population grew by 0.6%. Over the same period, the country experienced strong and sustained economic growth averaging 4.3% (Figure B) well above its population growth for decades. This has permitted GDP per capita to grow by an average of 3.7% over the period 1990-2019 and to double over the period.

[2] Mauritius is one of the least corrupt countries in Africa, ranked 5th among African countries in the latest Corruption Perception Index ranking (2021). In addition, the Democracy Index (2020) ranked Mauritius among the best democracies in the world, 20th out of 167 countries, and categorized the country as a "full democracy" while countries as France or the United States of America are classified "flawed democracy". Furthermore, Mauritius is ranked 27th out of 161 countries in the Global Peace Index (2021), being the most peaceful African country.

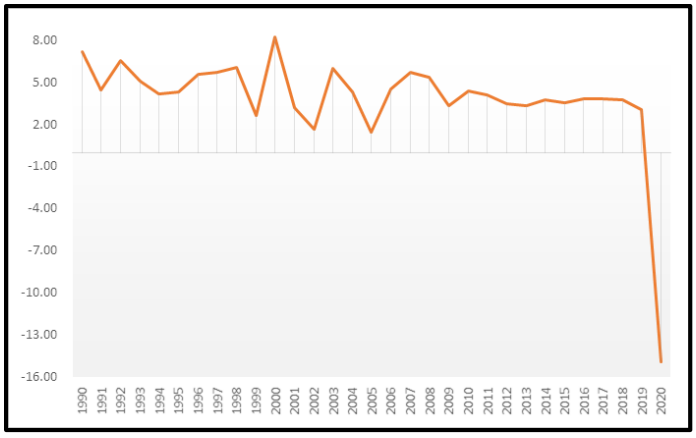
[3] Note that, each 1st July, the World Bank uses estimates from the previous year of the Gross National Income (GNI) per capita (current US$), calculated using the Atlas method, to classify countries according to income-groupings. In 2020, Mauritius temporarily became a high-income country, before returning to upper-middle income level in 2021 because of the impact of the COVID-19 crisis.
See: World Bank (n.d.)

Figure A: Evolution of Mauritius' real annual per capita GPD (index, 1990=100)



Source: World Bank, World Development Indicators Database (WDI).

Figure B: Evolution of Mauritius' real annual GDP growth (%)



Source: World Economic Outlook, IMF.

However, Mauritius' economic performances should not be only reduced to its demographic transition. Strong institutions, stability, good governance, and sound economic policies to structurally transform the economy have permitted the country to enjoy sustained growth for decades and, above all, reinforced the country's resilience during upheavals. In Figures A and B, the impact of the global financial crisis is characterized only by a small slowdown in 2009, with an economic growth which remained above 3% and then quickly returned to its pre-crisis level. In fact, real GDP growth fell from over 5% between 2007 and 2008 to 3.3% in 2009, then rose to over 4% in 2010. Such resilience in the face of the global financial crisis and the subsequent recovery is significant for a country whose economy depends heavily on the global market. This is the result of a strong and well-regulated financial system and the urgent fiscal measures implemented by the Government, with an estimated fiscal stimulus of 5% of GDP (over 2009 and 2010) consisting of

infrastructure investments, support to hardest hit businesses, employment preservation measures, and direct support to the most vulnerable (IMF, 2010).

In fact, the country had experienced more severe downturns in 2002 and 2005, during which the country had already shown great resilience to shocks. While in 2002 the economy slowed down due to the devastation of the island caused by Cyclone Dina which reduced substantially sugar production, real GDP growth remained positive at 1.63% and quickly recovered to almost 6% the following year (IMF, 2003). The same resilience was also demonstrated during the 2005 "triple shock", caused in particular by the erosion of trade preferences in the sugar and textile sectors, and the negative effects of rising oil prices (IMF, 2010). In addition, the recent economic crisis resulting from the COVID-19 pandemic, caused an unprecedented decline in real GDP growth, which became negative (-14.9%) mainly due to the sharp decline in tourism. However, thanks to the implementation of important fiscal policies to support businesses and workers, and a vast vaccination program, the IMF forecasts a recovery from 2021 with a growth rate of around 5% (IMF, 2021).[4]

Furthermore, it should be noted that good social cohesion and solid institutional stability have in fact fostered the continuity of sound economic development policies which have permitted such resilience in times of crises, but also the rapid development of the Mauritian economy. Indeed, since the 1970s, various government implemented policies to diversify the economy from one based essentially on agriculture (sugar production) to a dynamic and diversified economy strongly oriented towards exports and attracting foreign direct investments. To compensate for the small size of the domestic market and not being able to rely on significant mineral resources like other African countries, Mauritius had to turn to the external market and to attract international capital. Such an economic strategy has resulted in the creation of one of the most successful Export Processing Zones (EPZs) in the world, using mainly local funds obtained from the flourishing sugar industry in its early days (Rolf, 1991).

Mauritius' economic development continued after the 1980s, through the expansion of the EPZ, and the development of tourism. This was followed by a strategy to further diversify the economy, through reforms to create a better an enabling

[4] However, it should be noted that the government's fiscal efforts have increased the fiscal deficit - public spending having increased from 23 percent of GDP in fiscal year 2018/19 to 30 percent in the fiscal year 2019/20. The public debt situation has consequently worsened, with the level of public debt (as a percentage of GDP) rising from 84.6% in 2019 to 92% in 2020. The crisis has also seriously impacted the country's external sector balance by widening the current account deficit from -5.4% of GDP in 2019 to -12.6% in 2020.

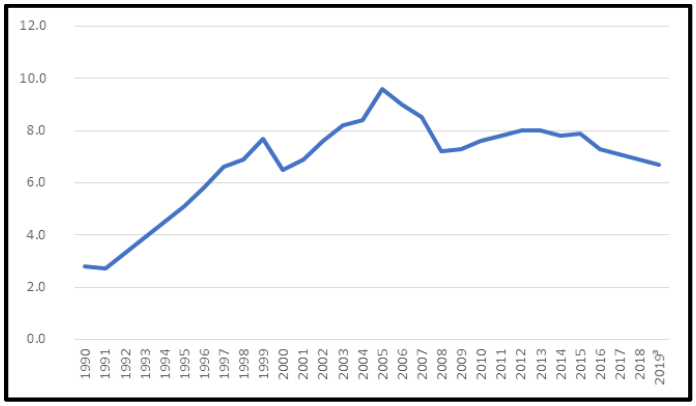
business climate and economic reforms to increase the country's competitiveness. This permitted other sectors, beyond the textile sector, to become pillars of the Mauritian economy, including tourism, financial services and information and communication services (ICT) (Vandemoortele and Bird, 2011). Tourism has now become one of the most important sectors of the economy, accounting for one fifth of the Mauritian economy (IMF, 2021). Moreover, the country's economic stability and the credibility of its institutions have provided a favorable environment for financial services and international finance whose weight has increased from 4.9% in 1990 to 11.8% in 2019 (in percentage of the GDP) (Statistics Mauritius, National Accounts, n.d.; IMF, 2019)[5]. In recent years, the government has also heavily invested in the development of the ICT which accounts for 4.3% of the economy in 2019 (Statistics Mauritius, National Accounts, n.d.).

The labor market

In 1968, almost half of the Mauritian population was under 14 years old, and consequently, one of the main challenges the country had to face was job creation. Indeed, such a demographic structure suggests a strong labor supply and presages a massive influx of young job seekers into the labor market, which explains the high unemployment rate of 20% in 1968 (Vandemoortele and Bird, 2011). With the creation of the EPZ, the particularity of which was to be highly labor-intensive, many jobs were created – about 80-90% of the EPZ's activity was in the textiles in its early days. The expansion of the EPZ and economic diversification policies adopted to further transform the economy rapidly reduced the unemployment rate to around 15% in 1985 and less than 3% in 1990 (Statistics Mauritius, Historical Series, Labour Force, n.d.). Between 1991 and 2019, the unemployment rate gradually rose, reaching 7.7% in 1999 and remaining at this level on average over the period 2000-2019. However, the unemployment rate has fallen continuously since 2013, when it was 8%, to its low level of 6.7% in 2019 (Figure C). It should be noted nevertheless that there exist substantial discrepancies regarding the unemployment rate between women (9.4%) and men (4.4%) and between young people (23.8%) and those aged over 24 years old (World Bank, World Development Indicators, n.d.).

[5] According to the IMF, Mauritius' International Financial Center has assets under management that amount to more than 50 times the country's GDP and contributed about 12 % to domestic output during 2016-18 (IMF, 2019).

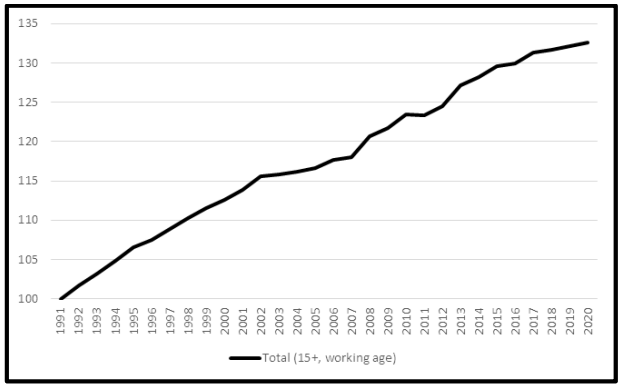
Figure C: Evolution of the unemployment rate (%)



Source: Statistics Mauritius, Historical Series, Labour force, Employment and Unemployment.

Turning to the evolution in employment, Figure D shows employment creation performance by Mauritius from 1991 and 2019. Total employment increased from 415,540 employees in 1991 to 571,709 employees in 2019. On average, employment increased by 1.15% between 1991 and 2019. Compared to an average increase of 5.6% between 1983 and 1990 (Statistics Mauritius, Historical Series, Labour Force, n.d.), the period 1990-2019 is therefore characterized by a significant slowdown in the capacity of the Mauritian economy to generate employment. Such a weakening of the employment growth has been concomitant with the increase in unemployment during the 1990s and 2000s, partly because the economy was no longer able to create enough jobs to absorb the pool of job seekers in the labor market. However, paradoxically, the slowdown in employment growth has been even more pronounced since 2010 (less than 1% employment growth), and particularly from 2018 when it fell under 0.5% (0.36% in 2018 and 0.46% in 2019), at the same time as unemployment was decreasing. This paradox of falling unemployment in conjunction with slowing employment growth is in fact a reflection of an ageing population. Indeed, the population growth rate has continued to decline and has been very low over the decade 2010-2019, averaging 0.15%, and almost zero in 2018 and 2019. As a result, the proportion of the population aged over 65 has increased considerably since 1991 – from 4.7% in 1991 to 12.5% in 2019.

Figure D: Employment (working age population, index, 1991=100)



Source: ILO, GET database, author own calculations.

An interesting exercise consists in comparing job creation performances of Mauritius to that of countries with a similar economic context and in the same region, as depicted in Table A. Apart from Botswana and South Africa, with an unemployment rate of 17.21% and 28.47%, respectively, Mauritius has higher unemployment rates compared to other countries in Table A, and this, despite a strong economic growth and a population growth which is about three times lower than that of each of these countries. This is because Mauritius has the lowest annual employment growth among the countries in the table. In fact, for every 1% increase in the Mauritian GDP, employment increases only by 0.3%, i.e., with an average rate of 4.3% growth in real GDP, employment has grown on average at 1.2% annually. For comparison, in Madagascar or South Africa, the employment response to real GDP growth is respectively 1.2 and 0.9, which suggests these countries have had –in recent times – and greater job creation capacity than Mauritius since for every 1% real GDP growth, employment increases by about 1%.

Table A: Comparative Economic Aggregates

Country	Population Growth, (annual, compounded 1991-2019) (ages 15 to 64)	GDP Growth[1], annual	Employment Growth[1], annual	Employment rate, 2019	Unemployment rate, 2019	Employment response to GDP growth[2]	Gini coefficient WB-WDI, latest available year
Mauritius	0.83	4.34	1.15	54.2	6.36	0.27	36.8 (2017)
Botswana	2.61	4.38	3.06	58.41	17.21	0.70	53.3 (2015)
India	2.04	6.45	1.53	46.74	5.27	0.24	-
Kenya	3.42	3.96	3.47	72.31	2.6	0.88	40.8 (2015)
Madagascar	3.30	2.88	3.41	84.49	1.67	1.19	42.6 (2012)
South Africa	2.14	2.43	2.25	40.12	28.47	0.93	63 (2014)
Tanzania	3.03	5.37	2.91	81.78	1.96	0.54	40.5 (2017)
Uganda	3.45	6.52	3.39	68.84	1.72	0.52	42.8 (2016)

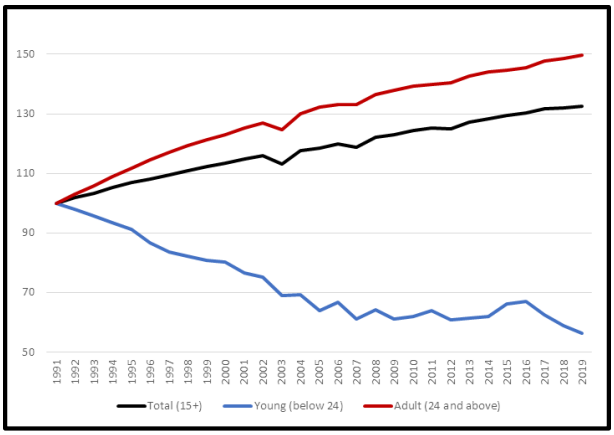
(1) Estimates based on Compounded Annual Growth rates (CAGR) using annual data from 1991 to 2019.

(2) Estimates of employment elasticity to GDP using regression analysis are the most appropriate method to evaluate the response of employment levels to GDP growth. Given that there are no sufficient data for regression analysis, we employ a discrete approach to estimate the response to GDP growth which consists of dividing CAGR employment growth by CAGR GDP growth. The two CAGR estimates are based on the periods 1991 to 2019.

Although Mauritius job creation performances has not been the higher in the region, the quality of the employment created would have compensated this counter-performance. For three decades, wage employment has been the main form of employment in Mauritius, accounting for about 80% of total employment, with a very stable trend over the period. Indeed, the evolution of wage employment has increased at the same rate as total employment over the period 1991-2019, rising by 32.6% (as has total employment increased) over the period (Figure E). This suggests that the policies of structural transformation of the Mauritian economy, reinforced since the beginning of the 1990s, have achieved one of their main objectives, namely the creation of quality jobs which are mainly wage and salaried employment – compared to self-employment,

often in the informal economy that predominates in neighboring countries. These jobs have been generated in particular through the development of the financial sector, tourism, ICTs, in addition to textiles. However, the problem of an aging labor force remains. The number of young wage earners (under 24 years of age) fell sharply between 1991 and 2019, from 83,443 to 53,195 young wage earners, a decrease of 36%. At the same time, the number of employees aged over 24 increased by almost 50%. As a result, young people represent only 9% of paid employment in 2019, compared to 25% in 1991.

Figure E: Employment of wage and salaried workers (index, 1991=100), Young, Adults, Total

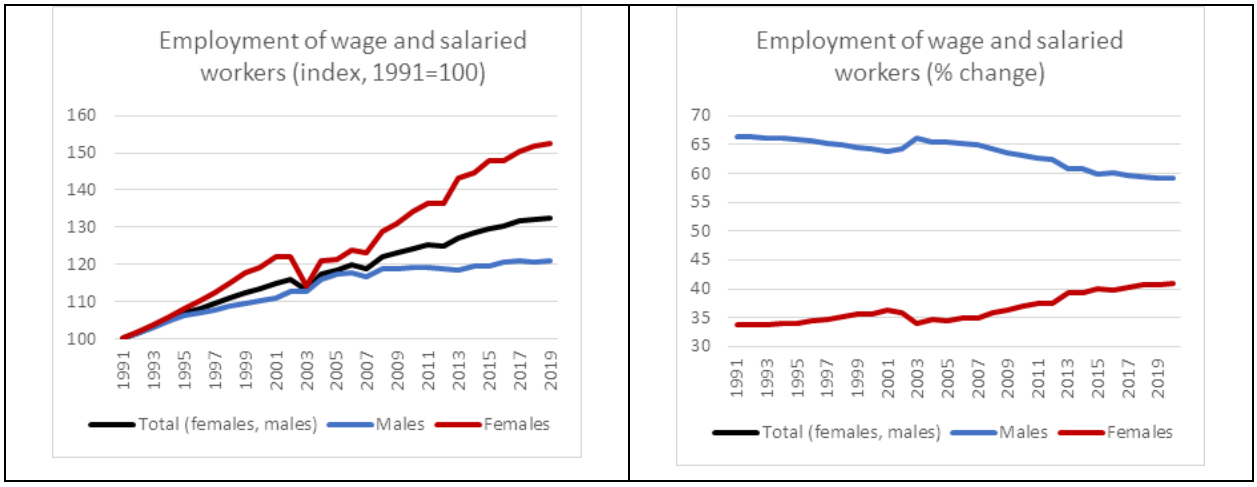


Source: ILO, GET database, author own calculations.

Another success of the job creation strategy of Mauritius is that those policies that have enabled the structural transformation of the economy also seem to have positively impacted at closing the employment gender gap, particularly for wage and salaried employment. Indeed, women's employment is characterized by wage and salaried employment, representing 85% of their jobs on average over the period 1991-2019 (compared to 77% for men). Over this same period, women's wage and salaried employment grew twice as fast as men's, as can be seen in Figure F. The cumulative increase in paid employment for women over the last three decades was 52.6% compared to 21.1% for men. This has resulted in an improvement of the gender distribution of wage and salaried workers, which changed from 66% for men and 33% for women in 1991 to 59% and 41% respectively in 2019. Nevertheless, as will be shown in Section 2, there is still a significant employment gap (including wage employment gap) between women and men in the Mauritius labor market.[6]

[6] It should be noted that women's wage employment seems to be disproportionately impacted by the economic downturn of 2002-2003, which was caused by the devastation of cyclone Dina on sugar production

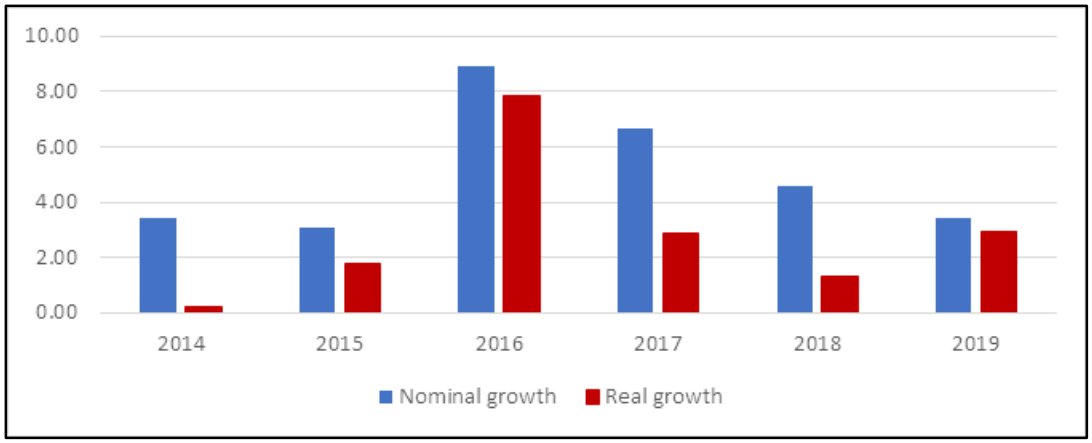
Figure F: Employment of wage and salaried workers (index, 1991=100), Females, Males, Total



Source: ILO, GET database, author own calculations.

Looking at wages and wage trends, Figure G shows that average wage growth has been around 5% in nominal terms and 2.83% in real terms, over the past five years. Inflation, which has been around 2% over this period, has been particularly low in 2016 and 2019, which permitted the increase in workers' purchasing power. This has not been the case in other years, particularly in 2014 when inflation exceeded 3% and almost wiped out the nominal growth in average wages. Inflation was also relatively high in 2017 and 2018, which limited the increase in workers' purchasing power, despite strong growth in nominal average wages, 6.65% and 4.57% respectively (ILO, 2018; ILO, 2020). Comparing Mauritius to relevant countries in the neighborhood (India, Kenya, and South Africa), except India, Mauritius stands out in terms of real average wage growth for the period 2013-2018 (Table B). However, in terms of nominal increase, Mauritius has the lowest wages evolution. This is because Mauritius is characterized by a low and stable inflation.

Figure G: Average monthly wage growth (annual percentage change)



Source: ILO, Global Wage Report, 2018/19, 2020/21. CPI estimates are retrieved from the IMF WEO database.

Table B: Average wage trends, comparison with few countries

Country	Nominal growth, annual average	Real growth, annual average	Nominal wage growth, cumulated 2013-18	Real wage growth, cumulated 2013-19
Mauritius	5,33	2,80	26,67	14,01
India	7,42	2,84	37,08	14,20
Kenya	6,95	0,44	34,73	2,21
South Africa	6,75	1,31	33,74	6,53

Source: ILO, Global Wage Report 2020-21; ILO, Global Wage Report 2018-19

Despite the labor market advances just mentioned, and the challenge of the Mauritian labor in relation to a rapidly ageing population, the country nowadays seems to face a labor market mismatch caused by the rapid structural transformation of the economy while the population has not acquired as rapidly the skills needed by the relatively fast growth of the financial services, the ICT sector, the health care sector and tourism (World Bank, 2018). Furthermore, although Mauritius has a lower prevalence of employment in the informal economy compared to other African countries, informal employment is estimated to have increased between 2012 and 2019, from 262,500 workers (49,5% of total employment) to 294,900 workers (51,6% of total employment) (ILO, n.d.). Therefore, policies that promote the formalization of the informal economy, together with training programs that tackle the needs of growing economic sectors, particularly focused on young women and men, could improve the growth of formal employment now and in the future.

The social context

Unlike other countries with comparable context and regional proximity, Mauritius has managed to improve both its economic performance and its social indicators. The country has ensured free education up to university level for all its citizens, free transport for school children and the elderly, and universal free health care. Social housing and social assistance are also provided to the most vulnerable (Stiglitz, 2011). This has considerably improved the standard of living and conditions of the population as shown by main social indicators. Such success is mainly due to a concerted strategy of nation-building that was adopted at independence, with the objective of maintaining social cohesion through strong and credible institutions, redistribution of economic and political power among the different ethnic groups, and the continuous pursuit of improving the economic conditions of the people (Vandemoortele and Bird, 2011). This has translated into the rapid evolution of the UNDP Human Development Index, which rose from 0.624 in 1990 to 0.804 in 2019. Ranking 66th in 2019, Mauritius has the highest ranking of any country in Africa and surpasses many countries in Asia and Latin America (UNDP, 2020).

In terms of education, which is particular factor in matter of labor market outcomes, Mauritius has made significant investments. In particular, the average number of years of education received by people aged 25 and over increased from 5.7 to 9.5 years between 1990 and 2019. Moreover, a child entering school in 2019 can expect to receive up to 15 years of education, which corresponds to an increase of 5 years when compared to the level in 1990. Over the same period, the proportion of people with at least secondary education has more than doubled, from 33% in 1990 to 67.2% in 2019 (UNDP, 2020). This is likely to be the results of large education spending made by government, a spending which represented 4.8% of GDP in 2018, well above the regional average (4%) and the average among upper-middle income countries (4.5%) (World Bank, 2020). In is important to highlight that these efforts, together with the efforts previously mentioned to create formal wage employment, have enabled the country to consistently improve its aggregate human capital which is significantly higher than that of other sub-Saharan African countries. The World Bank's Human Capital Index for Mauritius is 0.62[7], which is above the world average and the average for upper-middle income countries (0.56), and well above the average of 0.40 for sub-Saharan Africa. And in matter of the welfare state, Mauritius has also made many efforts to fight poverty, notably through the establishment of a social protection system that protects people's income and supports the weakest. Expenditure on social assistance was around 3.5% of GDP in 2015 (World Bank, 2020). Despite all these indicators, the situation with regard to inequality is not as positive as it would be expected; the evolution of income inequality has been limited while inequality seems to have increased slightly over the last two decades. The Gini index rose from 35.7 in 2006 to 38.5 in 2012 and fall back to 36.8 in 2017 (World Bank, World Development Indicators, n.d.). The income share of the poorest 20% also decreased slightly between 2006 and 2017, from 7.6% in 2006 to 7.2% in 2017, while the income share of the poorest 40% remained stable at around 11.6% over the period. In comparison, at the same time, the income share of the richest 10% and the richest 20% increased slightly, from 28.8% and 43.8% respectively in 2006 to 29.9% and 44.6% in 2017. Therefore, it would be interesting to review the extent to which the positive outcome in terms of wage employment and real wage growth observed in the country have impacted on household income inequality; and indeed, the extent to which the newly implemented minimum wage has contributed (or not) at reducing wage and household income inequality. These questions will be empirically reviewed in Sections 2 and 3 below.

[7] "A child born in Mauritius today will be 62 percent as productive when she grows up as she could be if she enjoyed complete education and full health" (World Bank, 2020).

1.2 Minimum wage policies and the minimum wage in Mauritius

The newly implemented minimum wage in Mauritius

On the 1st January 2018, the Republic of Mauritius implemented a universal statutory minimum wage, establishing a monthly floor for full time wage employees equal to 8,500 Rupees for non-exporting enterprises and 8,140 Rupees for exporting enterprises.[8] Since then the two amounts has been updated regularly ever January, including in January 2021.

Based on the CMPHS – taking 2019Q3, the third quarter of 2019, as reference point – about 51 percent of the working age population are defined as wage employees, a group that represents 80 percent of those actively employed at the time of the survey. Although all wage employees are covered by law by the new policy, in practice, only wage employees at the low end of the wage distribution would benefit from the implementation of such a policy. Going back to the CMPHS, and taking 2017Q3 as reference pre-policy period, this shows that the minimum wage bite – i.e. the proportion of wage employees below the minimum wage – was about 22 percent, whereas in 2019Q3, two years after the policy was first implemented, the minimum wage 'bite' had fallen to 13.5 percent.

Clearly, the previous narrative that describes the social and economic context in Mauritius suggest that the conditions would have been favourable for the implementation of a minimum wage at the time that it was implemented: in particular, a significant fraction of wage employees in the workforce, the growth of sectors where remuneration is often low for a significant fraction of wage employees (e.g., tourism) with positive and sustained economic growth which does not seem to translated into lower inequality. According to the ILO Global Wage Report 2020/21, the effective implementation of a minimum wage, if well designed, can have the effect of significantly reducing wage and income inequality at country level. In fact, this report aims at providing an empirical evaluation of how the minimum wage has impacted on key labour market outcomes in the country. However, before entering in those sections it is also important to review relevant published work to understand the possible consequences of a minimum wage policy and what other empirical studies – in other countries – have found when identifying the effect of a minimum wage. These issues are further explored in the following sub-section.

Theoretical and practical consideration of a minimum wage policy

A concern often voiced by some policy makers and related stakeholders refers to the possibility that a minimum wage policy could lead to lower wage employment and, in cases where informal wage employment is considerable, increasing levels of informal employment. Such a concern emanates from the prediction of *the standard competitive model*; in this model the suggestion is that a binding minimum wage (or the upward adjustment of an existing one) creates a floor above

[8] There are some nuance to these two basic floors regarding the characteristics of some wage employees. See Appendix 2 for full details of the policy.

some theoretical market equilibrium wage, i.e., the wage that would result in the absence of the policy. The model predicts that such a scenario would lead to a fall in the demand for formal employment and therefore unemployment or, in the absence of effective unemployment insurance, an increase in the supply of workers in search of employment in the informal economy. In the presence of informal employment, which is the case of Mauritius (see sections 2 and 3) an increase in the supply of informal workers depresses wages among them up to the point where those who have lost their formal employment end up working as informal wage employees (or self-employed workers) at a wage (or earnings) below the one prescribed by the policy.

Nowadays much of the empirical evidence suggests that such a stylized prediction does not reflect the causal relation between a minimum wage policy and employment, either in the formal or the informal economy; in particular, much of the research that has analyzed the relation has produced empirical evidence dismantling *the two pillars* predicted by the above mentioned model: *the adverse effect on employment (overall)* and *the effect in terms of depressing wages among workers in the informal economy*. We now provide a review of some of the relevant empirical literature that sustains the dismantling of these two predictions.

In terms of how minimum wages affect overall employment, Card and Krueger (1994, 2000) were the first to question the basis of such a theoretical construction with a pioneering study that used natural experiments to estimate the effect of changes in the minimum wage on employment in (some states of) the United States; their work showed that a minimum wage does not have adverse effects on employment. Neumark & William, (2008) reviewed more than 90 empirical studies – from developed and developing economies – to conclude that it is not possible to generalize the negative effects of minimum wages on employment: if at all, minimum wages sometimes have adverse effects on employment among the low qualified but even then the magnitude of the effect is relatively small (between 0.1 and 0.3 percent for each 1 percent increase on the minimum wage). More recently Broecke, Forti, & Vandeweyer (2015) provided an exhaustive review of the quantitative and qualitative literature – with an emphasis on research carried out in key emerging economies (The BRICS, Chile, Colombia, Indonesia and Turkey) – to overwhelmingly conclude that the evidence cannot detect adverse effects of minimum wages on employment with particular emphasis in economies characterized by informality: if at all, the evidence points to vulnerable groups (e.g., youth, low-skilled) as more adversely affected, but the size of the impact in any of these groups is small and/or insignificant. A recent study (David, Manning, & Smith, 2016) aims at explaining and testing why it is the case that most studies fail to find adverse effects of a minimum wage on employment, as it would be predicted by the standard neoclassic model. Their study considers the complexity surrounding the employer-employee relation and, given such a complexity, the importance played by the 'degree of monopsony'. The idea is that all employers have some degree of monopsony, either for geographical reasons, asymmetry of information between employer and employee or simply because employees are often faced with a limited degree of mobility. The existence of monopsony means that, in general, wages and wage growth are systematically established below the average labor productivity (or growth in labor productivity) of the enterprise for which employees work. Thus, when minimum wages increase (which is almost always an anticipated event) employers have sufficient margin to keep on operating at a benefit and without the need to cut on labor: this explains why the empirical literature finds negligent effects of an increase in minimum wages on the demand for labor. These findings are further evidenced by recent

empirical studies such as Groisman (2012) in the case of Argentina; or Maurizio & Vazquez (2016) in the case of Argentina, Brazil, Chile and Uruguay. As in other studies, the ones above-mentioned find no evidence of adverse effects of the minimum wage on employment; or the finding suggest only marginally low effects among low skilled workers in the population. Furthermore, it is important to mention that, in fact, some studies show that minimum wages have positive effects for the low skilled: using data from South Africa, Dinkelman & Ranchhod (2012) show that the introduction in 2002 of the first minimum wage for domestic workers was followed by a substantial increase in average wages (10%) for this group, together with a 16-20% increase in the fraction of domestic workers covered by a formal employment contract. The authors emphasized that the outcomes occurred even if the two traditional channels to encourage compliance with a minimum wage – enforcement and penalties – are not usually effective in the case of domestic workers. They argue that the observed voluntary employer's response has to do more with the wide spread announcement of the policy, which reinforced the notion of a fair wage for workers in the domestic sector.

The other notable prediction from the competitive model that has been dismantled by means of empirical evidence is that *a minimum wage hike depresses wages in the informal economy*.[9] Much of the empirical literature – in particular among studies on Latin America – suggest that an increase in the minimum wage is usually followed by a wage increase (and not a decrease) in the informal economy: some examples of these studies are Boeri, Garibaldi, & Ribeiro (2010), for Brazil; Maloney & Mendez (2004), for Colombia; Arias & Khamis (2008), for Argentina; and Canelas (2014), for Ecuador –to mention a few. The phenomenon is known as *the lighthouse effect*[10] and although there are several explanations for its mechanism, all refer to the fact that a minimum wage serves as reference price in the bargaining process of all workers in the economy, including those in the informal economy.[11] Consequently, when minimum wages increase and the increase is moderate, the evidence shows that average wages among wage employees with informal employment tend to increase as well. Several explanations have been put forwards to understand the mechanism behind the lighthouse effect. In particular, if a country routinely employs the minimum wage as an index to set all sorts of prices – inside and outside the labor market – it would be expected that wage bargaining in the informal economy also takes the minimum wage as a reference point. However, even if this is the case, the mechanism would require that firms that employ workers in the informal economy have monopsony power as well as the consideration that 'fair remuneration' is relevant in the production process (Baltar & Souza, 1980). One of the more acceptable explanation for the lighthouse effect suggest that 'sorting of skills' between the formal and the informal economy is an important determinant for increasing wages among workers in the informal economy given a minimum wage hike, i.e., the increase attracts some informal sector workers to formal employment in the formal sector thus reducing the supply of labor into the *informal sector*. The

[9] By default, a minimum wage would increase – as opposed to decrease – the average wage among workers in formal employment. If a wage employee is protected by a minimum wage and that wage employee was previously receiving earnings below a newly established minimum wage, his or her wages will increase. On average, among formal wage employees, the implementation of a minimum wage will automatically increase the average wage in the group most affected. What may be a different question is to what extent does a minimum wage impact on the average wages of all wage employees, a question that will be empirically assessed in Sections 2 and 3.

[10] First described by (Baltar & Souza, 1980) as the '*efeito farol*' in the Brazilian economy.

[11] As noted by De Soto (2002) informal workers are also organized and do go through a type of bargaining process which underlines the wage determination process in some parts of the informal economy.

movement implies an increase of wages in the informal sector that attracts workers with relatively higher skills – compared to the skill mix in the informal sector previous to the increase – which further increases the average labor productivity of the informal economy. Boeri, Garibaldi, & Ribeiro (2010) used panel data from Brazil to show the outcome in the aftermath of the 43% increase in the minimum wage in Brazil in 1995: the subsequent spill-over effects of the minimum wage on the sorting of workers between formal and informal increased labor productivity in the informal sector while the 'sorting' itself is estimated to have accounted for at least two thirds of the increase in the average wage of wage employees in the informal economy.

It should be noted that almost all studies that make reference to *the lighthouse effect* do so mostly in the context of Latin America where informality accounts for about 50% of the working population of which at least half are wage employees.[12] Outside Latin America some studies on the lighthouse effect can also be found in Asia (e.g., Rama (2001), for Indonesia; Fang & Lin (2015) for China) or, as previously mentioned, the specific case of South Africa in studying domestic workers Dinkelman & Ranchhod (2012).

An important body of research that looks at the causal effect of a minimum wage policy on employment – particularly in countries with large informal economies – focuses on micro and small size enterprises (MSEs). In this case, much of the research covers middle and low-income countries in Asia – notably China and Indonesia. These type of studies – where the unit of research is the enterprise – are almost non-existent in Latin American economies (or African ones). This is due to the unavailability of enterprise level data or difficulty among researchers to access such type of data. Going back to regions where these studies exist – notably South East Asia – the focus is almost always on how minimum wages affect employment – as opposed to wage outcomes – and in particular, the survival of small enterprises versus larger ones. These publications show that smaller enterprises are differently affected by the set-up of a minimum wage compared to larger ones. An example is the study by Alatas & Cameron (2008) where they look at the effect of rising minimum wages in Greater Jakarta (compared to different minimum wage regimes in neighboring locations outside Greater Jakarta) on the employment behavior of enterprises that differ in size. The data used in their study is the 'Indonesian annual survey on manufacturing firms' which covers firms with 20 or more employees, thus reflecting the formal sector which amounts to 41% of all firms in Indonesia. The findings in Alatas & Cameron (2008) show that the minimum wage hike did not affect the employment of large enterprises but did have a negative impact on the employment of smaller size ones. In particular, they show that small enterprises reduce employment by 16 to 41% in the short and medium run, i.e., in the two years following the first significant hikes in minimum wages in the region. Of course, it would be

[12] There are two reasons why most of the studies on the lighthouse effect are in Latin America: first, because of the existence of appropriate datasets that help empirically identify the effect. Secondly, and most importantly, because in emerging (middle income) countries such as those in Latin America the fraction of wage employees among informal workers is high (about 50%) and, therefore, wage policies directed to wage employees have a direct bearing in the wage structure of the informal economy. For example, in the case of Brazil, Bolivia, Costa Rica or Honduras, the informal economy accounts for 31%, 54%, 27% and 65%, respectively. Of these percentages, 14%, 28%, 14% and 64% - respectively – are wage employees in the informal sector or in private households. These examples show that in Latin America informal wage employment is significant, and the existence of data has allowed for a substantial amount of research on the topic. In other economies with significant informality (low income countries in particular) wage employment is marginal and informal wage employees are almost a negligent fraction of the informal economy (see ILO, 2013, for a definition of the different profiles of the informal economy and ILO, 2018, for the latest statistical update on informality around the world).

difficult to extrapolate the results of Alatas & Cameron (2008) to enterprises with less than 20 employees, but their results would indicate that smaller size enterprises – who, at the same time are more likely to operate in the informal economy – are more responsive in an adverse way to a minimum wage, compared to larger size enterprises. Other studies with that look at enterprises are Long & Yang (2016), for China; Nguyen (Nguyen, Tran, Vo, & Nguyen, 2014) for Viet Nam. A recent study Dung (2017) has looked at the causal effect of minimum wages on the employment and wages of Vietnam's enterprises distinguishing between micro firms and SMEs. The findings show that in presence of a minimum wage hike, micro enterprises substitute full time for part-time workers, but do not change the 'number' of employees. Instead, the estimates show that rising minimum wages has negative effects on the employment levels of SMEs – where most wage employees are full time workers – without the substitution effect observed in micro enterprises. The paper recognizes that there are large migration flows between regions with different minimum wages that could affect the results. Finally, the paper finds no effect of a minimum wage hike on wages (either increase or decrease).

Almost all studies mentioned above look at the impact of a minimum wages in employment outcomes of middle and low income countries. In high income countries perhaps the most relevant example of a recently implemented minimum wage was that of Germany, where a statutory and universal minimum wage was implemented starting on the first of January 2015. Since then, several studies have shown that over the years that followed its implementation, the minimum wage has not had a significant adverse effect on the labor market outcome of wage employees in Germany. Most studies show only small negative or close to zero effect on employment (Bonin et al. 2020; Bossler and Gerner (2017); Caliendo et al. (2018); Garloff (2019)). In the study of Caliendo, Schröder and Wittbrodt (2019) the estimates shows that two years after the minimum wage was first implemented hourly wages increased for low wage earners, although they also point out the significant amount of non-compliance detected at the onset of the minimum wage policy (early 2015) which was subsequently corrected. They also found that there has been a tendency to reduce the number of working hours thus effectively reducing the average monthly earnings among wage employees. Finally, the same study shows that the minimum wage did not achieve the desired outcomes in terms of reducing poverty or inequality.

Clearly, it is important to make specific evaluation using appropriate datasets to arrive at specific country estimates that allows to assess the impact of the minimum wage. And whereas in most cases studies focus on 'employment outcomes', the example of Germany shows that a comprehensive evaluation should review not just employment but outcome such as working hours, compliance and measures of inequality. In what follows, the aim is to use data from Mauritius at the micro-economic level, covering a pre and post policy period (2017 to 2019) to produce a comprehensive evaluation of how the implementation of the minimum wage in Mauritius has impacted on labor market outcomes and inequality at country level.

2 Labour market outcomes in the context of a newly implemented minimum wage in Mauritius.

The estimates in this report are based on the Continuous Multipurpose Household Survey (CMPHS for short), a survey administered by the National Statistics Office in Mauritius (Statistics Mauritius) and which provides population representative quarterly data, including labour market outcomes at the individual level. The target population in this report are wage employees since these are the group of workers that would have been directly affected by the implementation of a minimum wage: nevertheless, the description of outcomes among other types of workers (employers, self-employed and unpaid family workers) will be included when necessary. In all cases, estimates are based on the population age 16 to 64: we refer to this population as the 'working age' population.[13] The current section focuses on labour market outcomes before the COVID-19 pandemic, from the first quarter of 2017 (2017Q1) to the last quarter of 2019 (2019Q4). This span of time allows for a pre-minimum wage policy period (2017Q1-2017Q4) to be compared to the post-minimum wage policy period (2018Q1-2018Q4) and the subsequent policy adjustment (2019Q1-2019Q4).

We start by describing employment trends – including trends in hours worked per week – as a preamble to the description of earnings trends. Column 1 in figure 1 shows the distribution of the working age population by labour market status and how such distribution varies quarterly between 2017 and 2019. The charts in the figure show that the share of each of the labour market status has remained fairly stable over the period 2017-2019 with only slight changes in the shares that are hardly detectable. The shares of 'out of the labour force', 'unemployment' and 'employers' have all declined over the three year period, but by less than two percentage points in each case. And whereas the share of own account workers has remained practically unchanged, the share of wage employees – both formal and informal – have increased, but again, by a very small percentage: from 28.2 percent in 2017Q1 to 29.7 percent in 2019Q4 in the case of formal wage employment, and from 20.3 per cent to 21.7 per cent in the case of informal wage employment[14]. Considering formal and informal together, the share of wage employment among the working age population increased from 48.5 percent in 2017Q1 to 51.4 percent in 2019Q4. A comparison between women and men shows that between 2017 and 2019 wage employment among women grew by four percentage points – 2.3 percentage points more than in the case of men among whom wage employment increased by 1.8 percentage points. Still, in 2019Q4 the gap in wage employment between women and men of working age remains large at 17.4 percentage points, with men and women wage employment representing 60.2 and 42.8 percent of their respective working age populations. According to the latest edition of the World Employment and Social Outlook – Trends (ILO, 2021), these estimates are well below those

[13]It would have been more complete to consider individuals up to 70. However, the 2019 CMPHS provides age information in categories with all those age 65 and above gathered in a single group. To make surveys comparable over time we decide to estimates using only those 16 to 64 for all available years (2017 to 2020).

[14] For the definition and identification of 'informal' versus 'formal status' using the CMPHS, please see Appendix 2 of the report.

estimated in high-income countries (90 percent in the case of women; 86 per cent in the case of men) but close to the estimates among upper-middle income countries (59 percent in the case of women; 60 per cent in the case of men). The second column in figure 1 shows wage employment growth rate – indexed to the first quarter of 2017 – distinguishing between women and men and formal and informal employment. The first thing to observe in these charts is that seasonality is a significant characteristic of wage employment in Mauritius[15], and whereas seasonality affects both formal and informal wage employment, it seems that the two series move together in opposite directions: that is, when formal employment falls in a given quarter informal employment increases, and vice versa. Such pattern could suggest a certain degree of complementarity among formal and informal wage employment and some degree of flexibility to switch between them, a condition that could in fact have repercussions in compliance with the minimum wage. In fact, the charts in the figure (column 2) show that between the fourth and first quarter between 2017 and 2018 (first implementation of the minimum wage) formal employment declining for both men and women, while informal wage employment – particularly among women, the group more likely to fall in the neighbourhood of the minimum wage – increases sharply around the same period. Informal wage employment also grew between the first and second quarter of 2019 (first adjustment of the minimum wage). Considering the evidences just described, the causal framework in section 3 will consider investigating further the extent to which the implementation of the minimum wage has an effect at switching between formal and informal employment among wage employees.

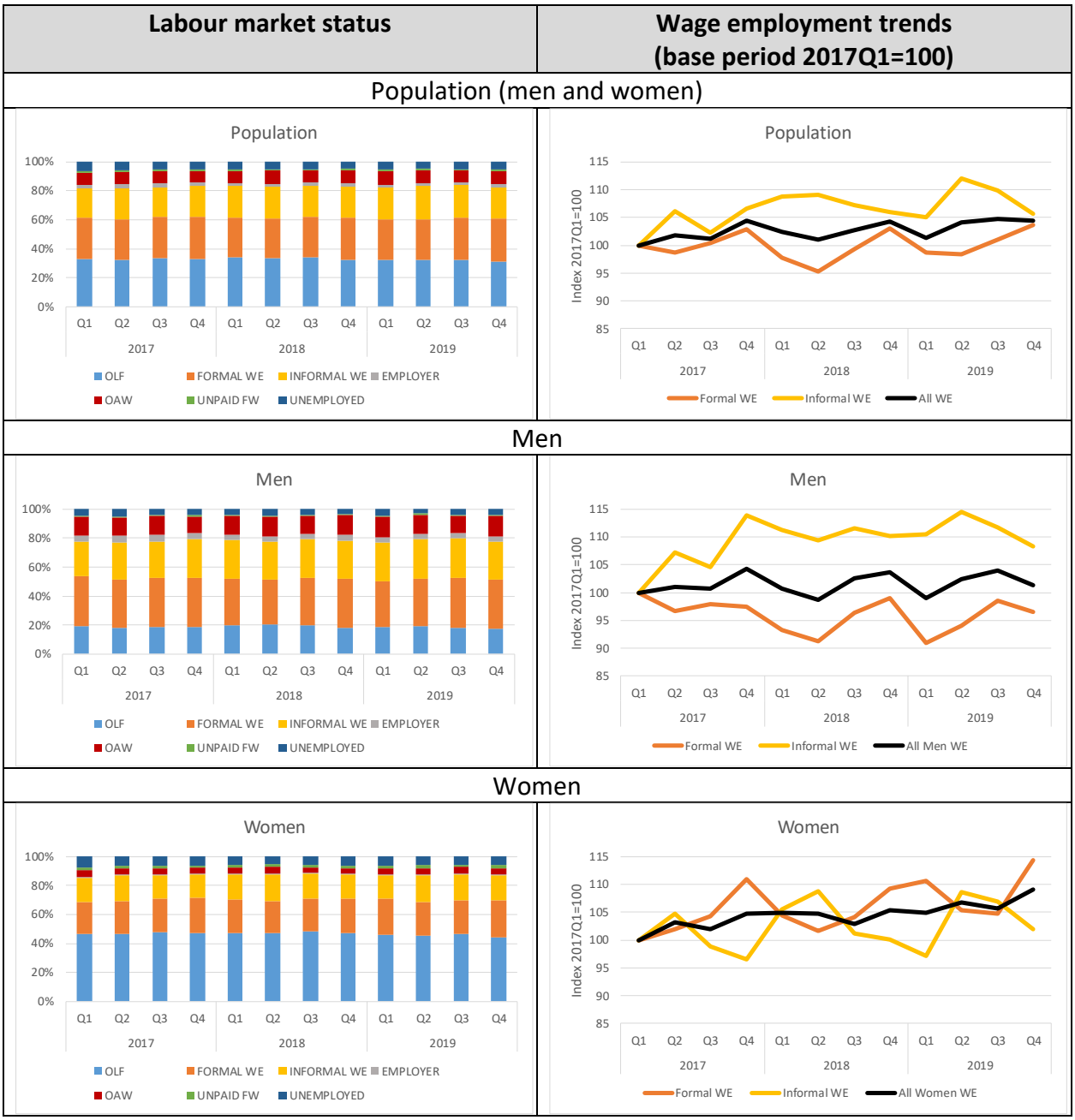
Figure 2 examines another aspect of employment, namely, trends in the number of hours worked per week. Some studies have found that whereas employment levels may not necessarily change after the implementation of the minimum wage, the policy can nevertheless have an effect in the number of hours worked among those that remain in wage employment (e.g., Dung, (2017) in Viet Nam, or Papps (2012) in the case of Turkey). In the case of Mauritius, figure 2 shows a rather stable trend in hours worked, for both women and men and for both formal and informal wage employment. In fact, from 2017 to 2019 the number of hours worked has remained almost constant at around 40 hours per week in the population, and 42 and 38 hours per week worked on average for men and women, respectively. Informal wage employees (women and men) seem to work lower number of hours per week, on average, compared to those in formal wage employment. On the other hand, the average number of hours worked per week among workers with informal employment – particularly among women – shows more variability across quarters compare to that of formal employment.

In sum, according to figures 1 and 2, growth in employment and growth in hours worked per week have not changed much in the period leading to the implementation of the minimum wage policy, or during and after its first adjustment. There are however possible differences between

[15] Ideally, we would want to remove seasonality effects while securing that possible changes due to the minimum wage are not removed. To do so we would need representative quarterly data that expands at least three more years back in time, i.e., from 2013/14 onwards. The quarterly weights for years before 2017 are not provided, therefore, seasonality for the years 2017 to 2019 cannot be removed.

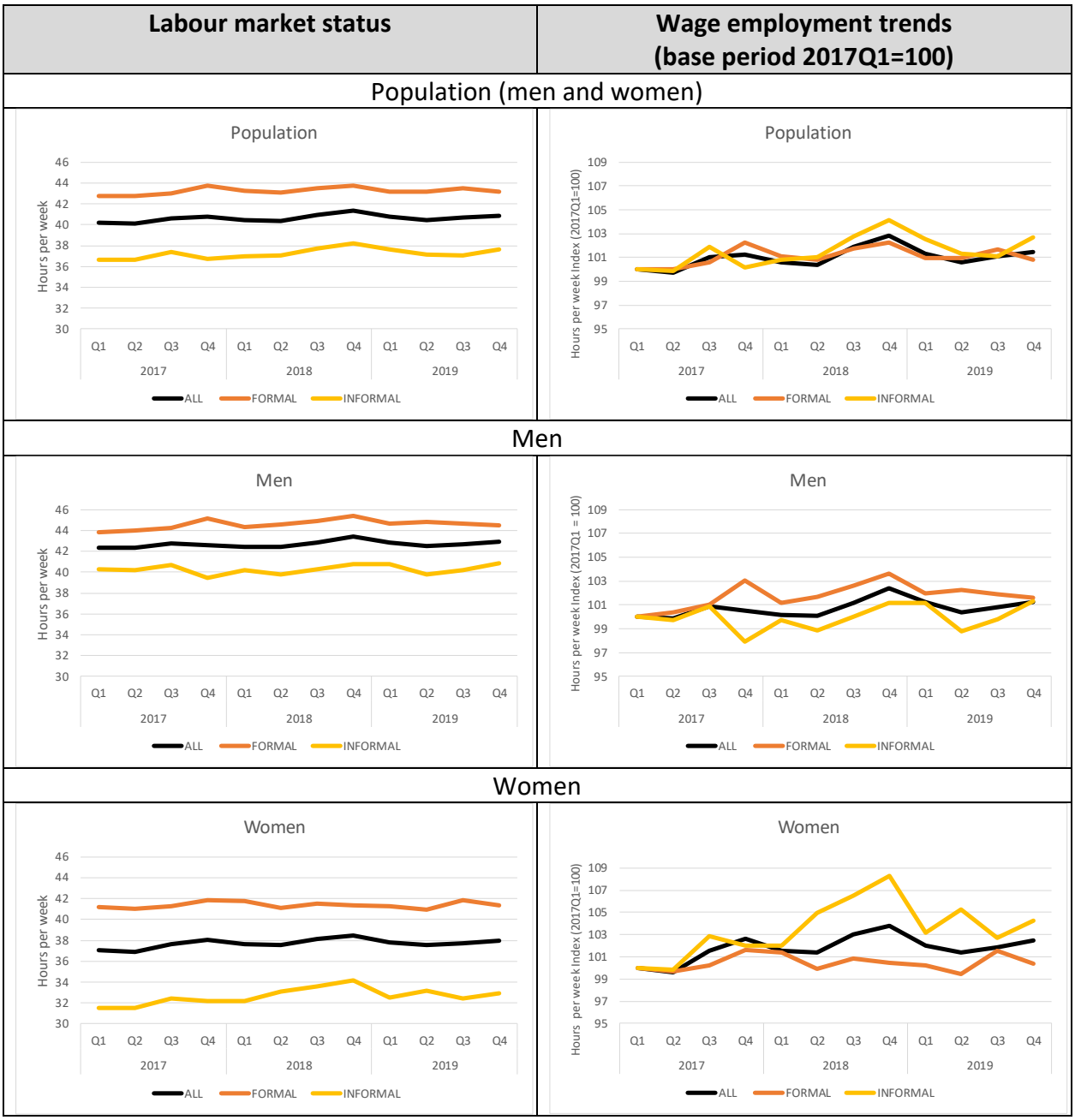
trends in formal employment compared to trends in informal employment, a consideration to take into account when estimating the causal effect of the minimum wage in the conditional framework of section 3.

Figure 1: Labour market status of working age population and employment trends among wage employees, 2017Q1-2019Q4



ILO estimates using the CMPHS (Statistics Mauritius).OLF = Out of the labour force; WE= Wage employees; OAW = Own account workers (self-employed); FW = Family worker. Trends are not seasonally adjusted. The problem is the implementation and further adjustments of the minimum wage have always taken placed at the same time (January, therefore from Q4 to Q1). With only three years of data available, removing seasonality would also remove any change as result of the minimum wage, which is what we want to identify.

Figure 2: Hours worked per week, wage employees, 2017Q1-2019Q4



ILO estimates using the CMPHS (Statistics Mauritius). Hours worked per week refer to 'main job only', thus excluding hours worked in other jobs. Trends are not seasonally adjusted; see footnote in figure 1.

After examining employment trends, we now move to describing earnings trends. Figure 3 shows the evolution of real hourly wages[16], real monthly earnings and the total wage bill – also in real

[16] Hourly wages are simply defined as total basic earnings divided by the number of 'usual hours worked' in any representative week. We consider only earnings and hours worked in the main job and exclude any other earnings component that is not considered 'basic earnings in the main job'.

terms[17]. In all three cases each chart shows all wage workers as well as distinguishing between women and men. In this figure, the first column shows trends in real levels whereas the second column shows real growth for each of the three measures taking the first quarter of 2017 as the base period. We emphasise that in this paper all the estimates are based on *actual basic earnings* thus excluding overtime payments and any other extra non-regular payments received by wage employees. This is in fact consistent with the minimum wage legislation in the country.[18]

A quick inspection of figure 3 shows that between 2017 and 2019, in Mauritius, growth rates in both real hourly wages and real monthly earnings occurred only among women wage employees – two percent and seven percent, respectively – whereas in the case of men, also between 2017 and 2019, real hourly wages declined by three percent while growth in real monthly earnings was near zero at 0.3 percent. Overall, these changes result in a visible increase in the total wage bill over the three years in question, an increase that is clearly much larger among women (16 percent) compared to men (2 percent). Also looking at figure 3, but this time between adjacent quarters, it is possible to detect changes that in principle are compatible with the arrival of the statutory minimum wage in the country: thus, between the fourth quarter of 2017 (2017Q4) and the first quarter of 2018 (2018Q1) real hourly wages increased for both women and men, coinciding with the implementation of the new minimum wage in January 2018. The changes where such that during this period average real hourly wages increased from 104 to 107 Rupees in the case of men, and from 93 to 97 Rupees in the case of women. Likewise, the period covering the first adjustment of the minimum wage in January 2019 – i.e., in 2019Q1 compared to 2018Q4 – shows that real average wages increased for men (from 101 to 104 Rupees per hour) while only marginally in the case of women (from 94 to 95 Rupees). What is striking, however, is that such positive real increases does not last over subsequent quarter within each year. Indeed, if the first implementation and further adjustment to the minimum wage had been the (only) reason for the observed quarterly increases just described, we would expect that the real average value either would remain at the increased level or become higher over subsequent quarters, particularly because inflation rates following between Q2-Q3 – for any of the three years – are lower compared to inflation rates registered in other quarters (see Appendix 1, Figure A1). Therefore, it is likely that seasonality – for example, a temporal hike in the demand for labour in the seasonal holidays at the end of the year – is an important factor behind the observed

[17] Real values are obtained by deflating the nominal ones using the consumer price index (CPI) provided by STATISTICS Mauritius. The original CPI values are released on a monthly basis; the quarterly CPI is based on the simple average of the monthly CPI values within each quarter.

[18] Individuals are asked to declare the labour income generated during the 'last month' with reference to the time of the survey. The question is design so that respondents between basic contractual earnings, earnings due to overtime and irregular bonus or payments. Considering the average across quarters, basic earnings accounts for about 85 per cent of all monthly income, overtime earnings for about 7 per cent and irregular bonus or payments for the remaining 8 per cent. On average, 20 per cent of wage workers earn overtime income whereas about 12 per cent of wage workers receive irregular bonus or payment across the 12 quarters. The main concern in this paper is 'basic' earnings since the minimum wage should not consider payments other than the basic contractual monthly earnings (National Wage Consultative Council Act 2016, and follow up amendments). Therefore, throughout the paper we consider estimating earnings – whether hourly wages, monthly earnings or total wage bill – using only the amount declared as basic salary by respondents. In further sections, however, we estimate if the implementation of the minimum wage had an effect on the probability of working overtime among wage employees (see Section 3)

increases in real hourly wages between the fourth and first quarters of 2017 and 2018, and likewise of 2018 and 2019, while the effect of having implemented a minimum wage as of January 2018 does not seem to have increased real average hourly wages, certainly not in a sustained manner over the long-run.

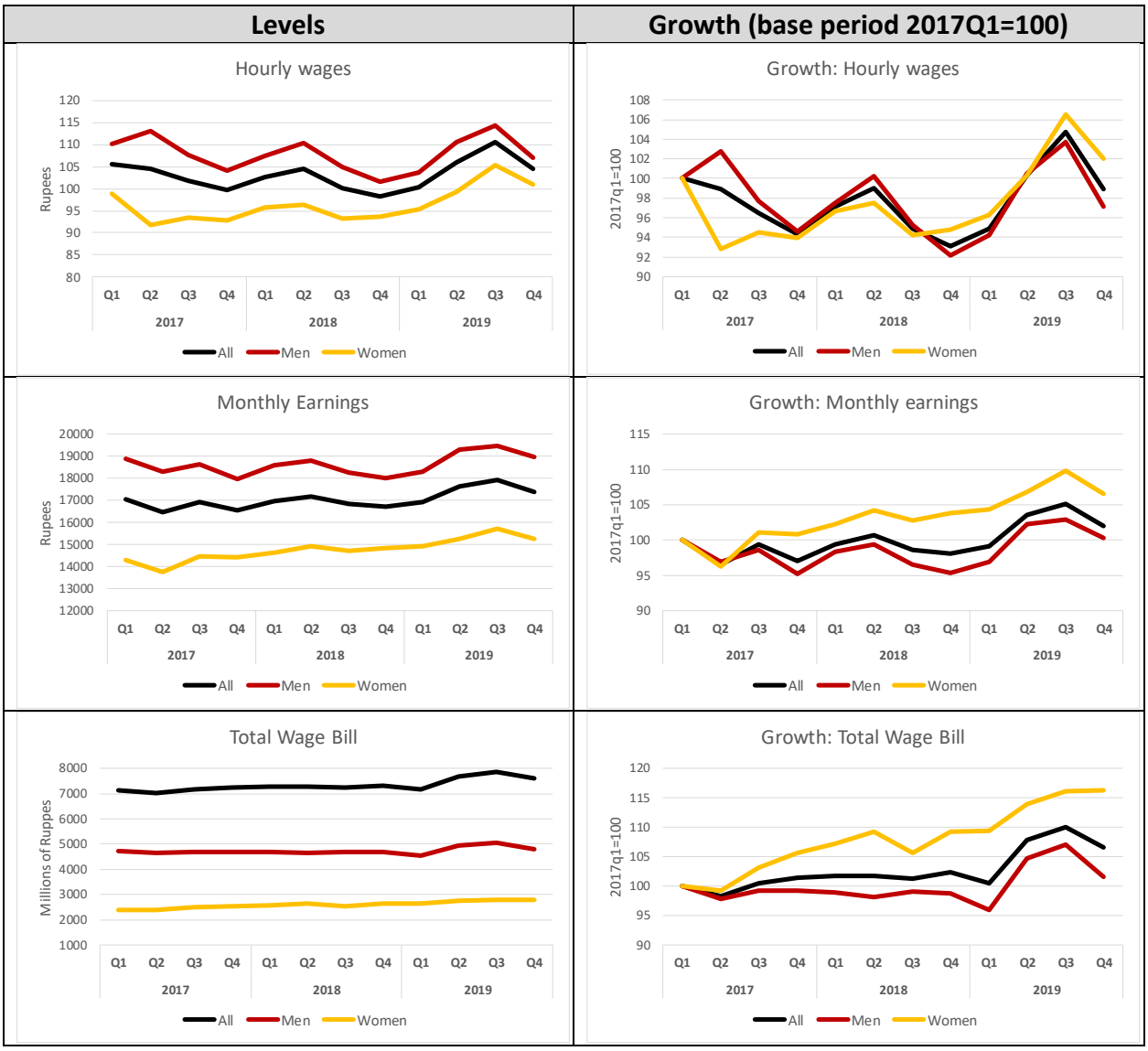
Figure 4 provides further details on outcomes among wages workers but disaggregating between those who earn below the minimum wage, those at the minimum wage, those above and up to two minimum wages, and wage workers with earnings above two minimum wages.[19] At this point it is important to emphasise that wage workers are heterogeneous with respect to working time, and some may actually earn less than the monthly defined legal floor simply because the work usually fewer hours per week compared to a full time worker. In order to compare everyone with the same standard, we use the rubric established by the Mauritius Wage Consultative Council Act 2016 to estimate the 'hourly minimum wage' that would correspond to each wage worker, and proceed to compare such worker's specific hourly minimum wage to the gross basic amount that each wage employee received per hour worked; this comparison, clean from the effect of hours worked, is what allows the classification of workers according to the four groups displayed in figure 4. Whereas in figure 3 trends were displayed across the 12 quarters covered between January 2017 and December 2019, figure 4 selects only the third quarter of each year. Exploring the same quarter across years should eliminate any possible seasonal effect – particularly when selecting the third quarter which is the one traditionally assumed to be least affected by seasonality. At the same time, if changes during the first quarter in a given year have had a lasting effect, these should be visible in the third quarter of that year. Starting with the first column in figure 4, the charts show the distribution of wage employees between the four groups mentioned above[20]: the estimates show that after the minimum floor was introduced the share of wage workers earning below such an amount declined by 7.7 percentage points by 2018Q3 and a further 1.7 percentage points by 2019Q3. And whereas the proportion 'at the minimum wage' has not changed much over the three years, the fraction earning just above and up to one minimum wage has increased by almost 5 percentage points. The latter could be evidence of 'a ripple effect' in the Mauritius labour market, i.e., wage workers that would not have in principle benefited from the minimum wage – since they would have already been recipients of such an amount before the implementation of the policy – experience a wage increase propagated by the legal floor at the minimum. More striking is the 5 percentage-point increase in 2019Q3 – relative to 2017Q3 – in the proportion of workers that end up earning more than two minimum wages. Although ripple effects are less likely to happen at higher wage levels, the fact that approximately 40 percent of wage workers are in the group 'above two minimum wages' implies that the lower earners in such a group could in fact be getting earnings close to the median wage, and the newly implemented minimum wage could have propagated higher earnings among these

[19] Traditionally the group defined as 'earning below the minimum wage' are defined as those with earnings at or less than 95% the actual value of the minimum wage; the definition of the groups follows that applied in the Global Wage Report: wages and minimum wages in the time of COVID-19 (ILO, 2020). See footnote in figure 4 for a detailed description of each of these groups.

[20] Although no minimum wage existed in 2017, it is possible to estimate the real value that would have corresponded in 2017 to the level of the minimum wage implemented in 2018.

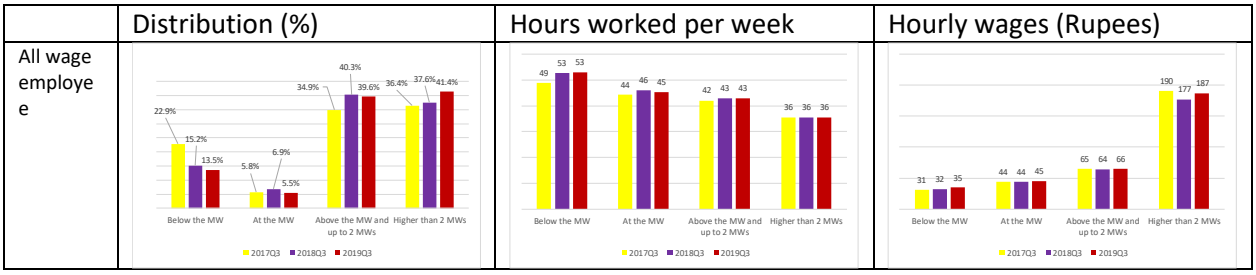
'higher earners' that happened to be close to the media at a pre-policy period. The reduction of wage workers below the minimum wage in percentage points is higher among women (from 32.4 percent in 2017Q3 to 20 percent in 2019Q3) than among men (from 16.4 percent in 2017Q3 to 9.1 percent in 2019Q3). However, the fact that the volume of women below the minimum wage is larger in number compared to that of men implies that even after the observed percentage point drop, in 2019Q3 the volume of women below the minimum wage is still 64 percent of that observed in 2017Q3, compared to 57 percent in the case of men. It is also interesting to notice that whereas the change in the group 'at the minimum wage' was small compared the other three groups, this is nevertheless clearly visible among women, for whom the share has increased from 5.5 percent in 2017Q3 to 7.4 percent in 2019Q3. Likewise, if the ripple effect is behind the increase in the fraction earning above the minimum wage and up to 2 minimum wages, such an effect is clearly stronger among women and not as visible among men. The second column in figure 2 shows the evolution of average number of hours worked per week. These charts show that only among the group 'below the minimum wage' have the number of hours worked per week increased in a considerable manner – in such group, and for women and men, the estimates show they work, on average, 4 hours more per week in 2019Q3 compared to the number of hours worked in 2017Q3. But for all three other groups the number of hours worked per week does not seem to change over time, with such patterns applying equally to women and men. Finally, column 3 in figure 4 shows the change in real hourly wages in each of the groups – thus complementing the estimates displayed in figure 3 but, since the focus is on each of the third quarters and free from seasonality, the estimates in figure 4 allows the display of possible sustained effects (if any) of the minimum wage on wage growth. The charts show that among those that remain below the minimum wage real earnings increased by about 4 Rupees per hour; this is equivalent to 780 Rupees per month for a full time wage employee, or 9 percent of the highest minimum wage level as defined in 2019 (i.e., 9 per cent of 8,900 Rupees). This increase in real hourly wages in the lowest earning group was to a large extent due to increasing earning for women while men's earnings in the group below the minimum wage remained similar across time. In fact, in 2019Q3 women earning below the minimum wage, earn, on average, nine percent more than men per hour, whereas in 2017Q3 the gap was reversed: by then men were earning 3.2 percent more than women per hour. Among the groups of wage workers at or above the minimum wage an increase in earnings is not observed: by default, those at the minimum wage remain at such level over time – in real terms, the hourly minimum wage in Mauritius was 44 in January 2018 and 45 in January 2019. But for the two groups of wage earners above the minimum wage there has been a downward pressure in real average hourly wages: this is particularly true in the case of those earning more than two minimum wages, and particularly true in 2018Q4 compared to 2017Q4. As it was previously described, the introduction of the minimum wage could have caused a ripple effect among wage workers who, previously to the implementation of the policy, were in the neighbourhood of (but above) the minimum wage. Thus, a share of workers seems to have moved to higher earnings brackets and it could be that they have probably pulled the average down in that group at the post policy period. In 2019Q3 the downward pressure (possibly due to the ripple effect) on real hourly wage seems to have died down although only women in this upper earning group are receiving hourly wages that are higher than in 2017Q3 in real terms.

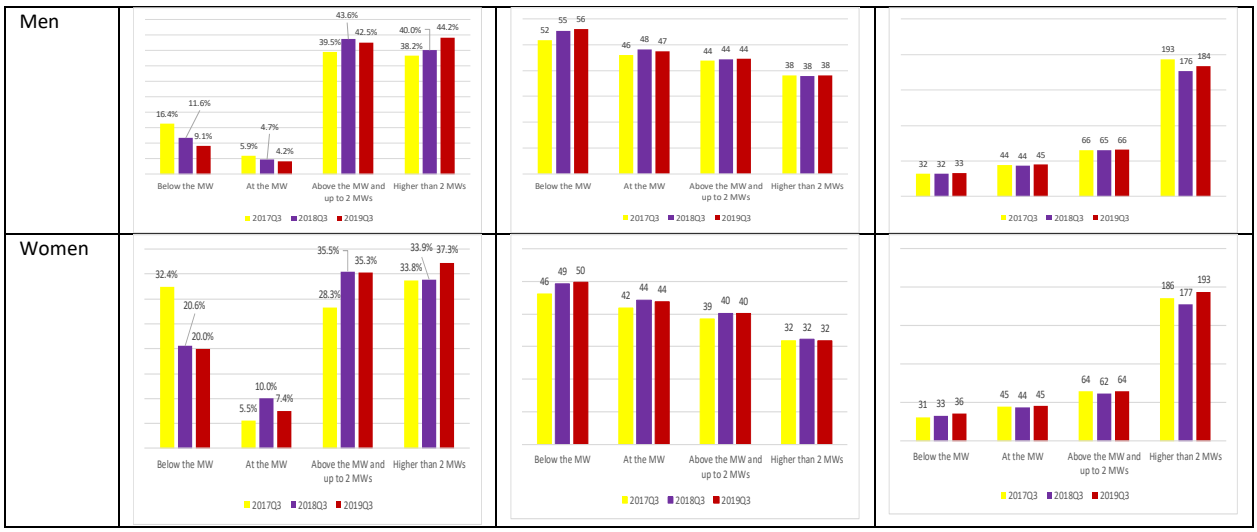
Figure 3: Earnings trends, 2017Q1-2019Q4



ILO estimates using the CMPHS (Statistics Mauritius). All trends in the figure are real trends having deflated the nominal values using consumer price index with base in 2017Q1. The estimates consider only 'basic contractual earnings'. Basic wage from main job only. Trends are not seasonally adjusted, see footnote in figure 1.

Figure 4: Wage employees, hours worked and earnings by groups created in reference to the minimum wage – pre & post policy distribution (2017Q3, 2018Q3 and 2019Q3)



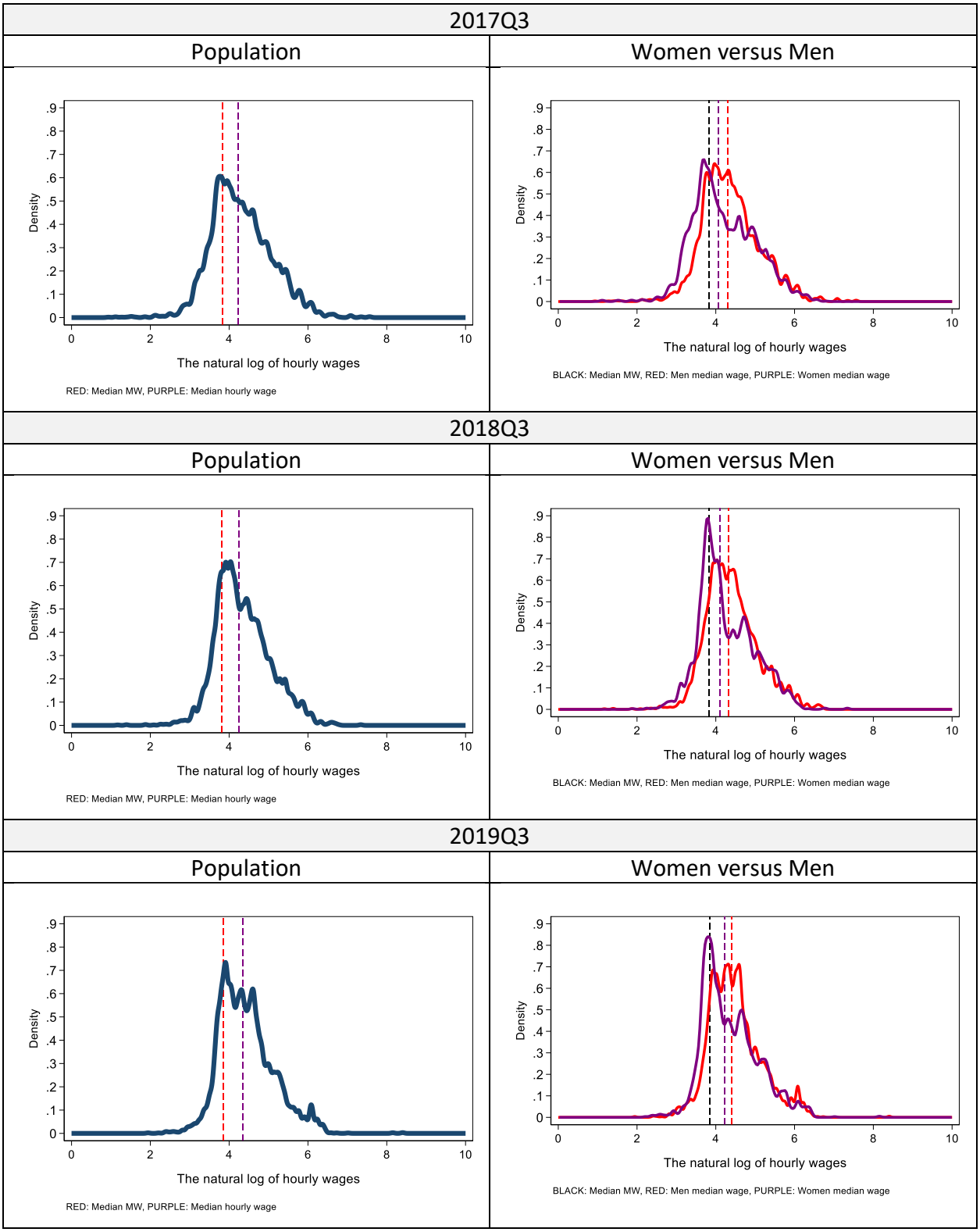


ILO estimates using the CMPHS (Statistics Mauritius). Wage workers below the minimum wage are those with hourly at or below 0.95 percent the actual minimum wage; wage workers at the minimum wage are those whose hourly wages are between 0.95 the minimum wage and at or below 1.05 times the minimum wage; the third group in the charts are those with earnings above 1.05 times the minimum wage but at or below two times the minimum wage; the highest-ranking group of wage earners are those with hourly wages above two times the minimum wage. Whenever the estimate refers to earnings (column 3) these show real trends having deflated the nominal values using consumer price index with base in 2017Q1. The estimates consider only 'basic contractual earnings' from the main job. Trends are not seasonally adjusted, see footnote in figure 1.

Figure 5 provides a complementary illustration that shows the minimum wage in relation to the complete hourly wage distribution; how such a relation changes across years and comparing these between women and men. In all charts of figure 5 the vertical lines show the location of the (weighted average) minimum wage and the location of the median – for the complete population and separately for women and men. Compare to the pre-policy period (2017Q3) there is a clear increase in the density – a hike – at around the minimum wage in 2018Q3 in the population. There is also a clear drop in the share of workers (the area underneath the bell-shape) that falls below the minimum wage in 2018Q3 compare to that in 2017Q3. This is consistent with more workers earning 'at or above' in 2018Q3 two quarters after the implementation of the policy in January 2018. In 2018Q3 there is also a visible spike a bit above the median wage, probably resulting from a first ripple effect after the introduction of the policy. In 2019Q3 the two spikes observed in 2018Q3 continue to be present while there is now a new distinguishable spike to the right of the median: this continues to be evidence of a possible 'ripple' effect at hourly wage levels well above the minimum wage. The second column in figure 5 distinguishes between women and men to show that the 'spike' is clearly more acute among women compared to men. Women, therefore, seem to be the group that has benefited most from the implementation of the minimum wage. On the other hand, the new spikes observed in the wage distribution in the population (women and men together) are clearly a feature in the wage distribution among men, and not so clearly visible among women. Thus, it seems that the ripple effect of the minimum wage (i.e., workers in the neighbourhood but above the minimum wage at the pre-policy period but benefiting from the new policy in the post-policy period) are more likely to be men than to be women. This is particularly visible in 2019Q3 when the changes in

hourly wages should have included the cumulative effect of the new minimum wage and its subsequent adjustment in January 2019.

Figure 5: Wage distribution (real values) and the minimum wage, based on hourly wages (2017Q3, 2018Q3 and 2019Q3)



ILO estimates using the third quarters of the CMPHS

Table 1 provides summary statistics to show how minimum wages might have changed key outcomes after its implementation: as with the previous two figures these estimates focus on third quarters to control for seasonal effects. In terms of employment rates, wage employment – relative to the working age population – has increased by about one percentage point per year, with similar percentage point increase among men (one percentage per year) and women (0.7 percentage points per year). These changes, which are rather small, implies that there has been an almost imperceptible change in the relative share of men and women wage employees in the population between 2017 and 2019, with such relative share remaining at 40-60 for women-men, respectively.

Average real hourly wages and average real monthly earnings have increased for both men and women; and although the average increased became noticeable only as of 2019Q3, already in 2018Q3 the inequality measures in the table show a decline in wage inequality. For example, the Palma Ratio, which measures the ratio between total earning of the top ten percent earners against the bottom 40 percent earners shows a substantial drop in 2018Q3. Thus, although the average might not have changed in 2018, the minimum wage is likely to have increased the total monthly earnings among those in the bottom of the wage distribution (among the bottom 40 percent) effectively reducing the distance between top ten percent and bottom 40 percent: thus, whereas the total earnings gap in 2017Q3 between the two groups was 47.6 percent, the gap in 2018Q3 had dropped to 36 percent, further declining to 33.7 in 2019Q3. Similar conclusions can be obtained when looking at the Gini coefficient. Likewise, the ratios D9/D1 and D5/D1, which are based on hourly wages, are consistent with the other inequality measures, further showing that the decline in wage inequality is not necessarily due to increase (decreasing) working time among the bottom (top) wage earners, but an actual decline in the distance between the bottom earners and the top earners.

The Kaitz index shows that before the implementation of the minimum wage, the distance between the minimum wage established as of 2018 was 65 per cent that of the median hourly wage in the population. After the minimum wage was first implemented, and after the first adjustment in 2019, the Kaitz index declines slightly. Considering that the value of the minimum wage increased over time, the estimated Kaitz index in subsequent years shows that the hourly wage at the median has also increased over time and by more in relative terms than the increased value of the minimum wage. Thus, in 2019Q3 the Kaitz approximates 60 percent, which is often a target when adjusting the level of the minimum wage in several high-income countries (e.g., France). But the estimates in table 1 also show that non-compliance with the minimum wage among wage workers remains high in 2019, particularly among women (20 percent) and even higher among women with informal wage employment (22.6 percent). Having said this, it is important to highlight that the minimum wage seems to have also had an impact among informal wage employees in the population, since those that fall below the minimum wage (hourly rate) has declined from 26.1 percent in 2017Q3 to 15.8 percent in 2019Q3. Wage employment, however, has remained rather high and stable between 2017, 2018 and 2019. And this is important because the data shows that informal wage employment in Mauritius represents a relatively large share: according to the table, in 2019Q3 a total of 44 percent of wage employees

were operating at the margin of formal arrangements, a share that applies equally to women and men.

Table 1: Unconditional measures summarizing the wage distribution, before and after the implementation of the minimum wage.

	Pre minimum wage policy (2017Q3)	After the implementation of the minimum wage (2018Q3)	After the first adjustment of the minimum wage (2019Q3)
% wage employees among working age population[1]	49%	50%	52%
% Men wage employees[1]	60%	60%	59%
% Men wage employee among men[1]	59%	60%	62%
% Women wage employee among women[1]	39%	40%	41%
Hourly wages (Rupees)			
All	101.9	100.2	110.6
Among Men	107.6	104.9	114.2
Among Women	93.4	93.2	105.3
Monthly earnings (Rupees)			
All	16,938.7	16,819.6	17,933.2
Among Men	18,631.3	18,252.5	19,457.6
Among Women	14,446.3	14,689.2	15,698.1
Wage Inequality measures[2]			
Palma Ratio	1.91	1.56	1.51
D9/D1	6.95	5.39	4.60
D5/D1	2.40	2.17	1.87
Gini coefficient	0.42	0.38	0.37
Hourly wage gender pay gaps[3]			
Raw mean	13.2	11.2	7.8
Factor Weighted	19.9	18.2	17.1
Decile weighted	15.4	13.5	11.2
Kaitz Index[4]			
All	0.65	0.63	0.59
Among men	0.65	0.62	0.58
Among women	0.66	0.63	0.60
% Wage employees with employment in the informal economy			
All	42%	44%	44%
Among Men	43%	45%	44%
Among Women	42%	42%	43%
% Non-compliance with the minimum wage[5]			
All	22.9%	15.2%	13.5%
Among men	16.4%	11.6%	9.1%
Among women	32.4%	20.6%	20.0%
% Non-compliance with the minimum wage (FORMAL)[5]			
All	20.5%	12.7%	11.8%
Among men	13.3%	9.9%	7.4%
Among women	30.9%	16.7%	18.1%
% Non-compliance with the minimum wage (INFORMAL)[5]			
All	26.1%	18.5%	15.8%
Among men	20.5%	13.8%	11.2%
Among women	34.5%	25.8%	22.6%

ILO estimates using the third quarters of the CMPHS. Monetary values show real movements at constant prices of 2017Q1. (1) Wage employees as fraction of the working age population; as share of men vis-à-vis women; and share within men and within women, respectively. (2) The Palma ration equals the share of monthly earnings of the top 10 percent wage earners divided by that of the bottom 40 per cent. D1, D5 and D9 are, respectively, the threshold values at the first, fifth and ninth decile of the hourly wage distribution. A Gini coefficient of 0 implies perfect equality and 1 implies perfect inequality. (3) The mean raw gender pay gap equals the mean hourly wage difference between men and women in relation to the mean hourly wage of men. The factor weighted gender pay gap considers breaking down the population into subgroups by education, age, public or private sector, and full or part time employment, and taking the weighted average among these groups (see ILO, 2018). The decile-weighted gender pay gap consists on estimating the gap at each decile and taken the weighted average. (4) The Kaitz index is the ratio between the minimum wage and the estimated median wage; since Mauritius does not have a unique minimum wage value we use the weighted average among wage workers in the population. (5) Non-compliance is defined as the share of wage employees that receive earnings at or below 95 per cent the hourly minimum wage.

Figure 6 explores the possibility that the introduction of the minimum wage could have changed the characteristics of wage employees at around the minimum wage; thus, figure 6 shows the share of *gender, age, region, education, formal-informal wage employment, public-private wage employment, occupations, economic sectors and the size of the enterprise* at each decile of the hourly wage distribution, comparing how these shares change between the three quarters of 2017, 2018 and 2019, respectively. In terms of gender, the share of women in the first decile declines from about 63 percent in 2017Q3 to about 57 percent in 2019Q3, while the share of women in the second decile increases from 55 to 57 percent over the same period. Previous estimates (table 1) suggested that there has been an increase in the share of women wage employees (among women of working age) over the period 2017-2019, therefore, the relative shift in the share of women to higher deciles would suggest that more women are now earning higher wages than at pre-minimum wage periods.

In terms of age, it seems that the first decile in 2019Q3 has more youth and older-age group wage workers compared to 2017Q3; thus, the share of workers aged 16 to 24 and the share of workers aged 55 to 64 in the first decile have increased, respectively, from 20 to 25 percent and from 10 to 16 percent of all wage workers in that decile. Since the first decile of the hourly wage includes a wage range below the minimum wage this would seem to suggest that the implementation of the minimum wage in Mauritius has benefited more those workers in the 'prime' age – i.e., between 25 and 54.

In terms of education, figure 6 shows there has been an increase in the share of wage workers with 'less than basic education' in the first decile, with such share increasing from 30 to 35 percent between 2017Q3 and 2019Q3. In the second decile, which includes those at the minimum wage, there has been an increase in the share of those with 'primary education completed' – from 45 percent in 2017Q3 to 51 percent in 2019Q3 – while the share of those with 'less than basic' but also those with 'lower secondary completed', have declined. Altogether, what the shifts in 'education' could be showing is an increase in demand for skills among those that are now higher earners – minimum wage earners – while those with less educational achievement are pull down to earnings below the minimum wage.[21]

In terms of informal wage employment, table 1 suggested that the overall share had not changed much across time, while figure 6 shows that there is a substantial decline in the share of wage employees in informal employment in the lower deciles while the relative share of informal wage employment at the top deciles (D8-D10) increases. It is interesting to see that at the second decile, which is where the minimum wage is located, the share of wage employees with informal employment declines from 40 percent in 2017Q3 to 29 percent in 2019Q3.

[21] Unfortunately, the CMPHS does not include 'years of experience' which, together with occupation, can provide a better approximation to the skills of wage workers in the population. Interestingly, there is also an increase at the higher deciles – from the sixth to the top – in the share of those who have 'high school completed and/or vocational studies' while the fraction of wage workers with university degrees at such top deciles has declined – without necessarily increasing in other deciles. Such movements at the upper end are less likely to be associated with the implementation of the minimum wage, and are probably an outcome of sample selection process in the data.

Finally, there seems to be very marginal – almost unperceived – changes between deciles and over time, particularly at the low end of the wage distribution in terms of public versus private sector, occupational categories, economic sector or the size of the enterprise. In terms of occupations the low and semi-skilled still dominate the lower deciles (at and around the minimum wage); wage employment in manufacturing/mining and quarrying/utilities, together with trade and private service sector providers dominate the lower deciles – particularly manufacturing which includes the exporting enterprises and EFZ; enterprises with less than five wage employees are more likely among the lower deciles than at the upper end of the wage distribution. Such patters do not seem to have changed between 2017 and 2019.

Therefore, overall, the unconditional exercise in figure 6 would suggest that there is a change in the characteristics of workers at around the minimum wage (age, education, gender) and lesser of a change when we look at the job characteristics (e.g., occupation) or the workplace (e.g., economic sector or the size of the enterprise). We shall take this information – based on unconditional dynamics – when estimating the causal framework in section 3.

Finally, figure 7 looks at possible changes of the minimum wage at household level. So far all our estimates focus on wage employees without any distinction with regards to their location across the household income distribution. As suggested in the latest ILO Global Wage Report (ILO, 2020) one of the factors that makes a minimum wage effective is that of applying to workers in low income households; and, moreover, a well-designed and effectively applied minimum wage should have the effect of reducing income inequality between households. Figure 7, 2017Q3, shows that indeed, a significant fraction of wage employees in Mauritius before the minimum wage, would have been located at household at or below the median per capita household income. In fact, in 2017Q3 about 67 percent of minimum wage earners were in households with per capita household income below the median. Therefore, this already points out to the potential of the minimum wage at having reduced per capita household inequality in the first few years after its implementation. What figure 7 seems to suggest is that over consecutive years (2018Q3, 2019Q3) there is an increasing share of wage workers at or below the minimum wage at around the fourth and fifth decile – of the household income distribution – while the share of those earning less than or at the minimum wage declines in the very low deciles. In sum, the shape of the household income distribution in 2019Q3 shows more compression compared to that in 2017Q3 – smaller share in the lower deciles and increasing share in the middle deciles – potentially showing that inequality in Mauritius has decline after the introduction of the minimum wage, a conclusion that would in fact be consistent with estimates of wage inequality in table 1.

Overall, the figures and estimates inspected in this section have provided an unconditional review of possible effects of the minimum wage. In the section that follow we examine conditional estimates that will allow us to identify and quantify the impact of the minimum wage and its adjustment. The abovementioned unconditional estimates provide a wealth of information to guide the empirical strategy in the identification process.

Figure 6: Changing characteristics across time and across the deciles of the hourly wage distribution (2017Q3-2019Q3)

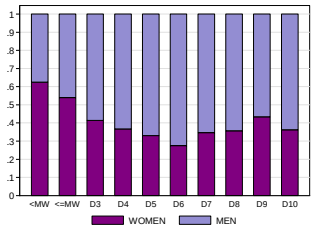
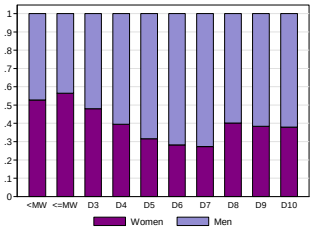
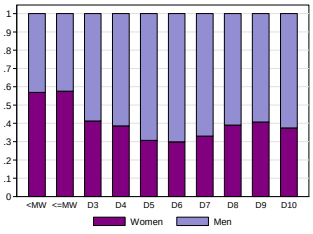
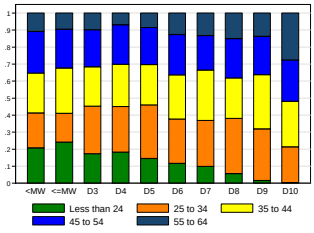
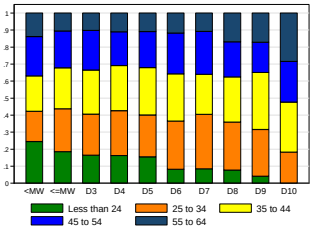
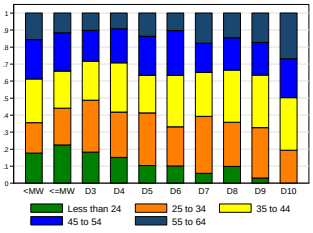
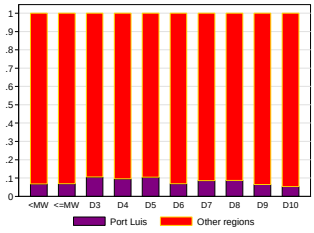
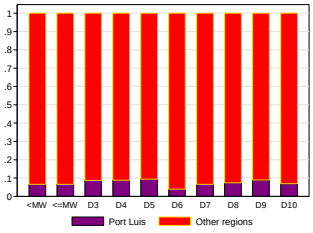
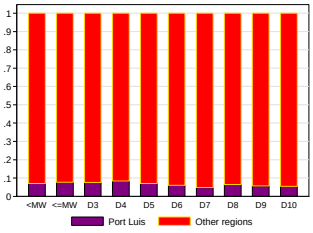
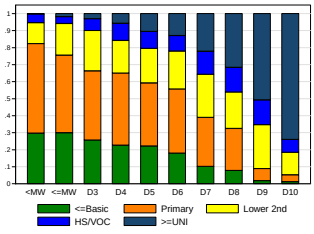
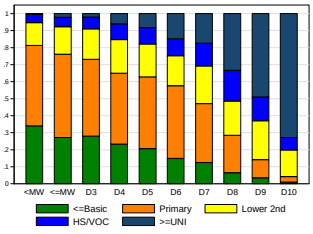
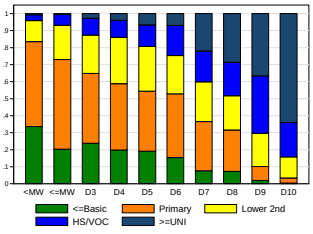
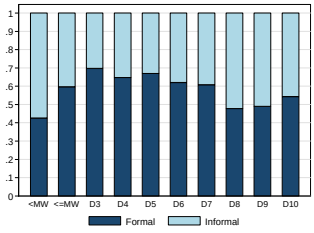
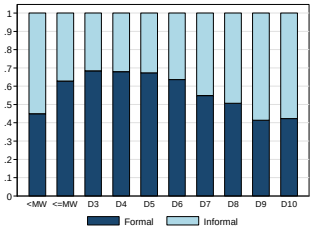
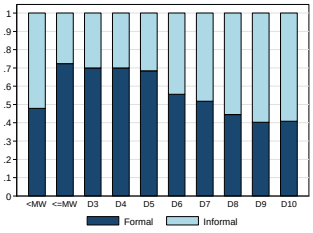
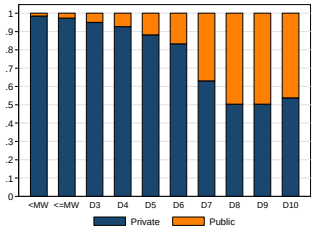
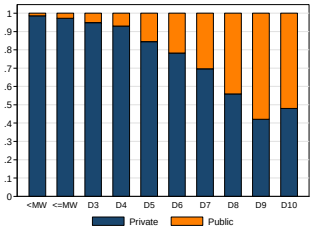
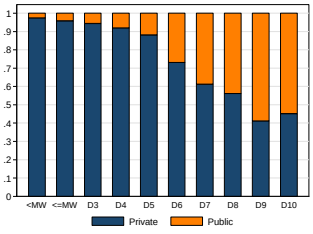
	2017Q3	2018Q3	2019Q3
Gender			
Age			
Capital (Port Luis) versus other regions			
Education			
Employed in the formal versus the informal economy			
Public versus private sector enterprise			

Figure 6 (continued)

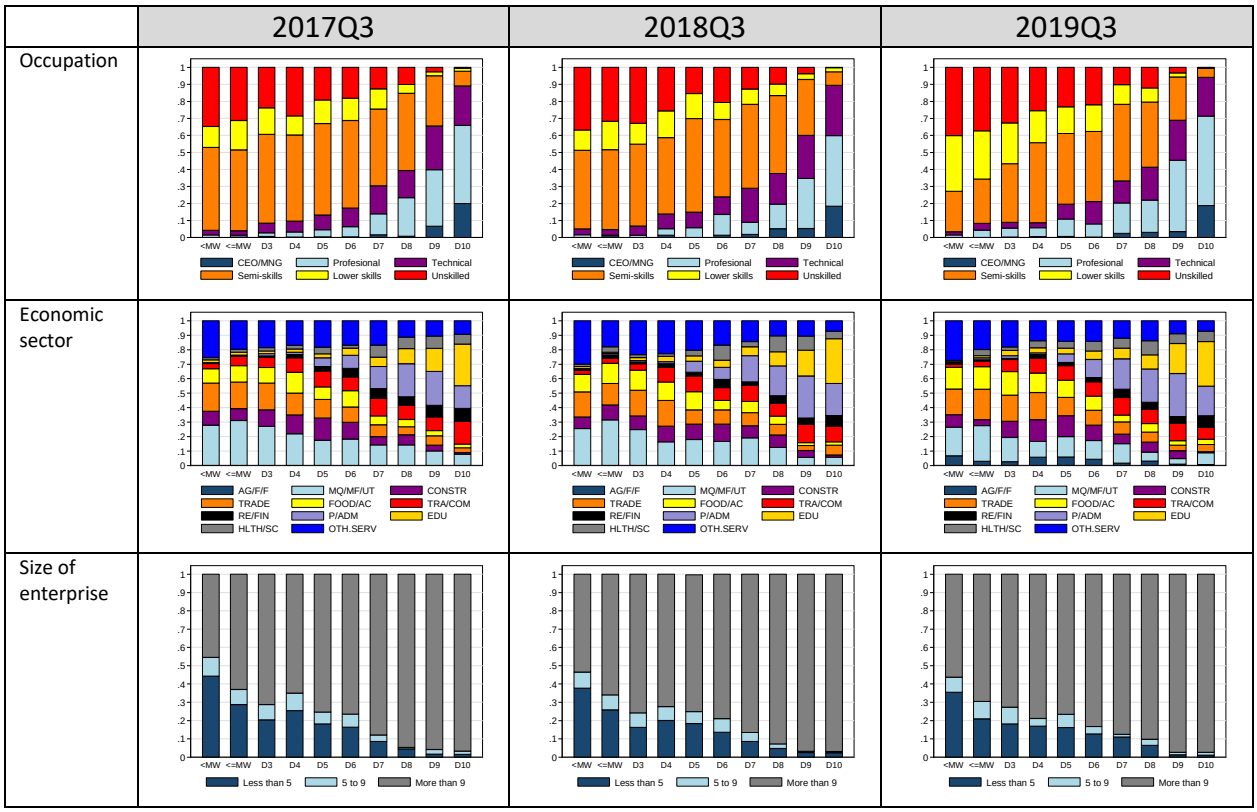
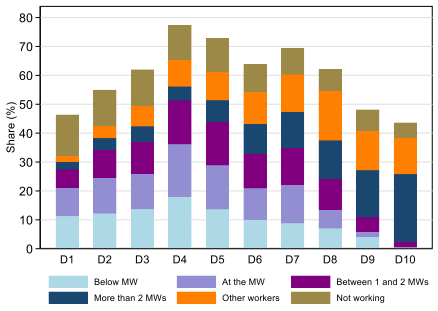
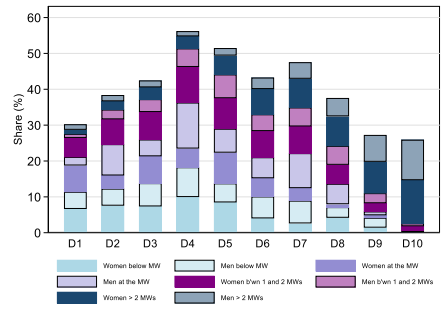


Figure 7: Distribution of wage earners across households by income deciles, in reference to the minimum wage, across time and distinguishing by gender.

2019Q3		

3 Impact assessment: a difference-in-difference evaluation of the minimum wage policy in Mauritius

The empirical evaluation of a newly implemented minimum wage, or that of an adjustment to an existing one, should be a fundamental undertaking when monitoring the effectiveness of the policy. The outcome that often raises most interest is *the level of employment*: did the minimum wage change wage employment levels in the country? Associated to the level of employment is that estimating the impact of a minimum wage on the number of hours worked per week (*work intensity*). In countries where informal employment is significant it is also important to identify possible changes distinguishing between formal and informal employment – or vice versa – as result of the minimum wage policy. Besides employment (and its related outcomes), a comprehensive evaluation of a minimum wage should include estimates on how the policy have affected average wages – among wage employees, on groups of wage employees (e.g., by gender) or at different deciles of the hourly wage distribution – as well as other outcomes that may be directly or indirectly associated with wages. For example, by how much did the minimum wage reduce low paid employment among wage employees? Did it modify wage and income inequality in the population? Or did the minimum wage reduce gender pay gaps, particularly at the low end of the wage distribution?[22] This report centers full attention to the outcome 'employment among wage employees.'

Previous sections of the report provide unconditional changes, i.e., a review of actual outcomes to help inspect the data and provide insights of how the minimum wage policy might have impacted on key outcomes among workers – in particular, among wage employees. In contrast, this section is based on conditional estimates that aim at identifying and quantifying the effect of the policy *net* from other possible changes unrelated to the minimum wage.[23] To do so we apply microdata (the Continuous Multi-Purpose Household Survey, CMPHS) to estimate standard

[22] There are several other outcomes that may have been impacted by the introduction of the minimum wage, for example, a change in the number of self-employed, a change in educational choices, productivity, or price adjustments, but to mention a few.

[23] Observing changes overt time using unconditional outcomes does not identify the effect of a particular policy because other changes – including other social or economic policy changes – could have impacted on the outcomes of interest. The empirical strategy in this section consists on netting out the impact of the minimum wage from other possible changes.

difference-in-difference specifications (DD), where the latter is a common tool employed to identify and quantify the effect of social and economic policies. In the case of implementing or adjusting a minimum wage, the DD method applied to a representative sample (of size n) compares the change on a given outcome after the policy was implemented (or after an adjustment) between wage workers who are impacted by the minimum wage (the treated) and those who are not (the untreated, also known as the control sample). To show the specification behind the DD estimator, let $T_i = 0$ indicate $i \in n$ observations in the pre-policy period and $T_i = 1$ indicate $i \in n$ observations in the post-policy period; let MW_{it}=1 identify individuals who would have been affected by the minimum wage policy at t and MW_{it}=0 for individuals who would not have been affected by the policy, also at t. Let Y_{it} be the outcome of interest for individual i at t – e.g., employment – and let X_i be a matrix of covariates where the latter are exogenous to both the outcome and the treatment and which, at the same time, could in part explain both the outcome and the treatment – e.g., age, education, gender, etc. With this, the simplest specification for analyzing the impact of implementing a minimum wage is:

$$Y_{it} = \alpha_o + \alpha_1 T_{it} + \alpha_2 MW_{it} + \alpha_3 \{MW_{it} \cdot T_{it}\} + X_{it}\beta + u_{it} \quad (1)$$

The ordinary least square estimator $\hat{\alpha}_3$ is the difference- in-difference (DD) estimator in the program evaluation literature; it is the impact on Y in the post policy period ($T = 1$) for those treated by the policy ($MW = 1$). This is easier to see because $\hat{\alpha}_3$ corresponds to the following expression:[24]

$$\hat{\alpha}_3 = \left(\bar{Y}_{MW=1,T=1} - \bar{Y}_{MW=1,T=0}\right) - \left(\bar{Y}_{MW=0,T=1} - \bar{Y}_{MW=0,T=0}\right) \quad (2)$$

In the latter, $\bar{Y}_{MW,T}$ represents the average outcome (e.g., average wage employment) for each of the four groups identified by MW and T. Thus, the first difference $\left(\bar{Y}_{MW=1,T=1} - \bar{Y}_{MW=1,T=0}\right)$ corresponds to the change among those impacted by the implementation of the minimum and, therefore, includes the effect of the policy on the outcome (Y). The problem is that the outcome could have changed between periods for reasons unrelated to the minimum wage; if the control and the treated samples are constructed correctly, then changes between periods 'unrelated to the minimum wage' should be picked up by $\left(\bar{Y}_{MW=0,T=1} - \bar{Y}_{MW=0,T=0}\right)$ which corresponds to the change in the outcome among the control group who by default would not have been impacted by the implementation of the minimum wage. In this way, the second term in the right-hand side of (2) nets out any other change between the pre-and-post policy period, leaving $\hat{\alpha}_3$ to be interpreted as a net impact of the minimum wage. The covariates entering X are included to adjust for possible systematic difference between samples that affect both the treatment and

[24] Once the specification is estimated by OLS regression, the conditional outcomes for each of the groups can be expressed as: $\bar{Y}_{MW=1,T=1} = \hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_2 + \hat{\alpha}_3 + X\hat{\beta}$; $\bar{Y}_{MW=1,T=0} = \hat{\alpha}_0 + \hat{\alpha}_2 + X\hat{\beta}$; $\bar{Y}_{MW=0,T=0} = \hat{\alpha}_0 + X\hat{\beta}$; $\bar{Y}_{MW=0,T=1} = \hat{\alpha}_0 + \hat{\alpha}_1 + X\hat{\beta}$. If covariates in X impact on Y irrespective of the policy regime – i.e., assuming that within the treated (and within the controls) the estimated coefficients in β remain constant – then the estimator $\hat{\alpha}_3$ would be obtained using expression (2).

the outcome. For example, gender: it is well known that men and women have different probability of wage employment as well as different probability of falling in the region of the minimum wage. In this respect, the variable 'gender' should be included when estimating the outcome 'wage employment'; omitting this variable ignores the systematic difference between groups and this could lead to biased estimates of the policy parameter $\hat{\alpha}_3$. On the other hand, including variables in X that could vary between the pre and the post policy periods is problematic because the change in these variables could in fact be endogenous to both the outcome Y and the treatment MW. [25] Therefore, the variables in X should only include covariates that are unambiguously exogenous to both the treatment and the outcome and, at the same time, are useful at explaining characteristics that could possibly determine systematic differences between wage workers in the treated group and those in the in the control group.

In terms of time periods, estimates of the policy parameter in (2) requires that the data includes a pre-policy and a post-policy period. In the case of Mauritius and considering that the minimum wage was first implemented in 1st of January 2018, any of the quarters in the year 2017 would be an adequate pre-policy period, while any of the quarter in the year 2018 would be considered an appropriate post-policy period. In fact, quarter-to-quarter comparison across these two years allows the estimation of (2) while controlling for seasonal effects. Thus, the empirical strategy – for anyone of the outcomes Y consists of estimating $\hat{\alpha}_{3,q}$ where $q = 1,2,3,4$. For example, $\hat{\alpha}_{3,1}$ identifies the effect of the minimum wage on Y in the first quarter of 2018. Together, the four parameters ($\hat{\alpha}_{3,q}$; $q = 1,2,3,4$) measure the impact of the minimum wage in Mauritius across the year 2018. Note that estimating the effect of the adjustment follows a similar procedure but, in this case, the post-policy year is 2019 (first adjustment occurred on the 1st of January 2019) and the pre-policy year is 2018.

One important aspect in the empirical strategy defined by (1) and (2) is that of distinguishing between the treated (MW=1) and the control (MW=0) among wage employees in the sample. When a policy applies to a particular geographic region in the country, or a specific group, the distinction is clear. In the case of Mauritius, the minimum wage was applied universally which means that in principle all wage employees fall in the treatment group and, therefore, there is not a natural control group. One way to solve this identification problem is to define the treated group as those who are more likely to be impacted by the policy, namely, the group of wage workers at the minimum wage and below in the year previous to the implementation (or the adjustment); in this report this group is identified as those wage workers (observed in the sample)

[25] For example, it could be that as result of the minimum wage an individual decides to change occupational categories since some of these – e.g., guard, care worker – are covered by the minimum wage but at a different rate. Likewise, the minimum wage differs between exporting and non-exporting enterprises, while some sectors – e.g., manufacturing – are more likely to be associated with exporting goods. Therefore, when the minimum wage was implemented (or adjusted) some individuals would have changed occupations, sectors or even their contractual conditions – e.g. hours worked –in order to benefit more from the minimum wage. Thus, these factors – occupational categories, economic sector, hours worked – could in fact be a function of the minimum wage. Including these in the right hand side implies including outcomes that are endogenous to the treatment which would lead to possibly biased estimates of the policy parameter.

with earnings at or below 1.05 times the minimum wage.[26] Once the minimum wage applies – i.e., in any of the quarters of 2018, which is defined as the post policy period – in theory, the complete sample of wage workers 'at or below the minimum wage' should receive (at least) the minimum wage. At the same time, wage workers who earn above the minimum wage in the pre-policy period (any of the quarters in 2017) would not necessarily see their outcomes affected by the policy and, therefore, wage workers with earnings higher than 1.05 times the minimum wage can be described as the group of wage workers that would act as controls in the population. One problem with such strategy is the presence of 'ripple effects': the unconditional descriptive analysis in section 2 seems to show there exists a group of workers that would have been impacted by the minimum wage with such workers making slightly above the minimum wage in the pre-policy period. If this is the case, the estimation process needs to consider such ripple effects and eliminate wage workers in the ripple-effect zone from the sample defined as the comparison group, i.e., the untreated or control sample must be net from those who are impacted by the minimum wage through ripple effects. Appendix 3 applies a counterfactual strategy to identify the ripple effect zone, showing that whereas there is clear minimum wage zone up to about 40 Rupees per hour (real terms), there is also a ripple effect zone between the minimum wage (from above) and 80 Rupees per hour (also in real terms). In this report we consider two comparison groups against which to compare the outcome of those treated by the minimum wage: The Reference Group 1 is that which excludes wage workers in the ripple effect zone thus including only comparison wage workers with hourly wages above 80 Rupees per hour; the Reference Group 2 allows all wage workers in the comparison group – i.e. wage workers earning above 1.05 times the minimum wage.

Finally, it is important to highlight the nature of the data and how this can serve to identify the impact of the minimum wage policy in a DD framework. The CMPHS is a quarterly dataset where each quarter provides an independent and representative sample of the population in Mauritius – using appropriate quarterly weights. This means that the data can be used pooling repeated cross-section over time.[27] Pooling repeated cross-sections has the advantage that all the data is

[26] The group of wage workers more likely to see their earnings modified as result of the policy are those whose earnings fall 'below' the minimum wage'. The report considers including also wage workers 'at' the minimum wage – previous to the implementation of the policy – because with the arrival of the policy this group should also experience an increase in real wages to upgrade up to the minimum wage in the post-policy period. In any case, the fraction of wage employees below the minimum wage in Mauritius in 2017 – 3rd quarter – was 22.9 per cent (see Table 1) while the fraction 'at' the minimum wage – i.e. with earning above 0.95 times the minimum wage and up to 1.05 times the minimum wage – is relatively small (5.8 per cent of all wage employees).

[27] The use of pool cross sections with ordinary least squares assumes that there is independence between samples over time while all observations should be drawn from an identical distribution. These assumptions affect the variance-covariance matrix (as opposed to affecting the coefficients) and has implications when making diagnostics and evaluating the significant of the coefficients – e.g., the significance of $\hat{\alpha}_3$, the policy parameter. In the case of the CMPHS a fraction of the sample is likely to be repeated between quarters in consecutive years due to the underlying panel structure. This means that the assumption of 'independent samples' could in part be violated, which would give rise to potential heteroscedasticity – the off-diagonals in the variance matrix is not zero, as required – and this would in turn jeopardize the analysis of significance. One way to solve this problem is to produce robust standard errors. On the other hand, it could be assumed that repeated cross sections are drawn from identical distributions since in our estimates we are comparing members of the population in Mauritius, a small country, between consecutive years: and there is no reason to believe that the distribution of the population (e.g., age,

used in estimation with pre- and post-policy samples each providing a true representation of the underlying population. However, those surveyed in the pre-policy period are not necessarily equal in characteristics compared to the sample in the post-policy period. This problem can be (at least) partly solved using conditional models that account for systematic difference (in characteristics) between the two periods and between the two samples (treated and controls) between the two periods. Alternatively, the CMPHS has a panel structure embedded in the data whereby a household is surveyed over two consecutive quarters, leaves the panel for the next two quarters, and then is surveyed for a further two quarters (in total, a household can appear over at most 16 months). For example, a household that is surveyed in January of 2017 (Q1), is also surveyed in April of 2017 (Q1), and then it is further surveyed in January and April of 2018 (Q1 and Q3 of 2018). The use of a panel provides a very powerful data structure for policy evaluation since the same person is observed before and after the implementation of the policy, which means that in practice some of the key characteristics of individuals remain identical between the pre and post-policy period.[28] The problem with a rotating panel structure is that of attrition, either because some households stop their participation or because the rotating nature implies that some households are not followed over the required period (the same quarters in adjacent years). For example, in 2017Q1 some households would already be in their fourth round – they would have participated for the first time in 2016Q1 – and would no longer appear in the required post policy period (i.e., 2018Q1). These households must be discarded in a panel structure and, although new incoming households would be of similar location and/or socio-economic background, throwing data away makes the sample shrink considerably which brings about problems in terms of inference. Having said this, the use of the panel structure is a must to identify employment effects among wage employees as result of the minimum wage. The section that follows shows there are problems when merging panels between periods that place a question mark in the results obtained by applying the panel to model specifications leading to estimates of (2). This will be described below in detail.

Employment effects

Estimating the effect of the minimum wage on the outcome 'employment among wage employees' necessarily requires a panel structure that allows a comparison of the variation of wage employment among such wage employees (the dependent variable) before and after the implementation of the minimum wage (or its adjustment). Pooling and comparing two independent cross sections would not serve the purpose because in the two time periods 'wage employment among wage employees' results in identical values of the outcome variable (Y=1) and, therefore, the outcome in the two periods cannot be contrasted for changes that may occur

education, gender) varies in significant ways between 2017 and 2018 or 2018 and 2019. The same issues should not be present when using the panel structure where all the independent variables are truly exogenous and causal to the outcome, as is the case in our analysis.

[28] In this case the inclusion of covariates in a conditional model help to control for systematic difference between the treated and the control sample, as opposed to having to control for difference between two independent samples over consecutive time periods.

as result of the policy.[29] Using panel data, on the other hand, allows observing all those who are wage employees in the pre-policy policy – for all of them, $Y_{i,2017}$=1 – and then observing how the wage employment outcome may have changed in the post policy period for same set of individuals (i.e., $Y_{i,2018}$ may no longer be 1 for all of them). Using panel data with two periods calls for a slightly different model structure of that displayed in (1). In the presence of a two-period panel identification relies on a first differenced equation that can be written as follows:

$$\Delta Y_{i2} = \alpha_1 T_{it} + \alpha_3 \{MW_{i2}\} + \Delta X_{i2}\beta + \Delta u_{it} \quad (3)$$

In expression (3) the binary outcome MT_{i2} equals 1 in the post-policy period to indicate individuals in the panel who were observed in the minimum wage region during the pre-policy period; MT_{i2} is zero for others so that $\Delta MW_i = MT_{i2}$. Thus, the policy parameter that measures the effect of the minimum wage on employment is $\hat{\alpha}_3$.In practice, in the presence of two time periods, estimating (3) is identical to estimating a fixed effect model which removes (observed and unobserved) fixed individual effects that could have determined selection into anyone of the treatment groups, for example, age (which is observed) but also unobserved outcomes such as innate ability which could determine the potential classification into the treated or control groups. Thus, in estimating (3) all variables that are fixed over time (e.g., gender, age, even education) automatically drop from the estimation process so that X includes only time varying variables that have could affect the outcome and the treatment. The automatic dropping of these variables pauses a problem because those in the minimum wage group are not a random sample with respect to such variables. For example, wage workers in the minimum wage group close to retirement age in 2017 may be observed in 2018 as 'out of the labour force' due to a simple transition from employed to retired – and not due to the implementation of the minimum wage. If we cannot control for age when estimating (3), and if there is an unequal representation in the panel of 'close to retirement wage workers' between the treated (at or below the minimum wage in 2017) and the control sample (those above the minimum wage in 2017), the estimate of the parameter $\hat{\alpha}_3$ could be overstated: similar arguments apply to other variables which are fixed over time such as gender or education, for example. Therefore, in the case of employment as outcome – or whenever there is a must to use the panel structure rather than repeated cross sections – the estimate process consists of applying propensity score matching to identify the average treatment effect on the treated (ATET). This method identifies the impact of the minimum wage on the outcome 'employment' – in practice, ATET results in estimates analogous to the parameter $\hat{\alpha}_3$ expressed in (2) and (3) – while allowing to control for covariates that would otherwise renders the sample of treated and non-treated systematically different. In particular, the method employs covariates that are truly exogenous to the treatment and the outcome, but which could explain both the treatment assignment in 2017 and the employment outcome in the

[29] In contrast, a panel structure that follows individuals over time – e.g., at the same quarter in consecutive years, as is the case with the CMPHS – is such that some of those two appear as wage employees in the first period (Y_{i0}=1) could in fact appear as 'other labour market status' in the post-policy period (Y_{i1}=0), while the treated and control groups could vary in outcomes between the two periods. It is this change in the outcome, and the contrast in outcomes between the two groups, which allows the identification of the policy parameter.

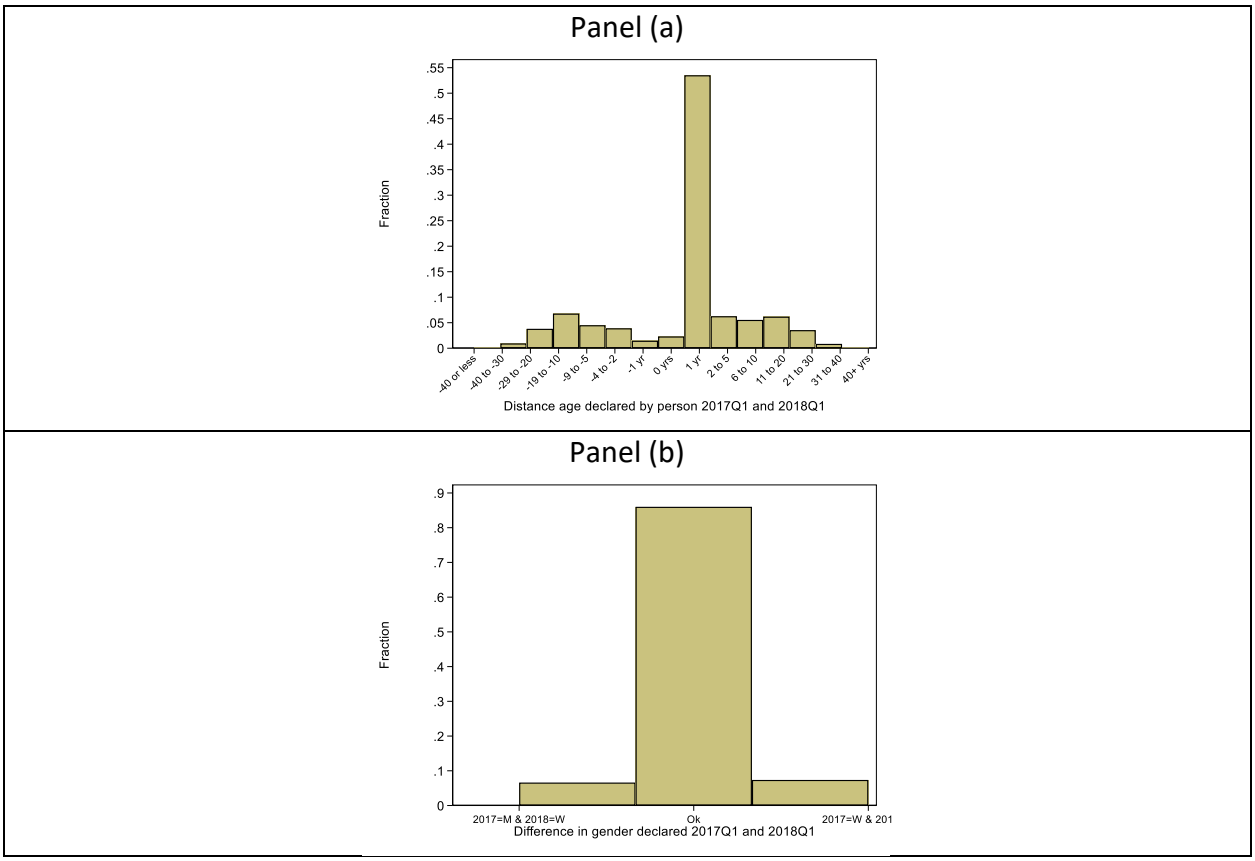
post policy period (i.e., throughout 2018).[30] The list of selected covariates to implement the method of ATET is the following: age, education, gender, geographic location, number of children in the household, number of adults in the household, dummy variable indicating if the individual is a parent, dummy variable indicating if the individual is married, average age of working age individuals in the household (excluding that of the individual) and proportion of actively employed in the household (excluding the working status of the individual). It can be argued that all these variables can impact on the employment of individuals in the post-policy period, as well as in the treatment assignment, while it is unlikely that these variables change 'as result of the policy'. Variables that could change between the pre and the post policy period as result of implementing the policy – and which are identified in the survey – are: occupational category; economic sector; part versus full time status at work; formal versus informal employment; the economic sector and the size of the enterprise for which the individual worked in 2017. All these variables are endogenous to the outcome and cannot be included in the selection of the counterfactual. However, it is possible to consider them in the analysis treating them as 'effect heterogeneity' and estimating an ATET for each of the categories for which they are defined (e.g., separating formal and informal wage employment and estimating the ATET parameter for each of the two categories).

Before proceeding with the analysis, it is important to highlight that the panel structure in the CMPHS is not necessarily reliable: if an individual is observed from one year to the next, clearly the change in his or her age should be 1; likewise, the gender declared in one year should be equal to that declared in the interview in the follow up year. Using the appropriate indicators to merge quarter-by-quarter datasets, as prescribed by the Mauritius National Statistic Office, figures 8 shows (taking 2017Q1 and 2018Q1 as example) a significant amount of incongruency regarding the value of the variables 'age' and 'gender' among individuals matched between periods in the panel structure. Panel (a) in figure 8 shows that only about 52 percent of the panel declare an age that is congruent between interviews – one year distance. Panel (b) shows that 85 percent of those interviewed declare the same gender between panels. If we consider only those individuals that are truly capture by the panel structure – they belong to the same household, have the same identification number, are one year older and keep the same gender between periods – then the sample drops to about 42 percent of its original size. Considering

[30] Estimating ATET consists of focusing attention on the employment outcome in each of the quarters in 2018. Allowing for variables such as age, education, gender, geographic location, experience, etc., the procedure estimates probability functions to compare those in the treated sample to those in the non-treated sample. Every observation in the treated sample is assigned a 'twin' member from the non-treated sample who shares similar characteristics in terms of age, education, gender, geographic region, experience, etc. It is assumed that the employment outcome of the twin would have been the employment outcome of the corresponding treated member had he or she not been in treated (i.e., had he or she not been subject to the minimum wage policy). Any member in the non-treated group (i.e., those with earnings above the minimum wage as observed in 2017) who are not assigned to a 'treated member' are automatically disregarded from the sample, thus giving higher weight to those in the non-treated sample whose characteristics are close to the characteristics of the treated sample. The employment outcomes in 2018 of the selected 'non-treated' constitute the 'counterfactual outcome' to the treated sample in the population in 2018. The ATET is estimates by comparing the actual share of wage employment among the treated sample in 2018 to the share of wage employment among the counterfactual sample. See Lechner and Vazquez-Alvarez (2011) for a practical example using ATET in a panel structure.

wage employees – the target population in this study – only 1,256 of the 3,113 originally observed in 2017Q1 are truly captured by the panel structure in 2018Q1. Thus, the results that follow in tables 2 to 11 must be taken with a significant amount of caution because the estimates and the policy implications are based on 40 percent of the wage employees in the population.

Figure 8: Coherence of Panel structure (Comparing answers of panel structure between 2017Q1 and 2018Q1



ILO estimates using the CMPHS for the periods 2017Q1 and 2018Q1. The merging between files to obtain the panel has been done using the following variables as supplied by Mauritius National Statistics Service: questno, hhno, month, indid, rotation, previntt, psu and demomemberno (where the latter is identified as memberno for 2017).

Table 2 shows estimates of the ATET – equivalent to the policy parameter in (3) – for each of the four quarters in 2018 (post-minimum wage application) considering the two reference groups: allowing and ignoring ripple effects, respectively. Tables 3 to 6 provides similar estimates as in tables 2 but for women and men separately (tables 3 and 4) and for wage employees in formal and informal employment (tables 5 and 6). In each of these tables the conditional estimates are presented alongside the unconditional ones: the latter simply compare the actual change in wage employment between the treated and the control sample.

Starting with table 2, and with reference to the estimates that excludes ripple effect workers, the results based on the use of the panel data suggest that the initial implementation of the minimum wage led to a decline in wage employment among wage employees at or below the minimum

wage of about 7.7 percent in the first quarter of 2018, and while this decline seems to turn into a increase in the second quarter (+5.5 percent) there are jet again drops in wage employment identified in the third and fourth quarters of 2018 (13 and 6.5 percent, respectively). Except for 2018Q3, estimating the impact separately for men and women (tables 3 and 4) shows that the minimum wage has reduced wage employment for the two groups (among those who are minimum wage earners) although the drop (in magnitude) is larger for women when compared to men. For example, in the fourth quarter of 2018 it is estimated that compared to women who earn 80 or more Rupees (i.e., women in the comparison group above the ripple effect zone) women observed at or below the minimum wage in 2017Q4 are 19 percent less likely to continue being observed in wage employment one year later. In the case of men, this estimated drop is 8.2 percent. Tables 5 and 6 estimate the effect of the minimum wage separately for wage employees in formal and informal employment, respectively. Overall formal employment seems to be positively impacted by the minimum wage whereas the results for wage employees in informal employment are mixed. Taking the fourth quarter of 2018 the estimates show all wage employees in formal employment – as observed in 2017Q4 – continue to be observed working as wage employees in 2018Q4, irrespective of whether they were impacted or not by the minimum wage (i.e., whether or not they were paid at or below the minimum wage – treated – or above 80 Rupees per hour – comparison group). Thus, luck of variation in the outcome variable in 2018Q4 implies that impact of the minimum wage is not identified, although no change in status would also imply no adverse effect of the minimum wage among this group with formal employment. This is not the case for informal wage employees with estimates showing that in 2018Q4, among those observed with earnings at or below the minimum wage in 2017Q4, about 6.9 percent would no longer be observed holding to wage employment.

Tables 2 to 6 is complemented with estimates where the comparison group includes those wage employees in the ripple effect zone, i.e., employees observed earnings at or above 80 Rupees per hour in any of the quarters in 2017. In all except three cases – except in 2018Q2 for all wage employees, 2018Q4 for men and 2018Q3 for wage employees in informal employment – the sign of the estimates is identical whether these include or exclude ripple effect workers. What varies between the two sets of estimates are the estimated magnitude of the impact. For example, estimates for 2018Q4 in table 2 (all wage employees) suggest that including workers in the ripple effects zone in the comparison group shrinks the estimated relative decline of employment among workers at or below the minimum wage from 6.5 percent to one of 1.4 percent. Thus, in 2018Q4 the minimum wage could have cause a decline in wage employment among workers in the ripple effect zone: once this declined is consider by including it in the comparison group and comparing estimates in the comparison group to the group most impacted by the minimum wage, the effect of the minimum wage on the latter shrinks to 1.4 percent – as opposed to 6.5 percent estimated when excluding ripple effect employees from the comparison group.

In practice, how do the estimates in tables 2 to 6 translate into overall employment changes as result of the minimum wage? At the end of the day, the estimated employment change – given that it is negative for just about all groups – is projected only among those at or below the

minimum wage. Considering the conditional estimates, allowing for employees in the ripple effect zone and taking 2018Q4 as reference quarter, there would have been an *overall* wage employment decline equal to 1.6 percent; 0.4 percent increase *among men*; 2.8 percent decline *among women*; no percent *change detected among* wage employees with *formal employment* and 0.3 percent decline *among those in informal employment*.[31] These estimates would imply a modest decline in wage employment as result of having implemented the minimum wage. However, since there are doubts about the construction of the panel structure, it is important to review these model-based estimates against the unconditional trends presented in section 2. Using the latter shows that the fraction of wage employees among the working are population were almost identical at 50.5 percent in 2017Q4 and 2018Q4. Considering that the size of the working age population and the size of wage employees has remained almost constant between each of the quarter of 2017 and 2018, this would suggest that the estimate of a 1.5 percent decline in wage employment in the overall population is probably an imprecise estimate that results from the restricted sample that remains in the panel between periods.

Table 2: Employment effects of the implementation of the minimum wage in January 2018 (Panel structure, ALL wage employees)

Exclude wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.088**	-0.13**	-0.16**	-0.10**
s.e	(0.002)	(0.002)	(0.002)	(0.002)
Conditional effect (ATET)	-0.077**	0.055	-0.13**	-0.065**
s.e	(0.005)	(0.008)	(0.006)	(0.005)
Observations	957	958	1100	1104
Including wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.08	-0.11	-0.14	-0.07
s.e	(0.002)	(0.002)	(0.002)	(0.002)
Conditional effect (ATET)	-0.10**	-0.056	-0.087**	-0.014**
s.e	(0.003)	(0.005)	(0.004)	(0.004)
Observations	1293	1368	1528	1571

ILO estimates using the CMPHS. Unconditional estimates are based on comparing the change in outcomes between periods between the treated and the non-treated samples. Conditional effects refers to the ATET using age, education, gender, marital status, geographic location, number of children and number of adults in the household,

[31] To arrive at these estimates the following applies: the conditional effect in 2018Q4 is -0.07, that is, the implementation of the minimum wage in January 2018, as measured by comparing treated versus non-treated wage employees shows that 7 percent *more* of those who were at or below the minimum wage in 2017Q4 would no longer be in wage employment when compared to those in wage employment but who were earnings above the minimum wage in 2017Q4. In 2018Q4 the panel structure shows that a total of 98,087 individuals are classified as 'treated', i.e., observed in 2017Q4 at or below the minimum wage. Thus, 7 percent of these amount to 6,866 individuals. These are the estimated number of wage employees that, treated by the minimum wage, are no longer in wage employment in 2018Q4. At the same time, the panel structure shows that there are a total of 429,721 wage employees in 2018Q4. Adding the 6,866 to the observed 429,721 amounts to 436,587; these is the bulk that would have been observed as wage employees in the absence of the minimum wage – assuming the correct estimates as provided by the panel structure. Thus, the decline in wage employment as result of the minimum wage equals 1.57 = (6,866÷436,587).

average age of working age household members (excluding the age of the individual) and proportion of working household members (excluding individual). The ATET estimator is based on propensity score matching through Logit regression, allowing for as many as 5 neighbourhood matches per individual, with variance estimated assuming individuals in each quarter of 2018 to be independently and identically distributed. Standard errors (s.e.) in brackets. ** Significance at 5 percent, * Significance at 10 percent

Table 3: Employment effects of the implementation of the minimum wage in January 2018 (Panel structure, MEN wage employees)

Exclude wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.08	-0.12	-0.14	-0.06
s.e	(0.002)	(0.003)	(0.002)	(0.002)
Conditional effect (ATET)	-0.09**	-0.12**	-0.16**	-0.082
s.e	(0.006)	(0.008)	(0.011)	(0.009)
Observations	552	522	641	636
Including wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.080	-0.10	-0.13	-0.034
s.e	(0.002)	(0.003)	(0.002)	(0.002)
Conditional effect (ATET)	-0.07**	-0.032	-0.12**	0.024
s.e	(0.005)	(0.007)	(0.005)	(0.006)
Observations	757	783	918	962

ILO estimates using the CMPHS. See footnote in table 2 for details

Table 4: Employment effects of the implementation of the minimum wage in January 2018 (Panel structure, WOMEN wage employees)

Exclude wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.10**	-0.14**	-0.17**	-0.15*
s.e	(0.003)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.17**	0.13**	-0.16**	-0.19**
s.e	(0.007)	(0.01)	(0.009)	(0.008)
Observations	405	436	459	468
Including wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.09*	-0.12*	-0.14**	-0.11
s.e	(0.002)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.10**	0.035**	-0.072**	-0.10**
s.e	(0.005)	(0.007)	(0.006)	(0.005)
Observations	536	585	610	609

ILO estimates using the CMPHS. See footnote in table 2 for details

Table 5: Employment effects of the implementation of the minimum wage in January 2018 (Panel structure, wage employees in FORMAL employment)

Exclude wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	0.011	-0.013	0.006	0.003
s.e	(0.001)	(0.01)	(0.0005)	(0.0003)
Conditional effect (ATET)	0.006**	-0.014**	0.013**	N.I
s.e	(0.001)	(0.009)	(0.002)	-
Observations	540	421	494	523
Including wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	0.007	0.008**	0.003	0.003**
s.e	(0.001)	(0.0006)	(0.0003)	(0.0003)
Conditional effect (ATET)	N.I	-0.002	N.I	N.I
s.e	-	(0.002)	--	--
Observations	646	576	652	676

ILO estimates using the CMPHS. See footnote in table 2 for details. The status of 'formal employment' is identified in the pre-policy period. N.I = not identified due to a lack of 'formal' wage employees in the treated region in 2018Q1.

Table 6: Employment effects of the implementation of the minimum wage in January 2018 (Panel structure, wage employees in INFORMAL employment)

Exclude wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.03**	-0.03*	-0.12**	-0.03*
s.e	(0.002)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.041**	0.076**	0.099**	-0.069
s.e	(0.007)	(0.008)	(0.01)	(0.007)
Observations	425	449	496	478
Including wage employees in ripple effect zone	2018Q1	2018Q2	2018Q3	2018Q4
Unconditional effect	-0.072**	-0.019	-0.15**	-0.025
s.e	(0.037)	(0.038)	(0.04)	(0.037)
Conditional effect (ATET)	-0.016**	0.002	-0.046**	-0.013**
s.e	(0.006)	(0.006)	(0.007)	(0.006)
Observations	532	593	643	638

ILO estimates using the CMPHS. See footnote in table 2 for details. The status of 'informal employment' is identified in the pre-policy period.

Whereas the minimum wage was first implemented in January 2018, the first adjustment to the policy occurred in January 2019. Following the same procedure as that leading to the estimates of tables 2 to 6, tables 7 to 11 show the impact assessment of this first adjustment. In this case the pre- and post-adjustment periods are for each of the quarter of 2018 and 2019, respectively. Unfortunately, there is still a need to use the panel structure to aim at estimating the impact of such a policy change. Therefore, the estimates displayed in tables 7 to 11 also need to be cautiously review because the problem is the same as above: only about 40 percent of the panel

remains observed between quarters of adjacent years with a significant fraction of individuals in the panel that show incongruency in age and gender between periods.

Tables 7 to 11 show results that are like those observed in tables 2 to 7. Accordingly, the panel structure seems to pick up a negative impact of the adjustment on the wage employment of those whose earnings are at or below the minimum wage in each of the quarters of 2018. It is important to emphasise that after the implementation of the minimum wage in 2018 it should be the case that all wage employees receive earnings at or above the minimum wage, by law. However, as table 1 clearly shows, there are still wage employees that are not paid the minimum wage in 2019 although, as it is also clear from such table, the incidence of non-compliance has clearly declined between the first implementation of the minimum wage and the first year of the adjustment in 2019. Thus, comparing the wage employment rate of those earning above the minimum wage in 2018 – with or without including wage employees in the ripple effect zone – to those who received less than or equal to the minimum wage in each of the quarters of 2018, the employment outcome of the latter, at any given quarter of 2019, would have declined. In this case the magnitude of the impact seems to be smaller among women when compared to men and, in fact, in the last quarter of 2019 (2019Q4) women the wage employment rate of women at or below the minimum wage is estimated at 8.4 percent higher when compared to the wage employment observed in 2019Q4 among women earning higher than 80 Rupees per hour (i.e., above the ripple effect zone). The comparison between wage employees with formal and informal employment does not seem to detect a difference in the sign of the impact of the minimum wage between them – in both groups there is a decline in wage employment among those at or below the minimum wage in comparison with the reference groups. However, the magnitude of the decline among wage employees with informal employment is larger.

Table 7: Employment effects of the first adjustment of the minimum wage in January 2019 (Panel structure, ALL wage employees)

Exclude wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.16**	-0.14**	-0.14**	-0.15**
s.e	(0.002)	(0.002)	(0.002)	(0.002)
Conditional effect (ATET)	0.025**	-0.081**	0.057**	-0.15**
s.e	(0.009)	(0.007)	(0.011)	(0.007)
Observations	766	679	709	721
Including wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.16**	-0.13**	-0.13**	-0.13**
s.e	(0.002)	(0.002)	(0.002)	(0.002)
Conditional effect (ATET)	-0.13**	-0.12**	-0.010*	-0.099**
s.e	(0.005)	(0.005)	(0.006)	(0.004)
Observations	1,185	1,034	1,121	1,180

ILO estimates using the CMPHS. See footnote in table 2 for details

Table 8: Employment effects of the first adjustment of the minimum wage in January 2019 (Panel structure, MEN wage employees)

Exclude wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.17**	-0.083**	-0.067**	-0.16**
s.e	(0.003)	(0.003)	(0.003)	(0.002)
Conditional effect (ATET)	-0.12**	N.I	-0.019**	-0.16**
s.e	(0.01)	--	(0.008)	(0.009)
Observations	442	400	419	438
Including wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.18**	-0.083**	-0.058**	-0.14**
s.e	(0.003)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.17**	N.I	-0.05**	-0.084**
s.e	(0.006)	--	(0.007)	(0.006)
Observations	724	629	689	732

ILO estimates using the CMPHS. See footnote in table 2 for details. N.I = not identify due to lack in the variation of outcomes – between treated and comparison sample – in the post-policy period.

Table 9: Employment effects of the first adjustment of the minimum wage in January 2019 (Panel structure, WOMEN wage employees)

Exclude wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.16**	-0.19**	-0.23**	-0.15**
s.e	(0.004)	(0.004)	(0.004)	(0.003)
Conditional effect (ATET)	-0.095**	N.I	-0.085**	0.083**
s.e	(0.012)	--	(0.024)	(0.013)
Observations	324	279	290	283
Including wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.14**	-0.16**	-0.20**	-0.11**
s.e	(0.003)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.079**	N.I	-0.084**	-0.084**
s.e	(0.007)	--	(0.009)	(0.006)
Observations	461	405	432	448

ILO estimates using the CMPHS. See footnote in table 2 for details. N.I = not identify due to lack in the variation of outcomes – between treated and comparison sample – in the post-policy period.

Table 10: Employment effects of the first adjustment of the minimum wage in January 2019 (Panel structure, wage employees in FORMAL employment)

Exclude wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.05**	-0.066**	-0.090**	-0.088**
s.e	(0.003)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	0.072**	0.013	-0.091**	-0.124**
s.e	(0.013)	(0.009)	(0.014)	(0.007)
Observations	359	335	363	350
Including wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	0.007**	-0.008**	0.003**	0.003**
s.e	(0.001)	(0.001)	(0.0003)	(0.0003)
Conditional effect (ATET)	0.037**	-0.02**	-0.0083	-0.056**
s.e	(0.005)	(0.006)	(0.007)	(0.005)
Observations	660	661	742	791

ILO estimates using the CMPHS. See footnote in table 2 for details. The status of 'formal employment' is identified in the pre-policy period. N.I = not identified due to a lack of 'formal' wage employees in the treated region in 2018Q1.

Table 11: Employment effects of the first adjustment of the minimum wage in January 2019 (Panel structure, wage employees in INFORMAL employment)

Exclude wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.055**	-0.069**	-0.15**	-0.09**
s.e	(0.002)	(0.003)	(0.003)	(0.003)
Conditional effect (ATET)	-0.029**	N.I	0.086**	-0.188**
s.e	(0.014)	--	(0.015)	(0.017)
Observations	425	449	496	478
Including wage employees in ripple effect zone	2019Q1	2019Q2	2019Q3	2019Q4
Unconditional effect	-0.027**	-0.026**	-0.12**	-0.028**
s.e	(0.002)	(0.003)	(0.003)	(0.002)
Conditional effect (ATET)	-0.14**	N.I	-0.023**	-0.15**
s.e	(0.008)	--	(0.010)	(0.006)
Observations	532	593	643	638

ILO estimates using the CMPHS. See footnote in table 2 for details. The status of 'informal employment' is identified in the pre-policy period. N.I = not identify due to lack in the variation of outcomes – between treated and comparison sample – in the post-policy period.

The analysis provided by tables 2 to 11 – impact of the minimum wage and its adjustment – are based on model structures that aim at identifying the effect of the policy on wage employment. What the analysis does not do is to estimate actual changes in labour market outcomes in 2018 among those individuals that are observed as wage employees in 2017. For example, tables 6 and 11 seem to identify that the minimum wage did reduce the incidence of informal employment among those who were most affected by the minimum wage (the treated). But then, what was the labour market outcome in 2018 of those who are no longer wage employees in that year but

who were so in wage informal employment in 2017? Also, although treated wage employees in informal employment in 2017 might continue to be observed as wage employees in 2018, are they in formal or are they in informal wage employment? And are there similarities in the change of labour market outcomes between the treated and the untreated sample?

To answer these questions, figure 9 shows the distribution between labour market status in each quarter of 2018 of individuals observed as wage employees in 2017 – again, necessarily relying on the panel structure and its potential weaknesses. The figure separates formal and informal employment and provides the distribution at each of the quarters of 2018 for the treated (columns 1 to 4) and the untreated sample (columns 5 to 8). Table 12 complements figure 12 providing a statistical comparison to estimate if there are significant differences in the change of labour market status between the two samples – the treated and untreated. For example, the first column in table 12 shows that 89.9 per cent of wage employees observed in the treated sample in formal employment in 2017 were still wage employees in the first quarter of 2018 (2018Q1) – 77.6 percent in formal employment and 12.3 percent in informal employment. In the case of the untreated sample the percentage who were still wage employees in 2018Q1 were 94.4 percent – 84.5 percent in formal employment and 9.9 percent in informal employment. Thus, comparing the two samples in the panel shows that among the treated in 2018Q1 there were 4.5 percent fewer wage employees than among the untreated sample. This difference, however, is not statistically significant: column 9 of table 12 shows that once we weight the difference of 4.5 by the estimated variance (i.e., the estimated t-value), the ratio equal -0.06. This very small value must be interpreted to suggest that the sample is too small – therefore the variance in estimation potentially too large – to assume that the 4.5 difference is a significant difference between the two samples.

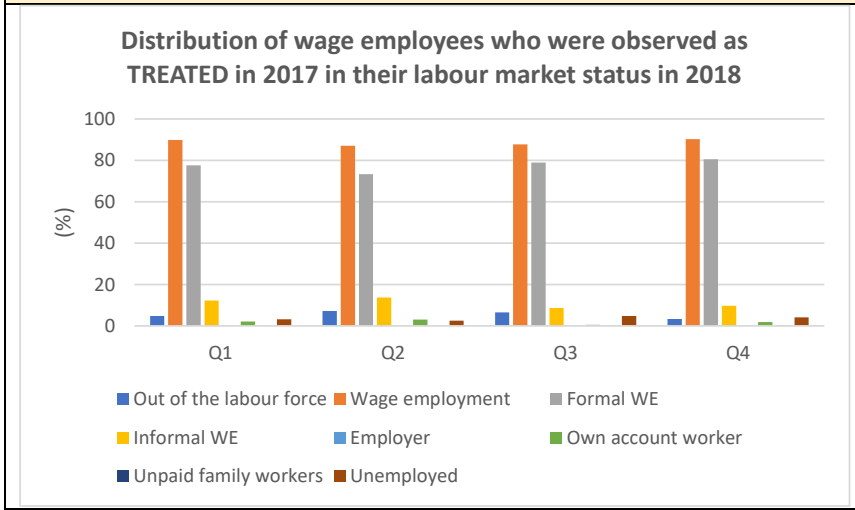
In fact, a review of the tests' results in table 12 – either among wage employees in formal employment or informal employment – shows that there is no statistical difference between the treated and untreated distribution of the 2017 sample of wage employees as observed in 2018. In the case of formal wage employees (as observed in 2017) whether treated or untreated, the shift from wage employment (2017) to other status – out of the labour force, own account worker, employer or unemployed – is small, while in both cases they finish the period (2018Q4) with a similar fraction of wage workers in 2017 observed as continuing to be wage workers in 2018 (80.4 and 84.6 percent, respectively). Based on these evidences it cannot be concluded that the minimum wage caused a shift of those wage workers most affected by the policy (the treated) towards non-wage employment since both, the treated and the non-treated show declining shares in wage employment that are not statistically different one year after the minimum wage was implemented.

In the case of informal employment (from the point of view of 2017), and compared to the untreated sample, there fewer wage employees in the treated sample that remain as wage employees in the post policy period: among the treated sample there are about 70 to 75 percent that hold on to wage employment across 2018 whereas in the untreated sample the estimate is around 90 percent across quarters. But again, the t-values show that the data is too small to conclude that the differences (between quarters) are statistically different. One very interesting observation is that among the treated sample who were in wage informal employment in 2017,

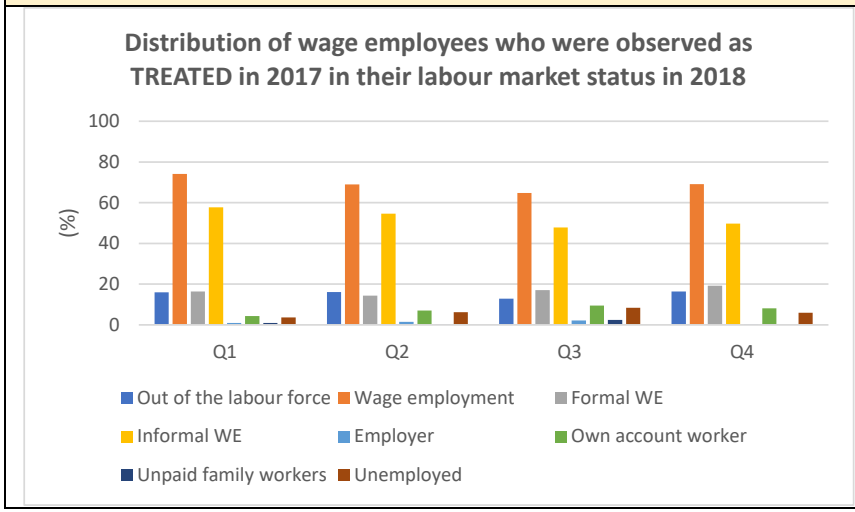
and in comparison with the untreated sample, there is a greater chance to switch towards formal employment in the post policy period. For example, table 12 shows that 19.3 percent of the treated sample in informal wage employment in 2017 are observed in formal employment in 2018Q4; among the untreated sample in informal wage employment in 2017 only 10.8 percent managed to switch to formal wage employment in 2018Q4. Again, the t-values that contrast the difference in shares between samples would suggest that there is no statistical difference. However, just looking at those who would have been more impacted by the minimum wage the evidence in table 12 would suggest that the implementation of the minimum wage has not played an adverse role in the formalization of the informal economy among the low paid wage employees in Mauritius.

Figure 9: **Distribution between labour market status in each quarters of 2018 of individuals observed as wage employees in 2017 (Panel members only).**

FORMAL WAGE EMPLOYEES in 2017



INFORMAL WAGE EMPLOYEES in 2017



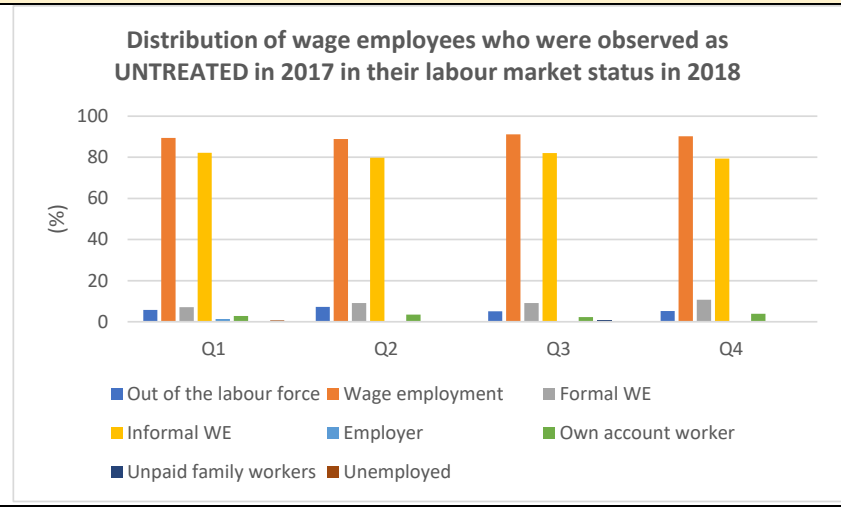


Table 12: Distribution between labour market status in each quarters of 2018 of individuals observed as wage employees in 2017 (Panel members only). Testing the significant difference between independent samples (quarter-by-quarter)

FORMAL WAGE EMPLOYEES AS OBSERVED IN 2017	TREATED SAMPLE (i.e., at or below the Minimum Wage in 2017)					UNTREATED SAMPLE (i.e., at or above 80 Rupees per hour in 2017)					Testing significant difference between estimated means between the two independent samples (t-values)			
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4
Out of the labour force	4.8	7.3	6.6	3.4		2.6	1.02	3.4	4.0		0.06	0.13	0.07	-0.02
Wage Employee	89.9	87.1	87.7	90.4		94.4	93.2	94.1	92.5		-0.06	-0.07	-0.08	-0.03
… of which FORMAL	77.6	73.4	79.0	80.5		84.5	78.8	80.3	84.6		-0.05	-0.03	-0.01	-0.03
… of which INFORMAL	12.3	13.7	8.7	9.8		9.9	14.4	13.8	7.9		0.03	-0.01	-0.06	0.03
Employer	0	0	0	0		1.0	1.4	0.4	0.3		-0.17	-0.17	-0.18	-0.17
Own account worker	2.2	3.1	0.6	1.9		0.9	4.6	1.9	1.6		0.08	0.06	-0.11	0.02
Unpaid family worker	0	0	0.2	0.3		0.2	0	0	0		-0.17	--	0.15	0.16
Unemployed	3.2	2.6	4.8	4.2		1.0	1.8	0.22	1.7		0.1	0.04	0.15	0.10
Sample size	216	196	230	267		284	271	306	280					

ILO estimates using the balanced sample of the CMPHS 2017-2018. The estimates are based on following the sample of wage employees observed in each of the quarters of 2017 and 2018, if and only if there is congruency between age and gender of individuals between the two adjacent years. The treated sample are those whose earnings fall at or below 1.05 times the minimum wage (real terms) as observed in 2017. The untreated (or control group) are those whose earnings fall at or above 80 Rupees per hour in real terms in 2017 – thus excluding individuals in the ripple effect zone whose labour market outcomes might have also been affected by the minimum wage. Each column (by quarters) adds up to 100. The test in columns 9 to 12 estimate if the there is a statistical difference in the percentages (distribution) between the treated and the untreated sample, at each quarter and for each labour market outcome. Since the two samples are independent the estimated t-values are estimated taking the difference between proportions and weighting such difference by the standard error of the difference between two independent sample means, that is, $t-test = (P_t - P_u) / \sqrt{\left(\frac{(p_t \cdot (1-p_t))^2}{n_t}\right) + \left(\frac{(p_u \cdot (1-p_u))^2}{n_u}\right)}$ where p_t *and* p_u are the fractions of the treated and untreated samples in same labor market status but different years (same quarters), whereas n_t *and* n_u are the sample sizes for each of the two samples, respectively. A t-value which is less than 2 in absolute terms (either negative or positive) indicates no statistical difference between sample means. For example, 89.9 percent of the treated sample (at or below the minimum wage) in 2017 remain as wage employees in the first quarter of 2018; in the case of the untreated sample (above 80 Rupees per hour) this percent is 94.4. The difference is 4.5 percent; that

is, in 2018Q1 4.5 percent more untreated remain as wage employees compared to the share among those classified as treated. Considering the pool standard error – the denominator in the formula for the t-test – the t-value equal -0.06, which is less than the value of 2 (in absolute terms). This means that the sample size is not sufficiently large to ascertain that 4.5 is statistically significant. Therefore, there is no statistical difference between the treated and the untreated in the share that remains as wage employees one year after the implementation of the minimum wage.

Table 12, continued

INFORMAL WAGE EMPLOYEES AS OBSERVED IN 2017	TREATED SAMPLE (i.e., at or below the Minimum Wage in 2017)					UNTREATED SAMPLE (i.e., at or above 80 Rupees per hour in 2017)					Testing significant difference between estimated means of the two independent samples			
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4
Out of the labour force	16.0	16.1	12.9	16.4		5.7	7.3	5.1	5.3		0.1	0.08	0.10	0.11
Wage Employee	74.1	69.0	64.8	69.1		89.3	88.8	91.2	90.1		-0.1	-0.12	-0.17	-0.14
… of which FORMAL	16.4	14.4	17.0	19.3		7.2	9.1	9.1	10.8		0.08	0.05	0.08	0.07
… of which INFORMAL	57.7	54.6	47.8	49.8		82.1	79.7	82.0	79.4		-0.12	-0.12	-0.19	-0.15
Employer	1.0	1.5	2.1	0.3		1.4	0	0.3	0.2		-0.04	0.14	0.13	0.04
Own account worker	4.4	7.0	9.5	8.2		2.8	3.6	2.3	3.98		0.04	0.07	0.13	0.08
Unpaid family worker	0.9	0.3	2.4	0		0	0	0.9	0		0.13	0.14	0.09	--
Unemployed	3.6	6.2	8.4	6.0		0.7	0.3	0.2	0.4		0.11	0.14	0.17	0.15
Sample size	174	204	242	215		267	215	280	342					

ILO estimates See footnote in previous part of the table.

4 Conclusions (executive summary)

On January 1st 2018 Mauritius implemented a universal statutory minimum wage system to cover all wage employees in the country. Although the level of the minimum wage varied according to some of the worker's characteristics (see Appendix 2) no group was excluded from the policy providing a floor that ranged from about 28 Rupees per hour (part-time watchperson) to about 43.6 Rupees per hour for a full-time worker in a non-exporting enterprise. Since the minimum wage was first implemented it has been regularly adjusted every 1st of January of each year, including in January 2021.

The Mauritius National Wage Consultative Council (NWCC), a tripartite consultative body linked to the Ministry of Labour, asked the International Labour Organization (ILO) for technical assistance to provide an impact assessment of the minimum wage in the country. This report has been produced in response to such a request and provides a comprehensive set of estimates that aim at describing multiple outcomes after the implementation of the minimum wage (section 2) and to test the effect of the minimum wage on the employment outcome among wage employees (section 3).

The data used for the analysis is the Continuous Multipurpose Household Survey (CMPHS) considering the year 2017 as the pre-policy period, the year 2018 as the post-policy period and the year 2019 as the (first) post-adjustment period. The data, which is representative at each quarter of the year, has been provided by the Mauritius National Statistics Office.

Unconditional estimates: a positive picture

The unconditional estimates in section 2 reveal that, overall, there has not been an adverse effect of the minimum wage among wage employees or for the outcome of wage employees (workers in general) in the population. The proportion of wage employees – relative to the working age population – increased from about 49 percent in 2017 to about 52 percent in 2019. Comparing the relative share of women and men the estimates show no statistical difference between 2017 and 2019: women accounted for about 40 percent of wage employees in 2017 and are observed to account for 41 percent in 2019. However, considering only women – of working age – there has been a significant increase in their representation as wage employees. Thus, whereas in 2017 only 39 percent of working age women were wage employees, this share has increased to 41 percent in 2019.

The data shows that there has also been a real increase in both hourly wages and monthly earnings. In the case of hourly wages these increased by 8.8 percent in real terms, from 102 to 111 Rupees per hour between 2017 and 2019. Monthly earnings also increased in real terms, in this case by 5.9 percent between 2017 and 2019 reaching 17,933.2 Rupees per month on average

in 2019. The increase in real earnings was different between women and men: in the case of women real hourly wages increased by 12.1 percent from 93.4 to 105.3 Rupees per hour between 2017 and 2019, whereas in the case of men the increase was smaller (6.1 percent) but starting from a higher hourly wage of 107.6 Rupees per hour in 2017 to reach 114.2 on average per hour in 2019. Considering that women are more likely than men to be located at the low end of the wage distribution – 54 percent of wage workers at or below the minimum wage in 2017 were women, despite the fact they only amount to 40 percent of wage employees – the observed higher wage increase in the period 2017-2019 would indicate they are likely to be the group that has benefited the most from the implementation of the minimum wage. The higher increase in real earnings for women relative to men has also brought about a decline in the gender pay gap: various estimates show the hourly wage gender pay gap has declined from about 15 in 2017 to about 11 percent in 2019.

Another indicator that points to the positive effect of the minimum wage in contributing to the real increase in the average hourly wage and average monthly earnings is that of a decline in wage inequality. The Palma Ratio, which measures the share of monthly earnings of the top 10 percent wage earners divided by that of the bottom 40 percent, shows a decline from 1.91 in 2017 to 1.51 in 2019. This means that whereas in 2017 the top 10 percent earned on aggregate 91 percent more than the bottom 40 percent, in 2019 this distance had dropped to 51 percent. The estimates show that almost half of the bottom 40 percent of wage employees in 2017 were in fact receiving wages at or below the minimum wage. It could be stated that thanks to the minimum wage there has been a decline in wage inequality in the country. Considering that wages income amount – on aggregate – to about 68 percent of total household income in Mauritius (taking 2017 as reference year) it is very likely that the minimum wage, through increasing the earnings of wage employees at the bottom end of the wage distribution, will have reduced household income inequality in the country.

The estimates seem to indicate the presence of ripple effects among wage employees above but in the neighborhood of the minimum wage. Thus, after the implementation of the minimum wage in 2018, the data shows a shift of those below the minimum wage towards the range of values at which the minimum wage is defined, as one would expect. However, there is also a shift of workers in deciles above but close to the minimum wage to become located at higher deciles. Among those that shift to higher locations there are probably wage employees that were previously earning the minimum wage. As they see their relative earnings decline – relative to other wage employees in the same enterprise, industry or sector – it is likely that they aim at negotiating higher wages to keep up the wage scale with other co-workers. According to the estimates (see appendix 3) the ripple effect zone goes from about 45 Rupees per hour to about 80 Rupees per hour.

Despite the positive outcomes observed after the implementation of the minimum wage (in 2018) and during its first adjustment (2019), the data continues to show a fraction of wage

employees whose earnings are below the minimum wage in the third quarter of 2019 – almost two years after the implementation of the law. Considering the full population – women and men – in total about 14 percent of wage employees were earning below the minimum wage in 2019. However, more women compared to men still earn below the minimum wage: 20 percent of women (among women) and 9.1 percent of men (among men) are earning hourly wages below the minimum wage. This percentage is greater if estimated among wage employees in informal employment. Among these, 23 percent of women (among women) and 11 percent of men (among men), earn below the minimum wage. Having said this, it is important to highlight that although informal employment remains high in Mauritius (43 percent among women, 44 percent among men), the data does not detect a major increase in informal employment neither after the implementation of the minimum wage nor after it was first adjusted in 2019. Thus, whereas in 2017 informal employment among wage employees was about 42 percent, the estimates show these percent to have increased to 44 percent in 2019.

Conditional estimates: uncertainty considering the panel structure

Unconditional estimates provide a good measure of what *actually* happened, but do not necessarily measure what happened *as result of the minimum wage*. For that it is important to produce model-based estimates that can distinguish how the minimum wage impacted among those affected by the policy – i.e. those who were observed at or below the minimum wage in the pre-policy period – in comparison to those wage employees that would not have been impacted by the minimum wage – i.e., those wage earners with outcomes affected by the same economic context, but with earnings well above the minimum wage and, therefore, not affected by the implementation of the policy.

These model-based estimates require the use of panel data, that is, observing the same individual in two distinct points in time: one before the implementation of the policy (e.g., in any of the quarter of 2017) and one after the implementation of the policy (e.g., in any of the quarter of 2018, preferably in the same quarter as observed in 2017 to control for seasonal effects). Although the CMPHS provides a panel structure, the procedure leading to the match of households and individuals between quarters (between 2017 and 2018, or between 2018 and 2019) is not ideal. The result of the match shows that only about 54 percent of the matched sample are one year old in the post policy period – thus 46 percent show ages that are not congruent with the matching process. For example, about 12 percent of the match sample are such that their ages vary between the two adjacent years in the order of 10 to 19 years. Likewise, a checking of the congruency of the variable 'gender' shows that about 17 percent of the panel declare a different gender in consecutive interviews. According to our investigations, it seems that the code that are given to interviewed members within a household (number 1, 2, 3, etc.) is not kept in subsequent periods. In other words, it is not possible to use this code to find out who is who in the next round of interviews unless the code is used with variables that help pin down true matches between periods. Considering only those individuals that are congruently declaring

gender and age between interviews, the remaining sample in the match panel drops to about 40 percent. The report refers to this sample as the 'congruent panel sample'

The report considers these congruent panel sample to provide model-based estimates to identify the effect of the minimum wage on wage employment in 2018 (impact of the minimum wage) and in 2019 (adjustment of the minimum wage). Accordingly, the estimates would suggest that there has been a modest negative impact of the minimum wage among those that would have been affected by the minimum wage. Thus, considering these conditional estimates, allowing for employees in the ripple effect zone and taking 2018Q4 as reference quarter, there would have been an *overall* wage employment decline equal to 1.6 percent; 0.4 percent increase *among men*; 2.8 percent decline *among women*; no percent *change detected among* wage employees with *formal employment* and 0.3 percent decline *among those in informal employment*. The estimates, therefore, would imply a modest decline in wage employment as result of having implemented the minimum wage. However, since there are doubts about the construction of the panel structure, it is important to review these model-based estimates against the unconditional trends presented in section 2. Using the latter shows that the fraction of wage employees among the working are population were almost identical at 50.5 percent in 2017Q4 and 2018Q4. Considering that the size of the working age population and the size of wage employees has remained almost constant between each of the quarter of 2017 and 2018, this would suggest that the estimate of a 1.5 percent decline in wage employment in the overall population is probably an imprecise estimate that results from the restricted congruent sample that remains in the panel between periods. The estimates that reflect the impact of the adjustment period (2018 versus 2019 panel structure) are similar in nature and magnitude as those obtained when estimating the impact of implementing the minimum wage (2017 versus 2018).

As a final exercise, the report estimates – once more, using the congruent panel structure – the distribution of wage employees observed in the pre-policy period (2017) in their labour market outcome as observed in 2018. After all, the impact evaluation – or the unconditional outcomes – can only provide information on wage employment versus non-wage employment, but are not informative on what happens to those who were observed as wage employees in 2017 and are no longer observed as such in 2018. Likewise, the unconditional estimates or the model-based estimates may show a decline in wage employment among informal wage employees after the minimum wage, but is not informative about the status 'formal' or 'informal' among those who remain in wage employment. Thus, the final empirical evidence in section 3 shows the distribution between labour market status in each quarter of 2018 of individuals observed as wage employees in 2017, separating formal and informal employment and comparing outcomes between those impacted by the minimum wage those who were not impacted by the minimum wage. The comparison is complemented with a statistical contrast (a test) to estimate if there are significant differences in the change of labour market status between the two samples – those affected and those not affected by the minimum wage. These estimates are presented for each of the quarters in 2018. For example, 89.9 per cent of wage employees observed at or below the

minimum wage in formal employment in 2017 were still wage employees in the first quarter of 2018 (2018Q1) – 77.6 percent in formal employment and 12.3 percent in informal employment. In the case of those earning above the minimum wage, the percentage who were still wage employees in 2018Q1 were 94.4 percent – 84.5 percent in formal employment and 9.9 percent in informal employment. Thus, comparing the two samples in the panel shows that among the lowest paid 2018Q1 there were 4.5 percent fewer wage employees than among the highest paid (not affected by the policy). This difference, however, is not statistically significant: the sample is too small – therefore the variance in estimation potentially too large – to assume that the 4.5 difference is a significant difference between the two samples. This is in part an inherited problem from the panel structure which remains congruent between periods, but too small to make reliable policy inferences.

Overall, the estimates in this last empirical exercise shows that the difference between the distribution of the two samples – affected and not affected by the minimum wage – as observed in 2018 is not statistically significant. Among formal wage employees (as observed in 2017) both groups finish the period (2018Q4) with a similar fraction of wage workers in 2017 observed as continuing to be wage workers in 2018 (80.4 and 84.6 percent, respectively). Based on this evidence it cannot be concluded that the minimum wage caused a shift of those wage workers most affected by the policy (at or below the minimum wage) towards non-wage employment since both groups show declining shares in wage employment that are not statistically different one year after the minimum wage was implemented.

In the case of informal employment (from the point of view of 2017), and compared to the higher earners in the sample, there are fewer wage employees in the low earning sample that remain as wage employees in the post policy period: among those at or below the minimum wage here are about 70 to 75 percent that hold on to wage employment across 2018 whereas in the higher earning sample the estimate is around 90 percent across quarters. But again, the t-values show that the data is too small to conclude that the differences (between quarters) are statistically different. One very interesting observation is that among those that would have been affected by the minimum wage and who were in wage informal employment in 2017 and comparing with higher wage earners also in informal employment, there is a greater chance to switch towards formal employment in the post policy period. For example, 19.3 percent of those at or below the minimum wage in informal wage employment in 2017 are observed in formal employment in 2018Q4; among the higher earners in informal wage employment in 2017 only 10.8 percent managed to switch to formal wage employment in 2018Q4. Again, the t-values that contrast the difference in shares between samples would suggest that there is no statistical difference. However, just looking at those who would have been more impacted by the minimum wage the evidence would suggest that the implementation of the minimum wage has not played an adverse role in the formalization of those with informal employment and who, at the same time, were observed as low paid wage employees in the pre-policy period.

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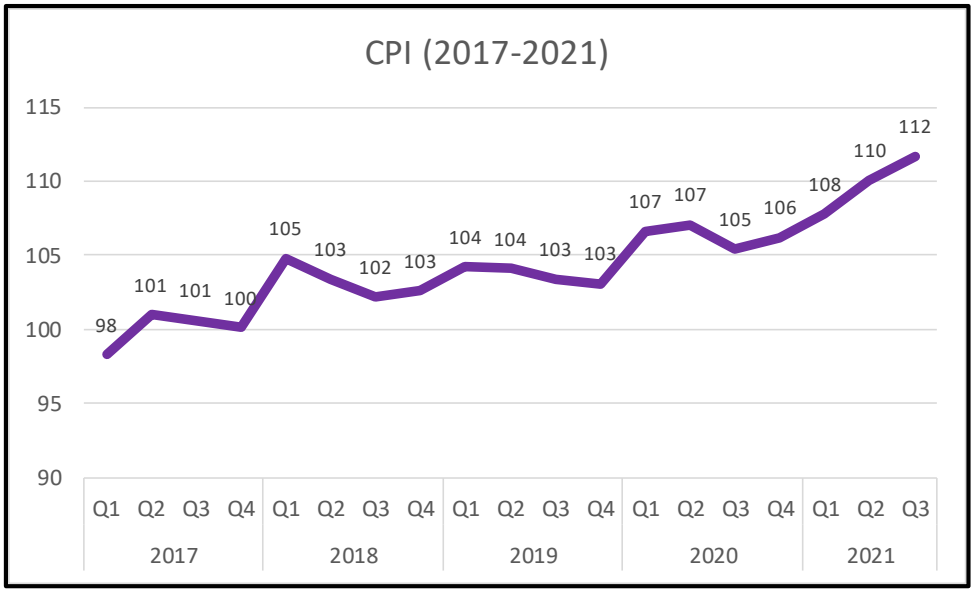
Appendix 1: Quarterly Consumer Price Index



ILO estimates using monthly CPI provided by Statistics Mauritius. Base period is 2017Q4.

Appendix 2: The minimum wage in Mauritius, from 2018 to 2021.

The minimum wage in Mauritius was first implemented on 1st of January, 2018 – following the National Wage Consultative Council Act 2016. In its first implementation – as of 1st of January 2018 – the basic amount paid for a full time worker was 8,500 local currency units (Rupees) in the case of non-exporting enterprises and 8,140 Rupees for wage workers in exporting enterprises. In both cases the amount corresponds to an employee that works 45 hours per week, 52/12 weeks per month.

There are, however, specific rules that apply to PART TIME workers and workers that operate as 'watchman' (i.e., ISCO-08 code 54). Thus, the following table shows the complete set of possible minimum wages that applied as of 1 January 2018:

Table 1: MW rubric from January 1st 2018 to December 31st 2021.

	FULL TIME WORKER (i.e., 195 hours per week or more)	PART TIME WORKER working up to 100 hours per month		PART TIME WORKER working between 101 and 194 hours per month	
	All occupations (***including*** WATCHPERSON)	**Not** occupied as WATCHPERSON	Occupied as WATCHPERSON	**Not** occupied as WATCHPERSON	Occupied as WACTHPERSON
Exporting enterprise	MW1 Rupees per month (as minimum amount)	(MW1/195)x HPMx1.1	(MW1/312)x HPMx1.1	(MW1/195)x HPMx1.07	(MW1/312)x HPMx1.07
Non-Exporting enterprise	MW2 Rupees per month (as minimum amount)	(MW2/195)x HPMx1.1	(MW2/312)x HPMx1.1	(MW2/195)x HPMx1.07	(MW2/312)x HPMx1.07

Where ***HPM***=*Hours worked per month*, and **MW1** and **MW2** vary by year according to the following:

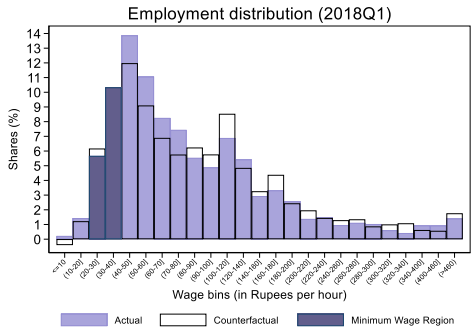
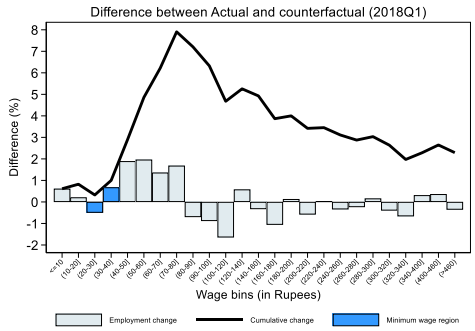
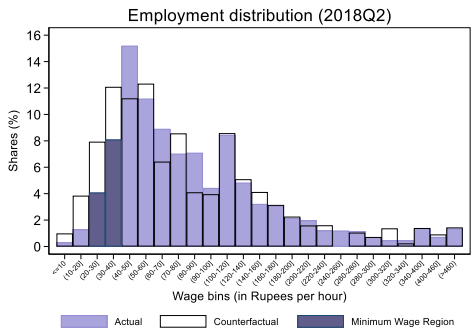
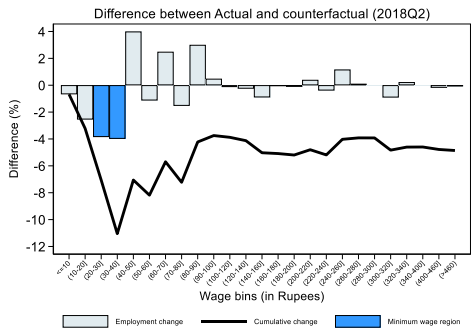
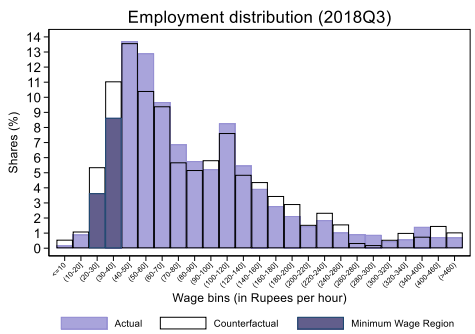
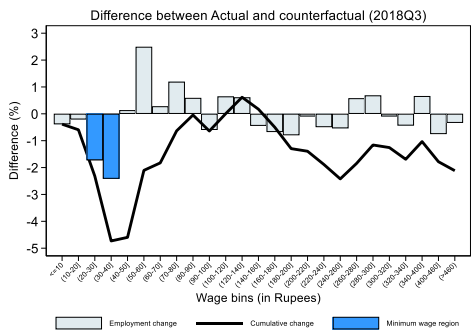
	MW1 (Rupees)	MW2 (Rupees)
1-JAN-2018 to 31-DEC -2018	8,140	8,500
1-JAN-2019 to 31-DEC-2019	8,540	8,900
1-JAN-2020 to 31-DEC-2020	9,000	9,700
1-JAN-2021 to 31-DEC-2021	9,375	10,075

Notes:

- The amount refers to the basic salary from employer to wage employee and should not include extras such as overtime, irregular payments or (in the case of non-exporting enterprises) should not include in-kind payments.
- In the case of exporting enterprises, they can consider at most up to 2,500 Rupees per month as in-kind payments.
- The word 'WATCHPERSON' is substituted by WATCHPERSON and GARDE-MALADE as of January 2019 – thus effectively including care workers.
- The Minimum Wage applies to all those who work for an employer – therefore excluding own account workers, family workers and employers of other workers.

Appendix 3: Ripple effects of the minimum wage in Mauritius

Figure A3: Ripple effects zones

	Actual and counterfactual employment distributions (25 bins, Rupees per hour)	Difference between actual and counterfactual (based on column 1 figures)
Q1		
Q2		
Q3		
Q4