

Minimum wages and youth employment in Belgium

Did the removal of youth sub-minimum rates
impact wages and employment?

February 2018

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Federal Planning Bureau

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Abstract – Between April 2013 and January 2015, youth sub-minimum wage rates were repealed in Belgium. We identify the impact of the reform by comparing outcomes before and after the abolition, across eligible and ineligible categories of young workers, and across abolishing and not abolishing joint committees. Our results show that the reform had a small positive impact on wages and on retention rates and a slightly higher negative impact on accession rates.

Jel Classification – J38, J31, J21

Keywords – Minimum wages, youth sub-minimum rates, youth employment, policy evaluation, triple difference estimator, propensity score matching

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Executive summary

Between April 2013 and January 2015, youth sub-minimum rates of the statutory minimum wage (RMMMG-GGMMI) were abolished for workers aged 18 to 20 in Belgium. This removal was gradually introduced and amounted altogether to an increase of 6% for workers aged 20, 12% for those aged 19 and 18% for those aged 18 years. Minimum wage rates for teens aged 16 and 17 remained at their existing lower levels, amounting respectively to 70% and 76% of the adult minimum wage without tenure. While the reform aimed at reducing age discrimination on the labor market, it could have had an adverse effect on youth employment.

Belgium has one of the highest minimum wages among OECD countries in combination with structurally high youth unemployment rates, especially for low-skilled youth. In this framework, it is conceivable that a rise in the minimum wage could generate negative effects on teenage employment. At the same time, Belgium has a complex minimum wage system with the sectoral level playing the main role and the national level serving as an absolute floor. This means that there are numerous minimum wages and that the sectoral minima, when they exist, are generally higher than the national minimum wage. Moreover, only a few joint committees abolished youth sub-minima in the 2013-2015 period following the reform. Quite a few had already abolished youth sub-minima starting in 2007 when pay scales had to be revised to replace age by seniority following a European Directive.

Therefore, to measure the impact of the reform, we focus those joint committees which abolished in the 2013-2015 period. More specifically, we identify the impact of removing sub-minima by comparing outcomes before and after the reform, across eligible and ineligible categories of young workers, and across abolishing and not abolishing joint committees. Our main results show that the abolition of youth sub-minima had a positive effect on wages and on the probability of remaining employed. On the other hand, it affected negatively accession rates. Our results support other studies which show that a higher minimum wage decreases job separations among youth. However, some of these studies also show that the decrease in hiring induced by the higher minimum wage offsets the decrease in separations. Our results show that this is also the case in Belgium.

Our main conclusion is that the reform had a limited impact despite a significant rise in the youth minimum wage. Three reasons can be invoked: the gradual character of the repealing, the fact that retention and accession effects almost cancel out and finally the presumption that sub minima were not really binding before the reform.

Synthèse

Synthese

1. Introduction

Between April 2013 and January 2015, youth sub-minimum rates of the statutory minimum wage (RMMM-GGMMI) were abolished for workers aged 18 to 20 in Belgium. This removal was gradually introduced and amounted altogether to an increase of 6% for workers aged 20, 12% for those aged 19 and 18% for those aged 18 years. Minimum wages for teens aged 16 and 17 remained at their existing lower levels, amounting respectively to 70% and 76% of the adult minimum wage without tenure. While the reform aimed at reducing age discrimination on the labor market, it could have had an adverse effect on youth employment.

Standard economic theory predicts a negative effect on employment of a rise in the minimum wage. Until the early 1990's most empirical studies supported this conventional view, especially for young and unskilled workers. These studies were mostly based on time-series aggregate data. Using cross sectional US data and counterfactual statistical methods, the seminal paper by Card and Krueger (1994) found no effects on teenage employment of a rise in the minimum wage. Their research triggered a huge amount of empirical work on the subject. In turn, these authors were challenged, in particular, by Newman and Wascher (2000, 2007). More than 20 years later and based on this abundant literature, it is fair to say that the disemployment effects of the minimum wage appear to be small (Manning, 2016).

Belgium has a complex minimum wage system with the sectoral level playing the main role and the national level serving as an absolute floor. This means that there are numerous minimum wages and that the sectoral minima, when they exist, are generally higher than the national minimum wage. Moreover, only a few joint committees abolished youth sub-minima in the 2013-2015 period following the reform. Quite a few had already abolished youth sub-minima starting in 2007 when pay scales had to be revised to replace age by seniority following a European Directive. Therefore, the reform might not have influenced wages and therefore youth employment.

A recent study conducted by the European Commission (2017) finds no effect of the reform on youth wages and employment. It measures the total impact of the abolition by comparing employment rates of youth aged 18 to 20 with those aged 21 to 25 before and after the reform. According to these authors, the absence of negative effect on youth employment confirms the nonbinding effect of the statutory minimum wage in Belgium.

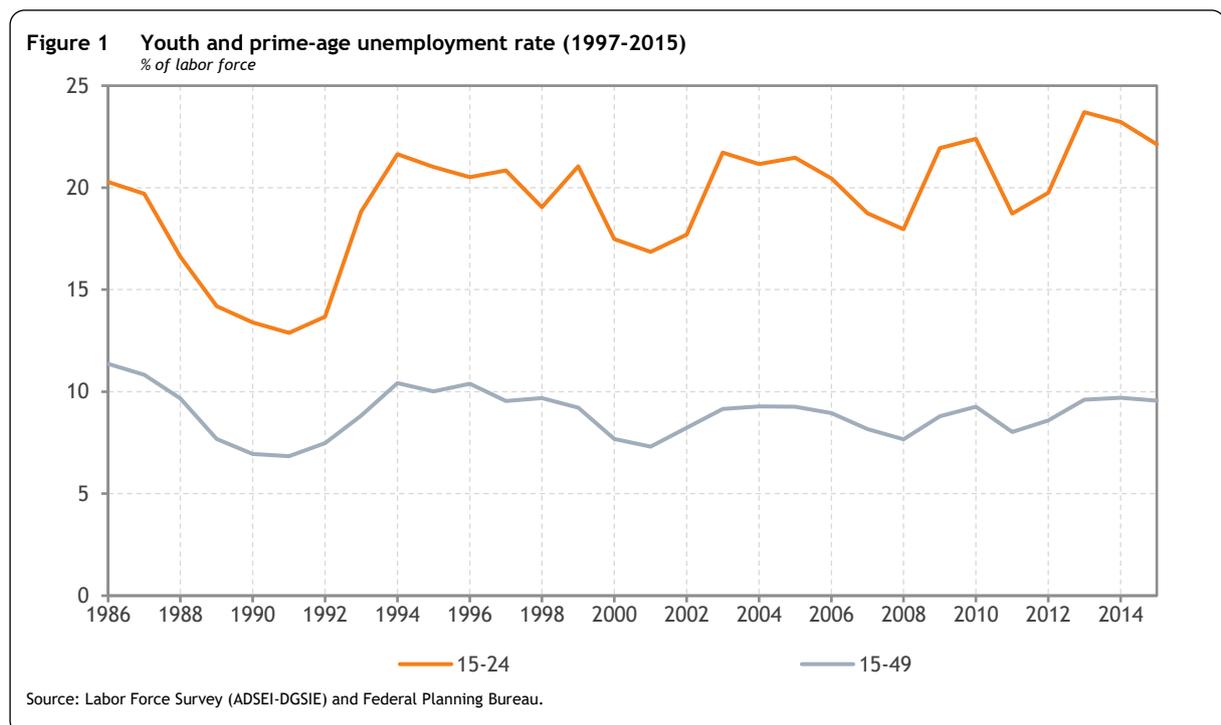
In this paper, we focus instead on the joint committees which abolished in the 2013-2015 period. Under certain assumptions, the increase in the minimum wage induced by the 2013-2015 reform among these joint committees can serve as a natural experiment to evaluate the effect of a rise in the minimum wage on teenage employment. More specifically, we identify the impact of removing sub-minima by comparing outcomes before and after the reform, across eligible and ineligible categories of young workers, and across abolishing and not abolishing joint committees. However, and like the previous study (EC, 2017), our measure of impact is conservative because we are considering all youth aged 18-20 including those who are not concerned by sub-minimum rates.

The rest of the paper is organized as follows. Section 2 motivates the study by presenting general facts about youth unemployment in Belgium. Section 3 describes the Belgian minimum wage system and the

2013-2015 reform of the youth minimum wage. Section 4 presents a short literature review on the effects of a rise in the minimum wage. Sections 5 and 6 describe respectively the methodology and the data. Finally, section 7 comments on the main results and section 8 concludes.

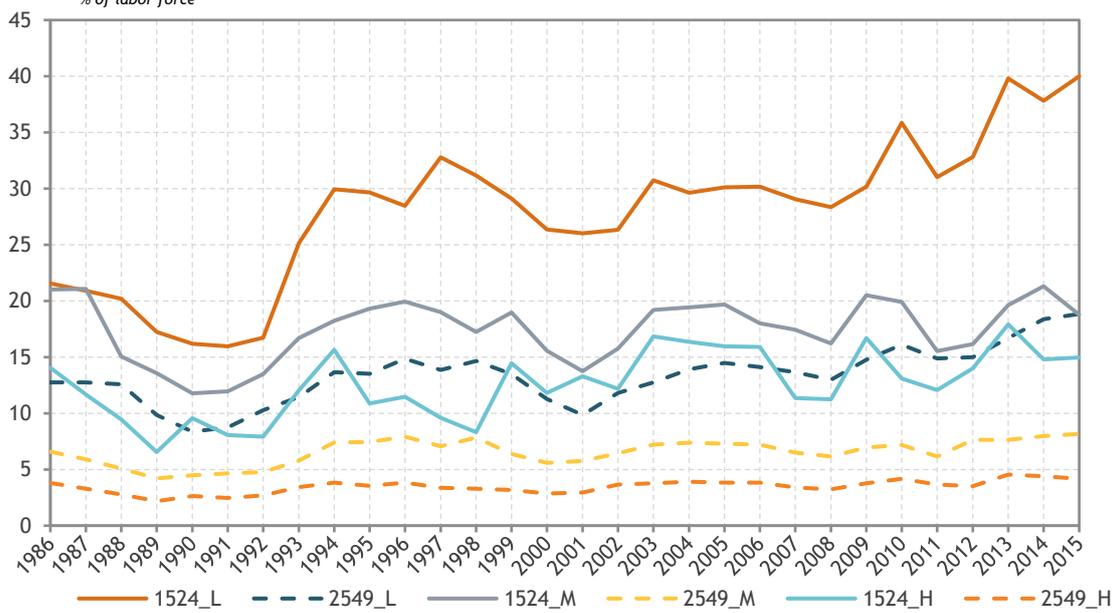
2. Youth unemployment in Belgium

Youth unemployment rates are structurally higher in Belgium compared to other European countries. Figure 1 shows the unemployment rate following the ILO definition of youth aged 15-24 years old and of prime-age adults during the period 1986-2015. Apart from the beginning of the period when the youth unemployment rate strongly decreases, it remains structurally high fluctuating between 15% and 25%. The adult unemployment rate is on average 7% during this period. Between 2007 and 2015, young unemployed have almost a threefold higher risk of being unemployed than prime-age adults. This ratio is only 1.6 in Germany and 2.4 in the Netherlands (Eurostat, 2016).



In Belgium, the unemployment rate is especially high for low-skilled youth. Figure 2 shows the unemployment rate by age and education level where low education (L) is defined as having at most a lower secondary education degree; medium (M) an upper secondary education degree (M); and high (H) a tertiary education degree.

Figure 2 Unemployment rate by age group and education level (1986-2015)
% of labor force



Source: Labor Force Survey (ADSEI-DGSEI) and Federal Planning Bureau (FPB).

Low educated individuals have higher unemployment rates than medium and high educated ones irrespective of age. However, the unemployment rate of low educated youth has increased almost two-fold in the last 30 years, reaching 40% in 2015. The 1992-1994 recession brought an increase of more than 10 percentage points; the 2008 recession, although with more fluctuations, added another 10 pp. Compared to medium and high educated young unemployed, recessions have generated greater negative impacts on low-skilled youth and subsequent recoveries more limited positive effects. The unemployment rates of medium and high educated youth, while also fluctuating according to the business cycle, have returned in 2015 to their (high) level at the beginning of the period, respectively 20% and 15%. A rising trend also appears for low educated prime age workers with their unemployment rate increasing from 13% in 1986 to 19% in 2015.

In a context of structurally high and increasing youth unemployment rates for low educated youth, it is particularly relevant to examine the impact of the minimum wage system on youth employment outcomes.

3. The minimum wage system in Belgium

Belgium has a “complex” minimum wage system (Ryckx and Kampelmann, 2012) with the industry level playing the leading role and the national level serving as an absolute floor. This means that there are numerous minimum wages and that the sectoral minima are generally higher than the statutory minimum wage. This dual system combined with a large coverage of collective bargaining ensures high compliance.

At the national level, the statutory minimum wage, called “Minimum average monthly guaranteed revenue” (RMMMG-GGMMI), constitutes an average monthly revenue that must be complied with on a yearly basis. However, it almost only applies in sectors where there are no (active) joint-committees. In practice, the minimum wage that applies to most people is higher and determined at the (sub-) industry level. There are roughly 180 joint committees and sub-joint committees where wages are negotiated. The minimum pay scales resulting from these negotiations are monthly for white-collar occupations and hourly for blue-collar ones and are at least equal, and generally higher, than the RMMMG-GGMMI.

Ryckx and Kampelman (2012) estimate that 11.4% of the labor force receives sectoral minima and that the average of sectoral minima corresponds to 59.6% of the Belgian median wage. Moreover, the population of minimum wage earners is younger, more female and exhibits lower educational attainment than that of workers earning higher wages.

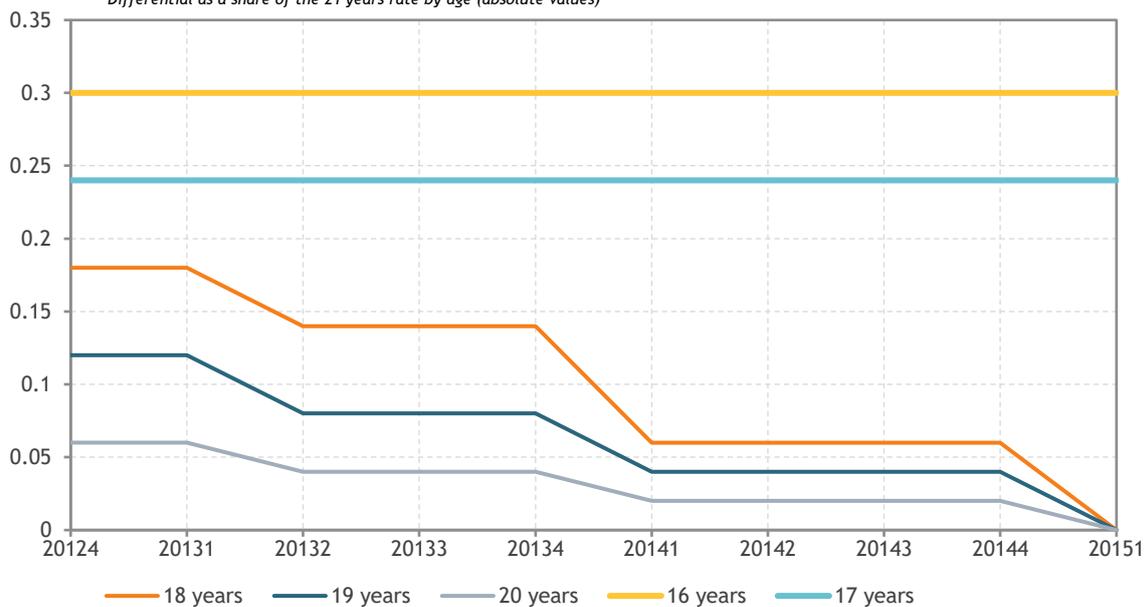
Youth sub-minima at the national level for workers younger than 21 exist almost since the introduction of the statutory minimum wage¹. Prior to the 2013-2015 reform, the rates with respect to the adult minimum wage without tenure amounted to 94% for 20-years old, 88% for 19, 82% for 18, 76% for 17 and 70% for 16. Starting in April 2013, the sub-minima were progressively suppressed for those aged 18-20 while they remained the same for 16-17 years old. Since January 2015, the adult minimum wage (without work tenure) applies starting at 18 years².

Figure 3 illustrates the reform. Until the first quarter of 2013, the statutory sub-minima for 18-years old amounted to a wage reduction of 18% with respect to 21 years old (without tenure). In April 2013, the wage differential was reduced to 14%; in January 2014 to 6%; and it disappeared in January 2015. The rates for 19 years old were respectively 12%, 8% and 4%; and for 20 years old, 6%, 4% and 2%.

¹ Convention collective de travail n°33 (23/2/1978).

² There are 3 distinct “adult” categories: workers aged at least 18 years and with no tenure (1.531,93 euro as of December 2016); at least 19 with 6 months tenure (1.572,58 euro); and at least 20 with 12 months tenure (1.590,64).

Figure 3 Reform of the youth sub minima (2013Q2-2015Q1)
Differential as a share of the 21 years rate by age (absolute values)



Source: Central Economic Council (CCE - CRB) and Federal Planning Bureau

The reform directly impacted the national sub-minima but its repercussions at the sectoral level are less clear. Based on data from the Ministry of Work (SPF ETCS - FOD WASO), it appears that about 43% of all (sub)-joint committees have had degressive minimum wages for young workers in the past. However, quite a few of them (about 64%) had already suppressed youth sub-minima before the beginning of the reform. In fact, several joint committees suppressed young sub-minima starting in 2007 following a European Directive requiring age to be removed from pay scales³. While 12% removed youth sub-minima between 2013 and 2015 following the reform, about 16% has kept degressive youth sectoral minimum wages⁴.

The limited use among sectors of youth sub-minima before the reform suggests that its impact on youth wages and employment, if any, should be quite limited at the macroeconomic level (cf. EU, 2017). Therefore, in the rest of the paper, we narrow our evaluation strategy to the analysis of the joint committees which abolished sub-minima as a result of the reform (see Appendix 1 for a list of these joint committees).

³ AIP-IPA 2007-2008 and European Directive 2000/78/CE.

⁴ These sub-minima do not always correspond to the statutory sub-minima rates before the reform.

4. Literature review

Standard economic theory predicts a negative effect on employment of a rise in the minimum wage. Until the early 1990's most empirical studies supported this view based on aggregate time-series data. With the increasing availability of cross sectional data, empirical studies on the elasticity of employment with respect to the minimum wage shifted to a more disaggregated level of analysis. Using firm level data and quasi-experimental methods, the influential paper by Card and Krueger (1994) found no negative effects on teenage employment of a rise in the minimum wage. This research triggered a huge amount of empirical work with numerous studies finding no significant or very small disemployment effects (see, for example, Dickens et al. (1999) for the UK, Addison et al. (2009) for the retail sector in the US, Dube et al. (2010) for low wage sectors in the US, and Allegretto et al. (2011) for teens in the US). In turn, these authors were challenged, notably by Newman and Wascher (1994, 2000 and 2007) and Burkhauser et al. (2000). Examples of other influential studies finding disemployment effects include Currie and Fallick (1996) on US teens and Abowd et al. (2000) for youth in France and the US.

More than 20 years later and based on this abundant literature, it is fair to say that the disemployment effects of minimum wages appear to be small including for teenagers and low-skilled workers. Nevertheless, a certain heterogeneity in results emerges, according to institutional factors such as the level of the minimum wage or its coverage. Moreover, alternative channels to employment have been examined which might be used by firms to deal with the higher costs of a rise in the minimum wage such as hours worked (Steward and Swaffield, 2006) or firm-specific training (Cardoso, 2009). Again, there is no consensus on these effects either.

An interesting line of research has further investigated the employment effects of minimum wages in terms of worker flows (Portugal and Cardoso, 2006; Brochu and Green, 2013; Dube, Lester and Reich, 2014; Kabátek, 2015; Bossler and Gerner, 2016) reconciling to a certain extent the different results found on employment. Portugal and Cardoso (2006) study a sharp increase in the statutory minimum wage in Portugal in the mid 1980's. The major effect found on teenagers is a reduction in separations from the employer which compensates for the reduction in accessions in new and existing firms. Similarly, Brochu and Green (2013) find for Canada that higher minimum wages are associated with lower hiring rates but also with lower job separation rates. In turn, Bossler and Gerner (2016) find that the introduction of the minimum wage in Germany led to a sharp decrease in hirings and a slight increase in separations. Finally, Kabátek (2015) finds that youth sub-minima in the Netherlands generate high teenage job turnover with substitution of older workers by younger ones.

In this study, we follow this line of research and examine the effects of the abolition of sub-minima on wages, youth job separations and accessions.

5. Methodology

We identify the impact of removing sub-minima by comparing outcomes before and after the reform, across eligible and ineligible categories of young workers, and across abolishing and not abolishing joint committees. Eligible young workers are those potentially affected by the removal of sub-minima, they are aged 18-20. Ineligible workers are those not affected by the reform but similar to the previous group. We choose young workers aged 22 years old and discard 21 years old to avoid possible “contamination effects” due to the reform. The period prior to the reform extends from the second quarter of 2010 to the fourth quarter of 2012 (11 quarters). The period after the reform starts in the second quarter of 2013 and lasts until the fourth quarter of 2015 (11 quarters). We discard the first quarter of 2013 to avoid “anticipation effects” which might blur the evaluation results.

Our setting is like a difference-in-differences one where we add a third difference based on joint committee affiliation. Comparing joint committees which abolished with those who did not have sub-minima prior to the reform allows us to better account for other measures which might have affected the two age groups differently during our observation period.

To estimate the impact of the rise in the youth minimum wage in a context where youth employment has been decreasing, we consider three output measures: workers’ quarterly gross wage, employment retention during two and three quarters and a measure of employment accession. Because we do not have data on nonemployment, accession rates measure both transitions from nonemployment to employment and from employment in one firm to employment in another. Similarly, retention rates measure transitions from employment to nonemployment and from employment to employment between different firms.

Our model is built upon Albanese and Cockx (2015) where we add joint committee affiliation. Equation 1 presents the model:

$$\begin{aligned}
 Y_{ijq} = & \alpha + \varphi X_{iq} + \mu t + \omega q D_{iq} \\
 & + \sum_{-m+5}^m \alpha_q T_q + \beta D_{iq} + \gamma CP_{jq} + \sum_{-m+1}^m \theta_q D_{iq} T_q + \sum_{-m+1}^m \rho_q CP_{jq} T_q \\
 & + \sum_{-m+1}^m \tau_q D_{iq} CP_{jq} + \sum_{q=1}^m \delta_q D_{iq} CP_{jq} T_q + u_{iq}
 \end{aligned} \tag{1}$$

- where Y_{ijq} is the outcome measured for individual i , working in a firm belonging to joint committee j in quarter q ;
- α is the constant term;
- $q = -m, \dots, -1$ denotes the quarters in the pre-treatment period; $q = 1, \dots, m$ denotes the quarters in the post-treatment period ($m \in \{0, 1, \dots, 11\}$);
- X_{iq} are characteristics of the young worker, his/her job and his/her firm in quarter q

- t is a common time trend and qD_{iq} captures different quarterly time trends for the two age groups;
- $D_{iq} = 1$ if individual i is between 18 and 20 years old in quarter q ; $D_{iq} = 0$ if individual i is 22 years old in quarter q ;
- $T_q = 1$ if the period in which the outcome is measured is quarter q and $T_q = 0$ otherwise;
- $CP_{jq} = 1$ denotes the joint committees which abolished sub-minima following the reform; $CP_{jq} = 0$ denotes the joint committees which did not have sub-minima before the reform in our sample;
- α_q captures quarterly time effects;
- β captures the differences between the age group 18-20 and 22;
- γ captures the differences between the joint committees which abolished and those which did not have youth sub-minima prior to the reform;
- θ_q captures the quarterly differences between the two age groups during the period where the reform takes place;
- ρ_q captures the quarterly differences between joint committees having abolished and those not having youth sub-minima during the period when the reform takes place;
- τ_q captures the quarterly difference of belonging both to the age group 18-20 and to joint committees which abolished;
- δ_q is the difference-in-difference-in-difference estimator which measures the impact of the reform in quarter q ($q = 1, \dots, 11$);
- μ and ω capture respectively common trends and trends specific to each age group during the period;
- φ captures the effects of the control variables related to the young worker, his/her job and firm;
- u_{iq} is an error term.

An important aspect of our setting is that we are following age cohorts instead of individuals. Therefore, individuals can belong to the treatment group in one quarter when they are 18-20 years old and to the control group at a later quarter when they attain the age of 22 (and are employed). More importantly, individuals can enter and exit the treatment and control groups every quarter. To better control for possible changes in the composition of our different groups we apply a propensity score matching procedure.

This method allows us to make treatment and control groups more alike by applying weights to each observation. Weights are determined in function of the probability of belonging to the treatment group in a reference quarter. This means that individuals belonging to both groups in other quarters who resemble those in the treatment group in the reference quarter will get higher weights. On the other hand, atypical individuals in both treatment and control groups will get low weights or will be excluded. Our reference group is composed of young workers aged 18-20, working in joint committees

which abolished sub-minima following the reform, during the fourth quarter of 2012. This corresponds to the last quarter before the reform in our data⁵. Appendix 2 details the matching procedure used.

Finally, our identification strategy crucially depends on the assumption that outcomes of the different treatment and control groups follow similar evolutions in the absence of the reform. Because graphical tests are difficult to interpret with so many groups, we conduct “placebo tests” for each of the outcome variables. If the assumption of parallel trends holds, we should find no effect of the term capturing the impact of the reform when estimating equation 1 in a period prior to the introduction of the reform. Our placebo period spans from the second quarter of 2007 until the fourth quarter of 2012. Consistent with our estimation strategy, we also apply a matching procedure where the reference group is composed of young workers aged 18-20, working in joint committees which abolished sub-minima following the reform, during the fourth quarter of 2010. We find no effect for all outcome variables. Appendix 3 presents these results.

⁵ The last quarter before the reform is the first quarter of 2013. However, to avoid the risk of anticipation, we excluded this quarter of the analysis.

6. Data

We are using longitudinal quarterly individual data on employment and wages from the National Social Security Office (NSSO). Starting from population data covering the period from the second quarter of 2010 to the fourth quarter of 2015, we select young individuals belonging to specific joint committees. Two groups of joint committees are identified: the first comprises 6 joint committees which abolished sub-minima following the 2013-2015 reform and for which sufficient employment data is available; the second includes 10 joint committees⁶ which did not have sub-minima prior to the reform (see appendix 1 for a list of the two groups). In turn, two groups of young workers are distinguished: those aged 18 to 20 and (potentially) affected by the reform, and those aged 22 and not affected by the reform.

6.1. Variables

For every individual, we have information on socio-demographic characteristics (age, gender and region of residence), his/her job (full/part-time and blue/white-collar status) and his/her firm (size, NACE-sector and joint committee affiliation). Moreover, while anonymous, our data allows us to follow quarterly employers and employees through time. Table 1 presents the different variables.

Table 1 Variable definition

Variable	Description
Dependent variables	
Quarterly gross wage	Quarterly gross wage including regular bonuses
Retention rate (q+1)	Probability of being employed in the same firm in q+1
Retention rate (q+2)	Probability of being employed in the same firm in q+2
Accession rate	Probability of being hired by a firm in q
Independent variables	
Gender	Man, woman
Age	Age at the beginning of the quarter (in years)
Region of residence	Flanders, Wallonia, Brussels
Blue-White-collar status	Blue, white-collar
Full-part-time status	Full-time, part-time
Employers' social security cuts	Quarterly amount of employers' social security contribution cuts
Firm size	<5, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999, >1000
Joint Committee affiliation	Joint Committee number
NACE-sector	NACE-A21 classification

Our output measures have some drawbacks. In the case of gross wages, we do not know when workers take their annual holidays. This affects wages of blue-collar workers the most since their holiday allowances are not registered at the NSSO. This means that when holidays are taken, quarterly wages drop in our data. This affects the second and third quarters the most since many workers take their annual holidays at this time of the year. It also means that we are not able to identify workers who are paid

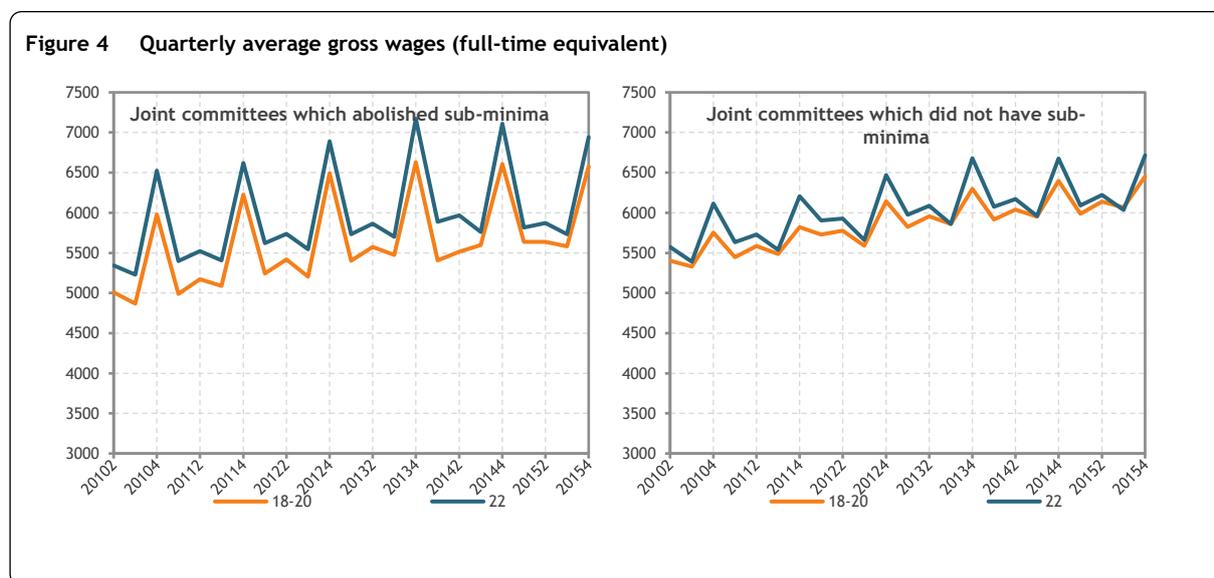
⁶ The selection was random starting from the population of joint (sub-)committees which did not have sub-minima prior to the reform and conditional on the presence of youth employment. Also, one joint committee was excluded because of its atypical value-added evolution during the period of analysis.

very close to sub-minima each quarter. Therefore, we estimate the impact of the reform on all 18-20 years old and not only on those who would have had a raise following the reform. In the evaluation literature, this is referred to as measuring the impact of the intention to treat rather than of treatment itself. This is a relevant measure in our case since we are primarily interested in the average effect of the reform on the wages and employment of young workers⁷.

Our measures of retention and accession are computed taking advantage of the longitudinal character of our data. Retention in quarter q is calculated at the individual level as the probability of staying employed with the same employer one or two quarters later. In the case of accessions, we compute the probability of employment in quarter q conditional on non-employment with the same employer in quarter $q-1$ ⁸. While the follow-up of employees is extremely reliable with our data, mergers and splits might generate some errors in the follow-up of firms and therefore on our retention and accession probabilities. However, this problem seems to be sufficiently small not to invalidate our conclusions⁹.

6.2. Descriptive analysis

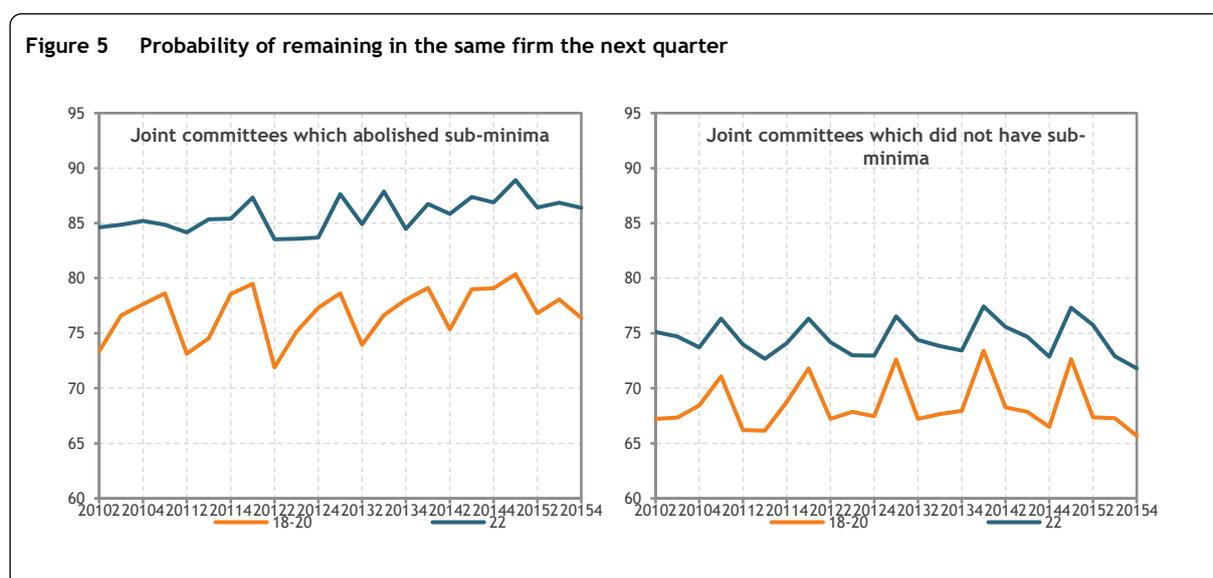
Figures 4, 5 and 6¹⁰ illustrate the outcome measures for the different groups during our observation period, respectively gross wages, the probability of remaining employed the next quarter in the same firm and the probability of being newly hired by a firm. The left figures show the outcomes in the joint committees which abolished sub-minima and the right ones in those which did not have sub-minima at the time of the reform. In each figure, outcomes are shown separately for young workers aged 18-20 (treatment) and 22 years old (control).



⁷ The effect of the reform on 18-20 years old paid close to the minimum would be higher.
⁸ In other words, accession rates consider both transitions from nonemployment to employment and from employment at one firm to employment at another firm. Similarly, retention rates include transitions from employment at one firm to employment at another firm and from employment to non-employment.
⁹ Boucq and López Novella (2018) estimates that “false” firm creations with our data amount to a maximum of 5% of all firms per quarter over the period 2007-2015.
¹⁰ The data used in these figures is primary data, before the matching procedure.

Average gross wages (Figure 4) fluctuate a lot between quarters, especially in the joint committees where sub-minima were abolished. They are lower during the third and second quarters mainly due to holiday allowances which are not reported for blue-collar workers and partly reported for white-collar. Average wages peak in the fourth quarter largely due to regular bonuses paid at the end of the year. Also, it is at this time of the year that firms check whether they have correctly paid their employees in the past year¹¹. In particular, firms must make sure they respect the statutory (or sectoral) minimum wage which is binding on an annual basis (see section 2). If they come short, they must compensate their employees. As expected, Figure 4 also shows that the difference in average wages between 18-20 and 22 years old is smaller in the joint committees which did not have sub-minima. Finally, no clear difference appears before and after the second quarter of 2013 between age groups in joint committees which abolished and those who did not. Therefore, the reform does not seem to have had a major impact on wages.

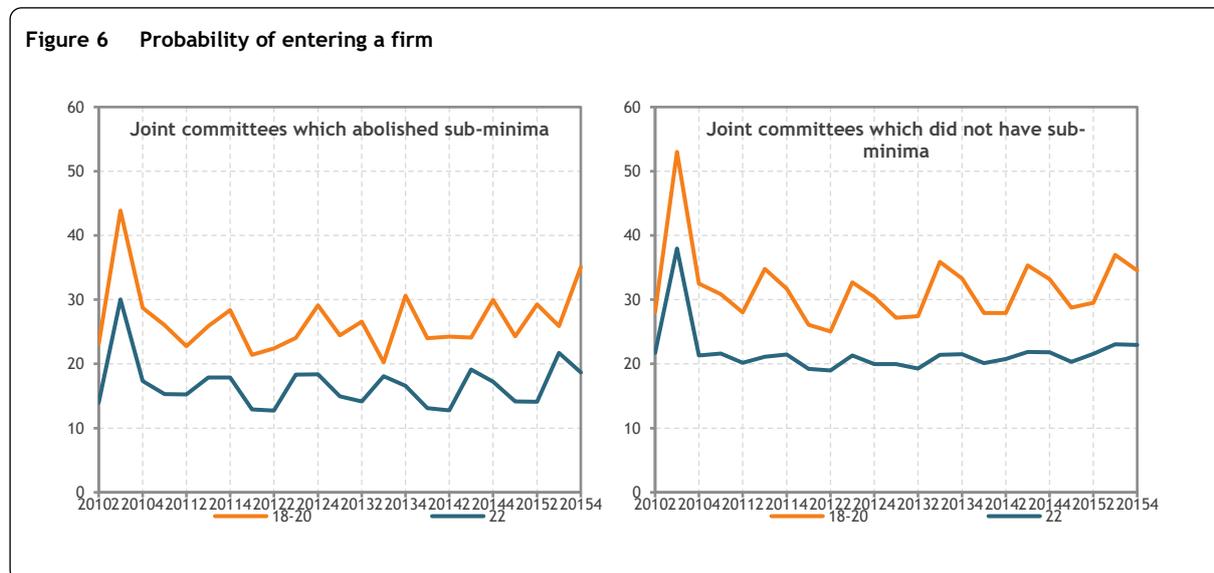
The probability of remaining employed the next quarter with the same firm (Figure 5) for both 18-20 and 22 years old is much higher among joint committees which abolished sub-minima. For both groups of joint committees, the probability of remaining employed is higher for 22 than for 18-20 years old. Like wages, there is a strong seasonality across quarters with the first quarter exhibiting the highest probability of remaining with the firm and the second the lowest. The seasonality is somewhat less pronounced for 22 years old in joint committees which abolished sub-minima. Finally, for joint committees which did not have sub-minima, there is a slight decrease in the retention probabilities at the end of the period for both age groups. Again, no clear difference appears between age groups and joint committees before and after the second quarter of 2013.



The probability of entering a firm (Figure 6) is higher for 18-20 than for 22 years old in both groups of joint committees. This time, accession probabilities are slightly higher in the joint committees which did not have sub-minima and it is generally higher in the fourth quarter of the year and lower in the second. With the exception of the beginning of the period, accession probabilities remain relatively constant during our observation period. The peak in the third quarter of 2010 might be accounted for by the so-

¹¹ For workers who leave the firm before the end of the year, this check-up and the potential rectification happens at the time of departure.

called “crisis” measures, in particular, the “win-win” plan¹². This measure was particularly popular among employers hiring young low-skilled unemployed. Once again and with the exception of the last quarter of 2015, no clear difference appears between age groups and joint committees before and after 2013.



The graphical analysis of our outcome measures does not reveal any clear impact of the reform. The next section will further isolate these effects by simultaneously considering other factors which might have affected our outcomes during this period.

¹² The “win-win” plan granted significant lower labor costs to employers when hiring either young low/middle skilled job seekers or older/long-term unemployed. It consisted in a temporary reinforcement (from January 2010 to December 2011) of an existing measure, the Activa plan, including a reduction of social security contributions and an “activation” allowance. Finally, the labor cost advantage was higher and lasted longer for recruitments in 2010 than in 2011.

7. Estimation results

To better isolate the effects of the reform, we estimate equation 1 using Ordinary Least Squares for the four outcome measures: (ln) gross wages, retention probabilities respectively in the following quarter and in the two following quarters and accession probabilities. In doing so, we apply the weights obtained from the matching procedure. In what follows, we present first sample descriptive statistics and then move on to the econometric results.

7.1. Sample description

Table 2 presents descriptive statistics of our final sample for the four different groups of workers and joint committees.

Table 2 Sample descriptive statistics: treatment and control groups after score matching (% and euro)

	Joint committees which abolished		Joint committees without sub-minima	
	18-20 years old	22 years old	18-20 years old	22 years old
Total	60	40	49	51
Women	53	59	56	57
18-19	23	-	21	-
Part-time	50	46	77	56
White-collar	70	98	37	53
Flanders	72	67	83	78
Wallonia	18	24	11	13
Mean gross wage	5,556	6,305	6,107	6,403
< RMMMGM	5	0.8	0.8	0.6
# observations	34,153	22,324	13,873	19,085

While the shares of 18-20 years old, women and very young workers (18-19) are relatively similar between the two types of joint committees, differences remain for the other characteristics in our data. The share of part-time work is higher for 18-20 years old working in joint committees which did not have sub-minima prior to the reform. While joint committees which abolished have mainly white-collar workers, especially among those aged 22, those who did not have sub-minima have much higher shares of blue-collar workers. Regarding regional allocation, joint committees which abolished have higher shares of workers in Wallonia while those who did not are more prominent in Flanders.

As expected differences between average wages of 18-20 and 22 years old are larger for joint committees which had sub-minima prior to the reform (12%) than among those which did not (5%). Finally, we compute an indicator of the share of workers earning wages below the adult minimum wage (RMMMGM-GGMMI) in each group. This measure is an approximation since we are missing certain components of gross wages and it is computed for all quarters including those after the reform. Nevertheless, it allows us to have an idea across groups of the binding character of the statutory minimum wage. Although this share is relatively low for all groups, it is, as expected, higher for 18-20 years old working in joint committees which abolished sub-minima following the reform.

7.2. Results

Tables 3, 4, 5 and 6 present the estimation results for our different outcome variables. In addition to the dummies required by our triple difference methodology, all estimations include controls for characteristics of the worker, his/her job and his/her firm (see equation 1 and table 1 for a full description of control variables).

The effect of the reform is calculated as the average quarterly effect in the post reform period ($\overline{\delta_q} = \frac{\sum_{q=1}^{11} \delta_q}{11}$). In addition to the overall average effect including all three increases respectively in the second quarter of 2013, the first quarter of 2014 and the first quarter of 2015, we also examine the second and third increases separately¹³. Since the different increases differ in magnitude, we are interested in assessing whether they might have had a different impact on our outcome measures.

Table 3 presents the results for gross wages. On average the reform generates a quarterly wage increase of almost 3% over the post-reform period. This result is very similar to the effect of the reform if we restrict the period to the second and third increases. In fact, it is the last increase, in the first quarter of 2015, which generates the highest effect with almost 4%. These results are lower than the actual increases intended by the reform and which amounted to a total increase of 18% for 18, 12% for 19 and 6% for 20 years old. As mentioned before, we are considering all workers aged 18 to 20 including those which were not directly affected either because their wages are already above sub-minima or because they belong to worker categories for which the statutory minimum wage does not apply (e.g. apprentices¹⁴).

Table 3 Effect of the abolition of youth sub-minima on gross wages (%)

Ln(wages)	Total	Men	Women	18-19	Part-time	Full time	Blue-collar	White-collar
20132-20154	2.8**	2.2**	-0.3	4.1**	1.7	0.5	1.2	-0.2
20141-20154	2.8**	1.9**	0.1	4.3**	2.1*	0.3	1.2	0.0
20151-20154	3.8***	3.8**	1.0	5.3***	3.1**	1.3	2.1	0.6
# observations	93,853	42,827	51,026	65,167	44,657	49,196	15,864	77,984

***, ** and * correspond respectively to 1%, 5% and 10% significance level.

If we look at sub-populations, we see that the reform has a stronger impact on the wages of the youngest workers aged 18-19 with an average quarterly increase of 4% for the whole reform period and 5% for the last increase in 2015. While the effects of the reform for women are not significant, men's wages increase by 2.2% over the whole period and by 3.8% in 2015. Except for part-time work in 2015, all other categories do not have significant increases following the reform. Finally, it is the last increase introduced in January 2015 which seems to have the largest impact.

Table 4 shows the results for the probability of staying employed with the same firm the next quarter. All coefficients are positive indicating that the reform and the probability of staying employed are positively related. The probability of staying employed increases by almost 3 pp on average per quarter following the reform. The retention probability increases the most for the youngest workers aged 18-19

¹³ Depending on age, the first increase amounted to 2 to 4 pp, the second to 2 to 8 pp and the third to 2 to 6 pp (see section 3 for a detailed description of the three increases by period and by age).

¹⁴ We are not able to identify apprentices in our data. They are entitled to minimum earnings which are much lower than the statutory youth sub-minima. The exact amounts vary according to the linguistic community (Flemish, French or German) and to age (Flemish community).

and amounts to about 4 pp depending on the period considered. While the effects for men are all positive signalling a positive effect of the reform on the probability of staying employed, especially for the last period, they are not significantly different from zero. Similarly, effects for women are also positive and (slightly) significant but amount to a stronger increase of 4 to 6 pp according to the period examined. Finally, results are not statistically significant for blue and white-collar workers separately.

Table 4 Effect of the abolition of youth sub-minima on employment retention (q+1)

Effect in pp	Total	Men	Women	18-19	Part-time	Full time	Blue-collar	White-collar
20132-20154	0.028**	0.018	0.041*	0.041**	0.01	0.004	0.012	-0.014
20141-20154	0.032**	0.018	0.053*	0.044**	0.02	0.003	0.013	-0.006
20151-20154	0.034***	0.034	0.064**	0.045**	0.03	0.001	0.014	-0.007
# observations	93,853	42,827	51,026	65,167	44,657	49,196	15,864	77,984

***, ** and * correspond respectively to 1%, 5% and 10% significance level.

Table 5 shows results for the effect of the reform on retention probabilities two quarters later. While results are similar to those of table 4, a few interesting differences emerge. The increase in the probability of retention is stronger for all workers (total), women and very young workers. While the increase is similar for blue-collar workers, somewhat stronger for men and stronger for part-time work, these effects remain statistically not significant. Finally, white-collar and also full-time workers have negative effects, but they are not statistically significant and small.

Table 5 Effect of the abolition of youth sub-minima on employment retention (q+2)

Effect in pp	Total	Men	Women	18-19	Part-time	Full time	Blue-collar	White-collar
20132-20154	0.032**	0.01	0.056*	0.061**	0.023	-0.009	0.007	-0.017
20141-20154	0.04**	0.016	0.071**	0.07**	0.039	-0.007	0.013	-0.003
20151-20154	0.043**	0.043	0.084**	0.067***	0.051	-0.01	0.016	-0.012
# observations	93,853	42,827	51,026	65,167	44,657	49,196	15,864	77,984

***, ** and * correspond respectively to 1%, 5% and 10% significance level.

Table 6 shows the results of the effect of the reform on accession probabilities. Apart from white-collar workers, the effects are negative. The probability of entering a new firm following the reform is 3 pp lower on average for all workers and for men. These negative effects are higher for very young workers attaining almost 6 pp on average for the whole period. While the effects of the reform on the accession probabilities of women are not statistically significant, they are close to 3 pp for the periods starting respectively in 2014 and 2015. Blue-collar workers have also negative and significant effects of around 3 pp. Finally, white-collar workers have positive and significant effects close to 5 pp for the periods starting in 2014 and 2015.

Table 6 Effect of the abolition of youth sub-minima on employment accession

Effect in pp	Total	Men	Women	18-19	Part-time	Full time	Blue-collar	White-collar
20132-20154	-0.03***	-0.03**	-0.013	-0.056***	0.007	-0.016*	-0.029**	0.044***
20141-20154	-0.031***	-0.029**	-0.027	-0.054***	-0.003	-0.016*	-0.031**	0.051***
20151-20154	-0.032***	-0.032**	-0.026	-0.053***	-0.015	-0.014	-0.029**	0.049***
# observations	93,853	42,827	51,026	65,167	44,657	49,196	15,864	77,984

***, ** and * correspond respectively to 1%, 5% and 10% significance level.

Results for white-collar workers are counterintuitive. This might be due to our sample which contains much more white-collar workers in joint committees which repealed sub-minima than in those which did not even after applying the matching procedure. Table 2 shows that this is particularly the case for workers aged 22 who are 98% white-collar in joint committees which abolished while 53% in joint committees which did not. This means that we cannot rule out that this imbalance might be affecting our estimates.

In conclusion, and except for white-collar workers, our results are in line with those found in the literature on the effects of a rise in minimum wages on youth employment flows. The rise in the minimum wage induced by the reform had a positive impact on retention probabilities but a negative one on accession probabilities. Moreover, the second effect slightly overruns the first.

8. Conclusions

In this study, we analyse the effects of the reform of the youth statutory minimum wage which took place from January 2013 to January 2015. It consisted in the gradual repealing of sub-minima for youth aged 18 to 20. Because Belgium has a “complex” minimum wage system with the industry level playing the leading role, the youth statutory minimum wage mainly applies in sectors where there are no (active) joint-committees. In practice, the minimum wage that applies to most employees is higher and determined at the (sub-) industry level. Therefore, to analyse the impact of the repealing of youth sub-minima, we narrowed our analysis to joint committees which had youth sub-minima before the reform and which abolished them.

To estimate the impact of higher minimum wages induced by the repealing of youth sub-minima, we compare outcomes before and after the reform, across eligible (18-20 years old) and ineligible (22 years old) categories of young workers, and across abolishing and not abolishing joint committees. We consider three outcome measures: gross wages, the probability of remaining with the firm (retention probability) and the probability of being hired by a (new) firm (accession probability). Our results are in line with those found in the literature on the effects of a rise in minimum wages on youth employment flows. A rise in the minimum wage has a positive impact on retention probabilities but a negative one on accession probabilities. Moreover, the second effect slightly overruns the first, especially for very young workers (< 20 years old).

Our main conclusion is that the reform had a limited impact despite a significant rise in the youth minimum wage. Three reasons can be invoked: the gradual character of the repealing, the fact that retention and accession effects cancel out and finally the presumption that sub-minimum rates were not really binding before the reform. Further work on the impact of higher minimum wages should concentrate on the identification of youth closely paid at the minimum wage.

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10. Appendixes

10.1. Appendix 1 - Lists of joint committees

10.1.1. List of joint committees which abolished youth sub-minima following the 2013-2015 reform

Table A1.1 Joint Committees which abolished youth sub-minima in 2013-2015

Number	Name
100	Commission paritaire auxiliaire pour ouvriers
107	Commission paritaire des maîtres-tailleurs
113.04	Sous-commission paritaire des tuileries
120	Commission paritaire de l'industrie textile et de la bonneterie
126	Commission paritaire de l'ameublement et de l'industrie transformatrice du bois
202	Commission paritaire pour les employés du commerce de détail alimentaire
312	Commission paritaire des grands magasins
323	Commission paritaire pour la gestion d'immeubles et les travailleurs domestiques
327.01	Sous-commission paritaire pour les entreprises de travail adapté subsidiées par la Communauté flamande
327.03	Sous-commission paritaire pour les entreprises de travail adapté de la Région wallonne et de la Communauté germanophone
336	Commission paritaire pour les professions libérales
341	Commission paritaire pour l'intermédiation en services bancaires et d'investissement
330.04	Etablissements et services de santé autres, à l'exclusion des établissements de prothèses dentaires

Source: SPF Emploi, Travail et Concertation Sociale - FOD Werkgelegenheid, Arbeid en Sociaal Overleg

10.1.2. List of joint committees which abolished sub-minima following the 2013-2015 reform in our sample (treatment group)

Table A1.2 Sample of abolishing joint committees

Number	Name	Final date of abolition
100	Commission paritaire auxiliaire pour ouvriers	01/01/2015
120	Commission paritaire de l'industrie textile et de la bonneterie	01/01/2014
202	Commission paritaire pour les employés du commerce de détail alimentaire	01/07/2015
323	Commission paritaire pour la gestion d'immeubles et les travailleurs domestiques	01/01/2014
336	Commission paritaire pour les professions libérales	01/01/2015
330.04	Etablissements et services de santé autres, à l'exclusion des établissements de prothèses dentaires	01/01/2015

10.1.3. List of joint committees which did not have sub-minima before the 2013-2015¹⁵ reform in our sample (control group)

Table A1.3 Sample of joint committees which did not have youth sub-minima prior to the reform

Number	Description
112	Commission paritaire des entreprises de garage
118	Commission paritaire de l'industrie alimentaire
124	Commission paritaire de la construction
223	Commission paritaire nationale des sports
226	Commission paritaire pour les employés du commerce international
227	Commission paritaire pour le secteur audio-visuel
302	Commission paritaire de l'industrie hôtelière
314	Commission paritaire de la coiffure et des soins de beauté
320	Commission paritaire des pompes funèbres
322	Commission paritaire pour le travail intérimaire

¹⁵ These joint committees either never had youth sub-minima or they abolished them before 2010.

10.2. Appendix 2: implementation of the propensity score matching procedure

The reference group in our matching procedure consists of youth aged 18 to 20 working in joint committees which abolished sub-minimum rates during the fourth quarter of 2012.

Our matching procedure consists of 5 steps:

1. Estimation of propensity scores for all observations in treatment and control groups except for our reference group using a logit model. The explanatory variables are gender, region of residence, blue-white-collar status, full-part-time status, employers' social security contribution cuts and firm size.
2. Trimming: exclusion of observations which have a propensity score below 0.1 or above 0.9.
3. Re-estimation of propensity scores for remaining observations.
4. Transformation of propensity scores in odds ratios and normalisation in the corresponding group.
5. Estimation of equation 1 using the resulting propensity scores as weights.

10.3. Appendix 3: placebo tests

Our placebo tests consist in the estimation of equation 1 for each of our output measures during a period prior to the introduction of the reform. To pass the test, the parameter capturing the effect of the reform should not be significantly different from zero during this period.

Our placebo period spans from the second quarter of 2007 to the fourth quarter of 2012. This is a comparable period in terms of number of quarters to the one we are using to estimate the impact of the reform. We also apply the propensity score matching procedure described in Appendix 2 and estimate equation 1 using the resulting weights. Table A3.1 shows the results for the four outcome indicators for all observations. None of the parameters are significant.

Table A3.1 Placebo tests (%)

	Ln(wages)	Retention q+1	Retention q+2	Accession
20132-20154	-0.003	0.008	0.008	0.014
20141-20154	-0.004	0.001	0.002	0.007
20151-20154	-0.008	-0.005	-0.007	0.009
# observations	96,991	96,991	96,991	96,991

***, ** and * correspond respectively to 1%, 5% and 10% significance level.