

Effects of minimum wage rules on youth employment: Evidence from Danish monthly payroll records

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Research agenda and motivation

How important is the wage level for youth employment? This is a classic question in economics and in practical policymaking around the world. One timely example is the current US debate on increasing the federal minimum wage, where over 600 prominent economists have signed a letter in support of an increase in the minimum wage, including Daron Acemoglu, Kenneth Arrow, Alan Blinder, Angus Deaton, Peter Diamond and Emmanuel Saez to mention a few (Economic Policy Institute, 2014). The Congressional Budget Office in its recent report to the Congress on the effects of the minimum wage concluded that a 10 percent increase in the minimum wage would reduce employment among teenage workers by 0.75 percent. This was computed by setting the elasticity of teen employment with respect to a change in the minimum wage to 0.075 after a careful reading of empirical studies examining the relationship between wages and youth employment (CBO, 2014).

Three out of four OECD countries have government-determined legal minimum wages and for countries without a legal minimum wage, for example Denmark, a large part of the workforce is subject to wage floors specified by collective agreements (OECD, 2015).

The aim of our project is to exploit Danish wage records, which since 2008 have been recorded at a monthly frequency, to provide unique casual estimates of the effect of wage changes on youth employment. The high frequency of the Danish data combined with discrete increases in wages when individuals turn 18 years old, incorporated into nearly all Danish wage agreements, enable us to use a regression discontinuity approach, and thus provide much more convincing estimates than what have been done previously. This is described in greater detail below.

Knowledge from existing literature

Theoretically the effect of a higher wage, for example determined by law as in the United States or determined through collective agreements between employers and employees as in Denmark, is ambiguous. In a standard neoclassical supply-demand-model of the labor market a wage above the equilibrium level reduces employment and economic efficiency (this is, for example, illustrated in the first-year economics text book by Mankiw and Taylor, 2014). On the other hand, under monopsony, efficiency wages, and/or search models of the labor market, increases in minimum wages may increase employment and economic efficiency (see for example Manning, 1995; Rebitzer and Taylor, 1995; Flinn, 2006).

Modern empirical studies of the relationship between wage and youth employment are for the most part based on quasi-experimental variation stemming from reforms that change the minimum wage in one region/state compared to other regions/states. One of the most famous studies is Card and Krueger (1994)

who studied the effect of an increase in the minimum wage in New Jersey by comparing employment in the fast-food industry in New Jersey to that of Pennsylvania before and after the increase in the minimum wage, and without finding any negative effect on employment, in contrast to the conventional wisdom at the time based upon the standard neoclassical model. Other studies have followed Card and Krueger by applying difference-in-differences type methods to reform changes. For example, Hyslop and Stillman (2007) also find rather small negative effects of the minimum wage on youth employment.

The method used in the existing literature relies on strong common trend assumptions and requires that wage changes are unrelated to other changes in labor market conditions, e.g. cost of living. Moreover, the method is often only able to identify short-term effects of a change in the wage, while policy should be based on the structural/permanent effects, which may be much larger (Sorkin, 2015). A study of the variation in the minimum wage in Canadian provinces over time indicates that estimates tend to be larger in the longer run (Baker, Benjamin and Stanger, 1999).

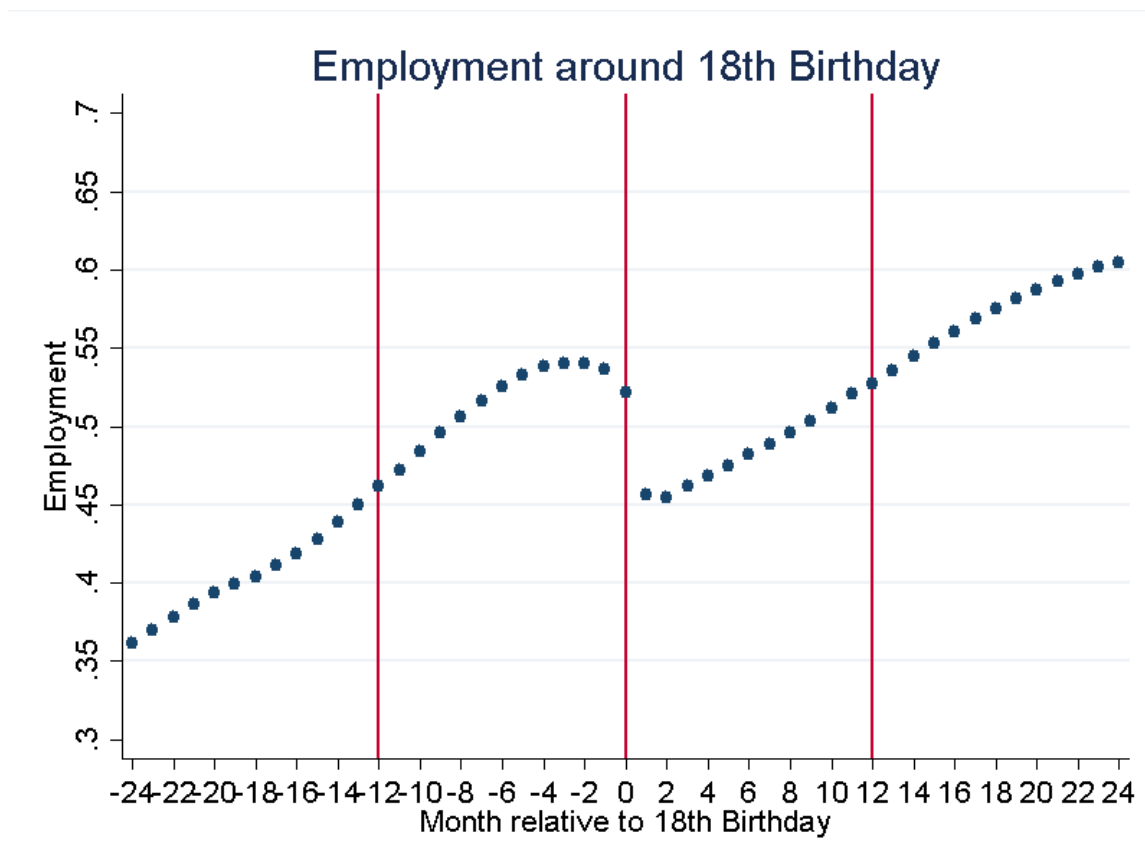
Research method

The monthly frequency of the Danish wage and employment data is unique and enables us to study employment effects when individuals turn 18 years old where their hourly wage rate jump to a higher level according to the Danish wage agreements. For example, for workplaces under the agreement by *Dansk Erhverv Arbejdsgiver*, the minimum hourly wage rate is DKK 62.81 when you are less than 18 years old and DKK 110.62 after you have turned 18 years old. Since birthdays are more or less randomly distributed over time and worker productivity and preferences for leisure are expected to develop continuously over the life-cycle, we may apply a regression discontinuity set-up at age 18.

Figure 1 illustrates how this approach works. The first point in the graph (-24) shows the employment rate of individuals who are 16 years old but not more than 16 years and one month, and computed for all individuals observed in this one month age interval over the period 2008-2013. The employment rate is 36.1 percent and due to the large sample size, the 95 percent confidence interval of this estimate is so narrow that it is impossible to see in the graph. The next point in the graph displays the employment rate of all individuals who are between 16 years and 1 month old and 16 years and 2 months old, and so on. Employment is defined as being registered with earnings of at least DKK 100 at an employer in a given month. The graph depicts the development in employment over the life cycle non-parametrically (we have removed pure time effects by including time dummies). We can see that employment gradually increases from 36.1 percent to 60.4 percent, with one large structural break in the month individuals turn 18 years old, where we observe a large drop in the employment rate. This change we observe in the raw data is striking: from two months before to two months after turning 18 years old the employment rate has dropped 18 percentage point from 54.0 percent to 45.4 percent. This strongly suggests that we can use a regression discontinuity analysis to estimate the effect of the increase in the minimum wage occurring at age 18 on youth employment.

Our aim is to estimate the structural/long-run employment elasticity with respect to the hourly wage rate. The data includes information on hours worked each month, which the employer has to report. We expect to be able to compute good measures of the hourly wage rate for virtually all workers, although the firm reports on hours probably have some measurement error. We can also obtain information of occupation from DISCO08 codes obtained from the wage statistics of Statistics Denmark. We can then use wage information from the (minimum) wage agreements, which may be combined with the e-income data.

Analysis of this type may be used to provide estimates of the effect on youth employment if, for example, the wage level were raised for 17 years old workers up to the current level of 18 years olds, or if the wage hike at 18 years did not occur until workers turned 19 or 20 years old.¹ The only threat with respect to empirical identification is other major things happening when individuals turn 18 years old. However, it is difficult to think of such things other than the wage hike that may explain the drop down in employment. For example, students are not eligible for student benefits before 3 months after turning 18 years old. For some job functions, e.g. money handling, you have to be 18 years old but that should, if anything, increase employment.



Note: The figure is based on E-income data for all individuals who are 16 to 20 years old in the period January 2008 to December 2014. The plotted quantities are estimated coefficients on event window fixed effects (one for each month around the individual's 18th birthday) from a regression of an employment dummy variable on event window fixed effects and 71 month fixed effects (Jan. 2008 to Nov. 2013).

¹ The analysis may, however, not be used to measure employment effects of an increase in the general wage level as it is impossible to extrapolate the result for young individuals to people in mid-age. Moreover, a general increase in the wage level would have general equilibrium effects, which are of second-order importance when focusing only on wage changes of young persons.

Expected output

The output of the project is expected to be one academic paper. This paper deals with a policy relevant topic that has received a lot of attention in the public debate, and it will be the first paper to employ a high-precision regression discontinuity research design, which is possible because of the monthly frequency of the data only available in Denmark. These features imply that the paper may have top-5 journal potential depending on the findings and else should be publishable in a top-field journal.

Budget and time plan

The core data exist, and we have previously worked with some of the data, which made it possible to create Figure 1. We plan to obtain additional e-income data up to 2015 from SKAT in the Spring of 2016. We apply for funding to pay Statistics Denmark for processing the data and linking it to other data at Statistics Denmark, including, for example, occupation codes (DISCO08) and socio-demographic variables of the employees. The data will have approximately 25 million observations, and we therefore apply for funding for a research assistant to help clean and analyze the data. We apply for funding to cover one month of research time for Peer Skov and Claus Kreiner. Finally, we also apply for funding to cover a one-week research visit at the University of Copenhagen for Daniel Reck (who is living in Michigan), enabling us to sit together and work on the project. The budget is attached. We expect to have a first draft of the paper ready by the end of 2015.

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