**REGULAR ARTICLE**

# Introducing minimum wages in Germany employment effects in a post Keynesian perspective

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## Abstract

The long ongoing discussion about the employment impact of minimum wages was recently reinvigorated with the introduction of an economy-wide, binding minimum wage in Germany in 2015. In the traditional line of reasoning, based on the allocational approach of modern labor market economics, it has been suggested that the impact is clearly negative on the assumption of a competitive labor market and clearly positive on the assumption of a monopsonistic labor market. Unfortunately, both predictions conflict with the empirical findings, which do not show a clear-cut impact of significant size in either direction. As an alternative, a Post Keynesian two-sector model including an employment market is presented here. Its most likely prediction of a negligible employment effect and a sectoral shift is tested against the German case of an introduction of a statutory minimum wage in 2015. Despite substantial wage increases in the low wage sector, our empirical analysis reveals very low overall employment loss, amounting to about 26,500 workers, as a result of a small sectoral shift from low wage industries to higher wage industries.

**Keywords** Post Keynesianism · Minimum wage · Aggregate demand · Aggregate supply

**JEL codes** B 50 · E 12 · E 23 · J 31

## 1 Introduction

The discussion about minimum wages in general is an old one.[1] The introduction of a statutory minimum wage in Germany in 2015 added yet another chapter to that discussion.[2] While the economic mainstream view – represented by the majority position within the German Council of Economic Experts (*Sachverständigenrat*) –

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[1]For an overview, see Neumark et al. (2014).

[2]See e.g. Heitger (2003), Franz (2007), Bauer et al. (2009), Paloyo et al. (2013).

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claimed that minimum wages create a negative employment effect, particularly for lower-skilled and youth, inexperienced workers (see SVR 2013: 284ff.), progressive or dissenting economists – represented by the minority position within the German Council of Economic Experts – argue that a minimum wage will actually increase the quantity of employment (see SVR 2013: 289 f., Bofinger 2015: 164ff.).

Both positions are based on a partial analysis of the labor market using allocational reasoning. Assuming the ordinary labor market to be characterized by perfect competition – as put forward in a number of introductory textbooks – a minimum wage will undoubtedly have significantly negative employment effects once the minimum wage is higher than the market-clearing wage rate associated with the respective skill level.[3] This is because any job that does not earn its labor cost, i.e. where the (minimum) wage rate is higher than the marginal productivity of that job, will eventually be priced out of the market. A minimum wage that is set below the market-clearing wage rate would clearly be useless. This straightforward result, based on the pre-analytical vision of the labor market being the operator of intertemporal exchange between (real) income, leisure time and postponed consumption, can only be altered without challenging that pre-analytical vision by refuting the assumption of perfect competition. Assuming a monopsonistic labor market, i.e. a labor market with one (dominant) employer, a minimum wage rate set between the profit-maximizing wage rate of the monopsonistic firm and the maximum wage rate associated with the productivity of the same quantity of employment will increase the level of employment and reduce the mark-down on wages (see, e.g., Manning 2003; Ashenfelter et al. 2010).

Both models present clear-cut and opposing predictions about the impact of minimum wage rates on employment and it should, therefore, be easy to evaluate these theories empirically: As there are many countries with long histories of minimum wage legislation (Neumark and Wascher 2008: 9ff., ILO 2014), we should be in a position to refute either of the two models or, rather, the assumptions on which they rest. Alas, meta-studies on the minimum wage (see, e.g., Doucouliagos and Stanley 2009; Wolfson and Belman 2014) paint a perplexing picture: "Economists have conducted hundreds of studies of the employment impact of the minimum wage. Summarising those studies is a daunting task, but two recent meta-studies analysing the research conducted since the early 1990s conclude that the minimum wage has little or no discernible effect on the employment prospects of low-wage workers" (Schmitt 2013: 22).

There are two possible ways to tackle the question of why this is the case. (1) Remaining within the traditional pre-analytic vision (i.e. accepting the ontological dimensions of the neoclassical paradigm), one has to find "channels of adjustment" that could stop managers from firing workers as would be expected in the ordinary competitive market model (see Hirsch et al. 2015; Schmitt 2013: 11ff.): increasing productivity through training or lower labor-turnover or reducing the effect of nominal minimum wages on real minimum wages by allowing the cost to be passed on in the form of price increases. Of course, one could also assume that real-world labor markets may be partly competitive (in some regions) and partly monopsonistic (in other regions): Depending on the employment shares of both market structures, this would cancel out positive and negative employment effects. (2) If one turns to a different pre-analytical vision – which

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[3] Most simulation studies for Germany predicted a loss of more than one million jobs (i.e. about 3% of total employment!) if the current minimum wage of 8,50 € were to be introduced (see, e.g., Schuster 2013: 33).

would mean a truly heterodox approach[4] – then a different prediction about the impact of minimum wages on employment becomes possible: one that is better in line with the empirical picture.

This is exactly what the present paper attempts to provide. Taking the empirical evidence as a strong disincentive to accepting the traditional line of reasoning, we will provide a model of a Post Keynesian 'employment market' that not only suggests a macroeconomic frame, but is based on a pre-analytic vision of the economy as a system of nominal obligations (part 2).[5] This general model needs to be restructured in such a way as to portray the effect of minimum wages on employment. As the effect of minimum wages is to hamper wage dispersion, or even to shrink the lower bound thereof, in order to avoid 'unfair' wages (or, morally speaking, 'exploitation') for that part of the labor force that is no longer covered by collective agreements (see Bachmann et al. 2008: 28ff.), we can rely on a two-sector model created to discuss the employment effects of growing wage dispersion (part 3). Finally, in part 4 we examine the effects of the introduction of a statutory minimum wage on employment in Germany in 2015 using availabe data on household consumption elasticities and sectoral affectedness by the minimum wage introduction.

## 2 A post Keynesian model of the employment market

Post Keynesianism is a portmanteau term for a variety of quite different heterodox approaches. By relying closely on the ideas presented in chapter 2 of Keynes' *magnum opus*, fundamentalist or monetary Keynesianism appears to have elaborated the most highly-visible approach to providing an alternative to the ordinary labor market of the neoclassical mainstream (see e.g. Weintraub 1957, Davidson and Smolensky 1964, Davidson 1994, Kregel 1984/85).[6] Monetary Keynesianism does not only forcefully reject Walras' law as (positive or negative) heuristic (see Heise 2017), it also provides a microeconomically-based, yet macroeconomically-embedded employment determination that turns the quantity-price nexus of neoclassical labor markets upside down. It is not the real wage rate that causally governs labor supply and demand until equilibrium is reached at the full employment level; but rather the quantity of labor demanded and supplied (at the level where real wage and profit expectations are fulfilled and, therefore, a stable position beyond the market-clearing point is reached) is determined endogenously and simultaneously with the real wage rate.[7] The employment market,[8]

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[4] For a theoretical deduction of heterodox economics, see Heise and Thieme (2016: 1107ff.).

[5] To our knowledge, there are only three Post Keynesian studies on minimum wages, of which one is not in English (Seccareccia 1991) and the other two rather broad in nature (Herr et al. 2009; Herr and Kazandziska 2011).

[6] Of course, ever since Franco Modigliani's extension of Hicks' ISLM interpretation of Keynes' *General Theory* (see Modigliani 1944), the labor market and employment determinantion have played a significant role in those economic approaches that are termed 'Keynesian'. However, to our knowledge, other than monetary Keynesianism, there is no other Post Keynesian approach that attempts explicitly to reject traditional labor market reasoning and to take seriously Keynes' claim that the real wage is no exogenous control or distributive device, but is endogenously determined *pari passu* with the quantity of employment.

[7] „…, and the volume of employment is uniquely related to a given level of real wages – not the other way round"(Keynes 1936: 30).

[8] Throughout this paper, we will call the virtual place of employment determination from a Post Keynesian perspective the 'employment market', in order to distinguish it from the ordinary 'labor market' of neoclassical provenance.

as will be developed below, cannot, therefore, be considered by way of a partial analysis, independently of its macro-economic environment. We will, thus, have first to outline a Post Keynesian macro model, before we concentrate – but always keeping the macro-economic links in mind – on the employment market.

The stylized, static[9] Post Keynesian model presented here is an elaboration of Setterfield (2006), Heise (2008) and Pusch and Heise (2010). It comprises seven structural and definitional equations and equilibrium conditions depicting the post-Keynesian core of the model. We start with the demand equation:

$$D_t = \alpha\left(w_-, I, \overline{m}, \overline{G}, L_t\right) \tag{1}$$

where $D$ is the value of aggregate demand, which evolves as a function of (given) nominal wages $w_-$, (given) nominal private investment outlays $I$,[10] the (given) investment multiplier $\overline{m}$, (given) governmental spending $\overline{G}$, and labor employed $L$.

The supply relation is:

$$Z_t = \beta\left(\overline{w}, \overline{T}, L_t\right). \tag{2}$$

$Z$ is the value of aggregate supply. $\overline{T}$ denotes (given) technology. The next equation is an equilibrium condition:

$$D_t \equiv Z_t. \tag{3}$$

The price level $p$ depends on the nominal (given) wage rate $\overline{w}$, given technology and a given mark-up $\overline{\pi}$:

$$p_t = \gamma\left(\overline{w}, \overline{T}, \overline{\pi}\right). \tag{4}$$

Real income $Y$

$$Y_t = \theta\left(\overline{K}, L_t, \overline{T}\right) \tag{5}$$

is dependent on production factors and technology. $L$ is the level of employment determined by Eq. (3), $K$ is the (given) stock of real capital.

We need to realize that equilibrium employment $L_t$ determined in the aggregate demand-aggregate supply section merely explains the aggregate employment demand by firms given their demand expectations are met. In order to understand whether such equilibrium employment demand matches the supply of labor provided by households, we either have to assume a given amount of labor brought forward at the ruling nominal

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[9] The focus of this paper is to investigate the effect of the introduction of minimum wages on employment using a two-sector model. Therefore, a (comparative) static approach is pursued, keeping as many variables as constant as possible.

[10] This, of course, is a very delicate assumption for a post-Keynesian model. It is set forth here only for the sake of simplicity and to reduce the complexity of the model.
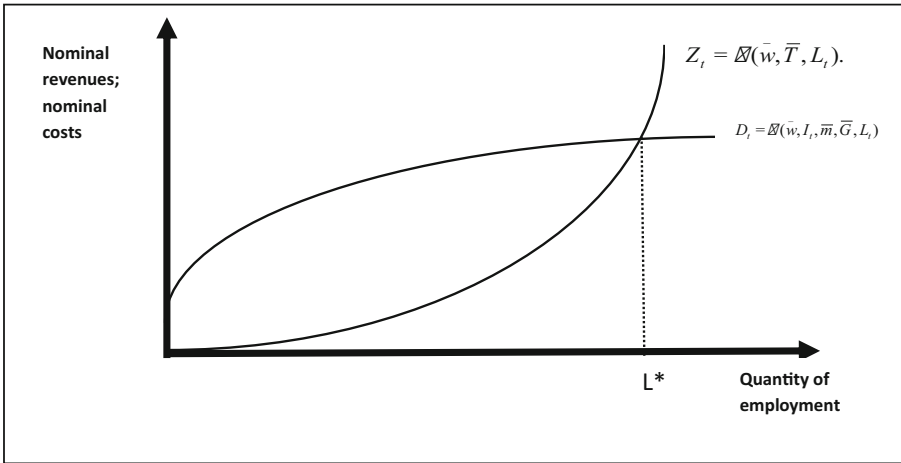
In the figure:

$Z_t = \varnothing(\bar{w}, \overline{T}, L_t).$

$D_t = \varnothing(\bar{w}, I_t, \overline{m}, \overline{G}, L_t)$

Labels: "Nominal revenues; nominal costs" (vertical axis), "Quantity of employment" (horizontal axis), "L*"

**Fig. 1** Employment determination in a Z-D-model

wage rate (irrespective of what the real wage rate will turn out to be) or, as will be done here, we assume a behavioural function of labor supply $L_S$ dependend on the given wage rate and an expected price level $p_e$:

$$L_S = \lambda\left(p_e, \overline{w}\right) \qquad (6)$$

In order to satisfy the conditions of expectational equilibrium, we need to extend the model:

$$p_e = p_t \qquad (7)$$

The model comprises an aggregate demand-aggregate supply section (Eqs. 1–3) determining the equilibrium employment level, an ordinary production function (Eq. 5), mark-up pricing (Eq. 4), labor supply (Eq. 6) and a stability condition (Eq. 7). The model is distinctly post-Keynesian in nature inasmuch as the employment level depends on the propensity to consume, the incentive to invest, the nature of long-term expectations, i.e. employment and overall output are determined by effective demand conditions (see Keynes (1936: 250).

The Post Keynesian employment market is depicted by the aggregate demand – aggregate supply section (Eqs. 1–3) and has first been elaborated by the late Sidney Weintraub (1957). As shown in Fig. 1, overall employment is determined by the intersection of the aggregate demand curve D and the aggregate supply curve Z. The D-curve is the aggregation of firms' expectations about nominal revenues taking the nominal wage rate as given. The Z-curve is the aggregation of firms' nominal costs associated with a certain level of employment, the given nominal wage rate, technology, and fixed capital stock. The resultant quantity of employment in the overall economy is thus the number of jobs made available by employers under profit maximization principles in a world of fundamental uncertainty.

Whether L* equals the quantity of employment supplied by households at the ruling wage rate, surpasses it or falls short of it, cannot be predicted with accuracy – in

economic history, we have experienced all three constellations.[11] What can be said with some certainty is that a mature economy with a large capital stock (i.e. low marginal efficiency of capital), high income and saturation level (i.e. low marginal propensity to consume), and high labor market participation rates for both men and women will be far less likely to secure full employment than an economy with lower capital stock (i.e. higher marginal efficiency of capital), lower income and saturation levels (i.e. higher marginal propensity to consume), and lower labor market participation rates. What can also be said is that any disequilibrium between supply and demand of employment cannot easily be cured by curtailing wage aspirations (see e.g. Davidson 1994: 179ff.), as the nominal wage rate (which is the appropriate controllable variable) enters equally into both aggregate demand and supply functions – graphically acting as a shift parameter that leaves the intersection of the curves unaltered with respect to the quantity of employment.[12] Therefore, Keynes and Post Keynesians favor(ed) a wage regime that is able to introduce some downward rigidity as an institutional device for safeguarding the stability of the economic system.[13]

It is necessary to point out at this stage that a labor market in which supply and demand for labor are equilibrated by real wage movements does not exist in any operative way (see, e.g., Lucas 1981: 242; Darity and Horn 1988: 220; Heise 2017). Real wages can neither be determined exogenously by the parties to collective bargaining nor by individual actors, but will be determined in line with employment and the price-level once the nominal wage rate is set and the production technology is given. Taking the common features of a 'well-behaved' production function for granted[14] (Eq. 5), higher employment is ceteris paribus associated with a lower real wage rate. But this correlation cannot be turned into a causality running from lower real wages to higher employment.

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[11] Post-war (West) German economic history, for instance, showed a period of 'over employment'up until the early 1970s (when migrant labor was invited into Germany to fill the rising number of vacancies), 'full employment' until the first oil crisis in the mid-1970s (when unemployment and job vacancies were approximately equal in number) and unemployment ever since.

[12] This result rests on two assumptions: (1) a closed economy; and (2) endogenous money. Of course, the assumption of a closed economy is not very realistic. But the introduction of external economic relations does not necessarily produce a different result (this depends on the exchange rate system) or would imply a beggar-thy-neighbor strategy. The second assumption is, of course, a basic Post Keynesian assumption, which undermines the likelihood of positive real-balance effects in favor of negative real-balance effects in the event of a severe deflationary process.

[13] "In the light of these considerations I am now of the opinion that the maintenance of a stable general level of money-wages is, on the balance of considerations, the most advisable policy for a closed system; …" (Keynes 1936: 270).

[14] This, of course, may be seen critically by Sraffians. However, it conforms to Keynes'acceptance of the 'first fundamental postulate'in the *General Theory* (Keynes 1936: 5ff.). Moreover, we interpret Sraffa's critique not as a complete refutation of a 'well-behaved'production function but as the theoretical proof that the particular properties of a 'well-behaved'aggregate production function (i.e. the falling marginal productivities of the factors of production) may not hold in any case. However, the empirical validity of this theoretical possibility is still open to discussion (see e.g. Hamermesch 1986, Felipe and McCombie 2005).

## 3 A Sectoral refinement

In order to discuss the effect of minimum wages on employment, we need to portray a two-sector model of the Post Keynesian employment market (see Heise 1998; Heise 1999): sector A comprises all firms that are affected by the minimum wage and sector B comprises all firms that pay wages above the minimum wage level (see Fig. 2).[15]

$L_A$ and $L_B$ denote the quantities of employment in sector A and B, respectively[16]; u depicts unemployment. What we are interested in is the impact of an increase in the nominal wage rate in sector A up to the level of a fixed minimum wage rate, while the wage rate in sector B stays unchanged. As elaborated in Heise (1998: 254ff.), the sectoral employment effect of a change in the sectoral wage rate depends on the relative weight of the 'substitution effect' of relative price changes of commodities (i.e. the respective sectoral price elasticities of demand) and the 'income effect' of (wage) income changes (i.e. the respective income elasticities of demand). The overall employment effect can be summarized as follows[17]:

$$N = k\left(\eta_{A,A} + \eta_{B,A} - \varepsilon_A - 1\right)w_A + (1-k)\left(\eta_{B,B} + \eta_{A,B} - \varepsilon_B - 1\right)w_B \qquad (8)$$

($\varepsilon_i$ = absolute value of the own price-elasticity of demand for commodities of sector i; $\eta_{i,j}$ = income-elasticity of demand of wage earners of sector j for commodities of sector I; k = employment share of sector A; ° denotes the rate of growth [percentage change] of a variable)

Let us assume the introduction of a fixed, binding minimum wage for all branches, resulting in an increase of the nominal wage rate in sector A by x%, while the nominal wage rate in sector B stays unchanged:

$$w_A{}^\circ = x$$

$$w_B{}^\circ = 0$$

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[15] Of course, sector A will comprise firms from many different industrial sectors and branches. In Germany, most firms with most of the employees that will be affected by the minimum wage legislation are from branches such as agriculture, forestry and fishing, retail, transportation, food and beverages, and hotels and restaurants (see Bellmann et al. 2015).

[16] In different studies (see Knabe et al. 2014; Brenke and Müller 2013; Falck et al. 2013; Heumer et al. 2013; Kalina and Weinkopf 2013), the percentage of employees affected by the minimum wage in Germany, i.e. $L_A$, ranges between 14% - 20% of total employment.

[17] Specifying eq. 1 and eq. 2 and assuming, for the sake of simplicity, that only wage earners consume and no governmental spending, we get: $Z_i = (\pi_i/\omega_i) w_i N_i$ and $D_i = c_{i,i} w_i N_i + c_{i,j} w_j N_j + I_i$ with $\pi_i$ = average labor productivity in sector i and $\omega_i$ = marginal labor productivity in sector i; $w_i$ = nominal wage rate in sector i and $N_i$ = employment in sector i; $c_{i,j}$ = marginal propensity to consume commodities from sector j of wage earners from sector i and $I_i$ = (autonomous) investment spending on commodities of sector i. Now, the rate of change of employment with respect to the rate of change of the nominal wage rate depends on the relative rate of change of the D- and Z-functions: $N_i{}^\circ \mid w_i{}^\circ = c_{i,i}{}^\circ N_i{}^\circ - (\pi_i{}^\circ - \omega_i{}^\circ)$. Defining $c_{i,i}{}^\circ = \eta_{i,i}$; $\pi_i{}^\circ - \omega_i{}^\circ = \varepsilon_i$ and k = share of employment in sector i (and, respectively, (1-k) as employment share of sector j), we get: $N^\circ = k(\eta_{i,i} + \eta_{j,i} - \varepsilon_i - 1) w_i{}^\circ + (1 - k)(- \eta_{j,j} - \eta_{i,j} + \varepsilon_j - 1) w_j{}^\circ$.
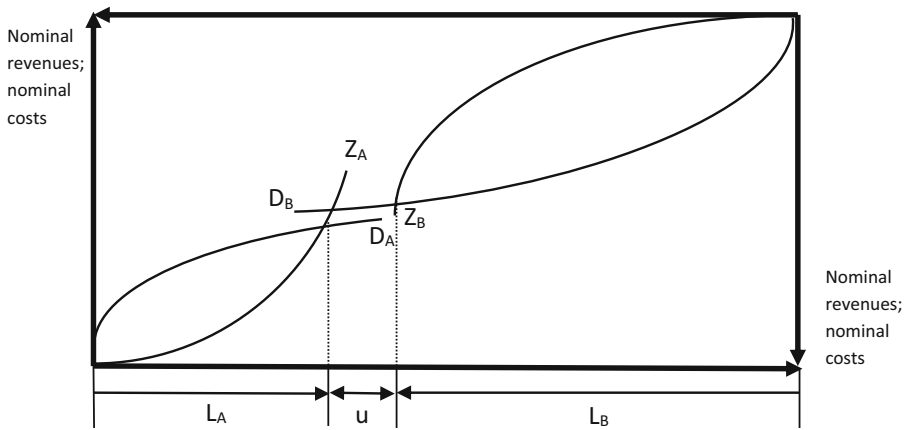
Fig. 2 A Post Keynesian 2-sector-model of the employment market

Disregarding cross-price elasticities of demand and any possible reaction from the central bank, the employment effect will be[18]

$$N_A^{\circ} = k\left(\eta_{A,A} - \varepsilon_A - 1\right)w_A^{\circ} + (1-k)\eta_{A,B}w_B^{\circ} \tag{9}$$

$$N_A^{\circ}|\ w_A^{\circ} = k\left(\eta_{A,A} - \varepsilon_A - 1\right)x \tag{9a}$$

$$N_B^{\circ} = (1-k)\left(\eta_{B,B} - \varepsilon_B - 1\right)w_B^{\circ} + k\,\eta_{B,A}\,w_A^{\circ} \tag{10}$$

$$N_B^{\circ}|\ w_A^{\circ} = k\,\eta_{B,A}\,x \tag{10a}$$

$$N^{\circ}|\ w_A^{\circ} = k\left(\eta_{A,A} + \eta_{B,A} - \varepsilon_A - 1\right)x \tag{11}$$

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[18] Herr et al. (2009: 12) come to the following conclusion with respect to employment effects of minimum wages in a Post Keynesian approach: „…minimum wages will change the structure of wages, the structure of prices, the structure of demand for final products and the structure of demand for inputs. How employment is affected is theoretically open and extremely difficult to predict empirically." If 'theoretically open' is to mean that there may be different Post Keynesian model specifications with potentially different results, the statement is correct but also somewhat trivial. Whether the effects are 'extremely difficult to predict' depends on the specific model specification – formal specifications as opposed to narrative approaches, at least, offer the charm of making prediction rather easy. Whether such predictions can easily be falsified empirically, is yet another question and depends on the testability of the theoretical predictors. But, maybe, that is what they meant by 'extremely difficult to predict empirically'.
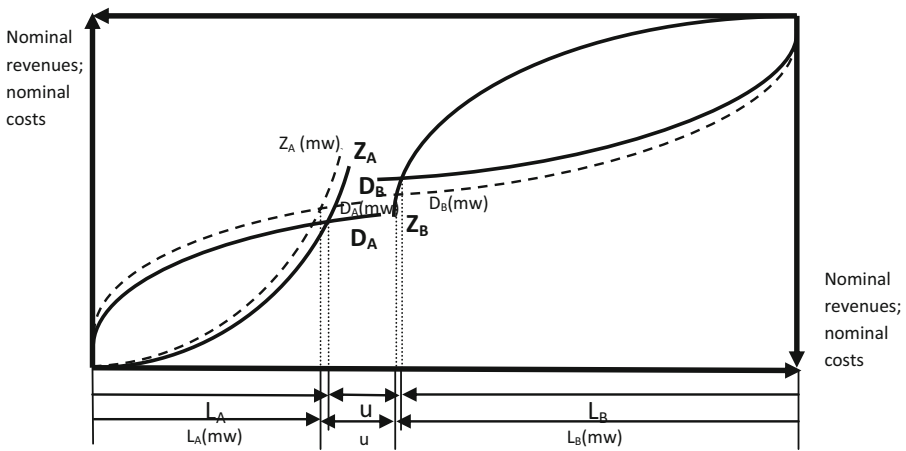
**Fig. 3** A Post Keynesian employment market with minimum wage. Note: mw denotes the respective function or variable after the introduction of a minimum wage

The 'substitution effect' is given by the magnitude of the price-elasticity of demand for those commodities produced by workers affected by the minimum wage legislation, $\varepsilon_A$; the 'income effect' is determined by the income elasticities of demand of those workers affected by the minimum wage for commodities from sector A, $\eta_{A,A}$, and for commodities from sector B, $\eta_{B,A}$ (see Eq. 11). From Eqs. 9a and 10a, the respective sectoral impacts of the introduction of a minimum wage in sector A can be specified. Obviously, they will be of different magnitude and they might also be of different sign: While sector B might gain from minimum wages in sector A (income effect), sector A itself will have to weigh the positive income effect against the negative substitution effect. Most likely, the employment impact in sector B will be positive, while it will be negative in sector A (see Fig. 3).

## 3.1 An application: A quantitative analysis for Germany

From chapter 19 of the *General Theory*, we can infer that Keynes was rather sceptical about the positive effect of wage reductions on employment outcomes. Contrary to neoclassical labor market theory,[19] Keynes argued that both moderate wage reductions and moderate wage increases, which result in neither massive deflationary nor massive inflationary pressure, will affect the price level, but not the total quantity of employment (see Keynes 1936: 267). It is only once wage changes trigger a contractionary monetary reaction or markedly increase the real burden of nominal obligations that negative employment effects are likely to occur.

Keynes, however, assumed a single nominal wage rate for all firms (by transforming different types of labor into 'ordinary labor') and thus concentrated on change in the general wage level, while ignoring the possible effects of a change in the wage structure. In order to shift our attention to precisely this object of inquiry, we had to

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[19] Pigou's *Theory of Unemployment* (Pigou 1933), which Keynes explicitly criticized in his *General Theory*, can still be seen as the foundation of modern labor market theory.

refine the simple Post Keynesian employment market model by introducing two different sectors, A and B, in which the nominal wage rates $w_A$ and $w_B$ differ and may change in different ways. As we have seen, the sectoral, as well as total, employment effect of a change in the wage structure due to the introduction of a generally binding minimum wage depends on the respective magnitudes of the income- and price-elasticities of demand.

## 3.2 Description of sectors

In order to predict the effect of a minimum wage in sector A, we have to estimate the respective elasticities of demand for those commodities affected by the introduction of a minimum wage and the income-elasticities of demand of the wage-earners of sector A. This, alas, poses serious problems. In the real world, there is no such sector in which all firms are affected by the minimum wage as there is no alternative sector in which no firm is affected by the minimum wage. Instead, we will have to group firms (or, rather, industries) according to the share of their employees being affected by the minimum wage. Our example is the case of Germany, where a statutory minimum wage of 8.50 € was introduced with effect from 1st of January 2015 onwards.

In order to measure the affectedness of industries ressulting from the minimum wage introduction, we used the GSOEP (German Socio Economic Panel) and its two-digit industry classification (Nace 1..99). GSOEP, supplied by DIW, is a yearly survey among about 30,000 German residents. It comprises industry and worker information that can be used for the calculation of hourly wages of about 10,500 workers. We did not consider workers with legal exemptions from the statutory minimum wage – such as trainees, former long-term unemployed in their first half year of employment, students below 18 years and apprentices. However, we did consider industries with a temporary exemption from the minimum wage as their collectively agreed minimum wages were on track to be replaced by the statutory minimum wage by 2018. We did not consider industries with higher sectoral minimum wages (extended by law, e.g. for blue collar workers in mainstream construction).

For the calculation of the hourly wage we used the monthly gross wage, agreed hours, paid overtime as well as collective agreement information (25% overtime premia are customary when there is a collective agreement). An overview of those industries and their relative minimum wage affectedness is given in Table 1. Column 2 depicts the relative share of workers with an hourly wage below 8.50€ in each industry in the year 2014, just before the minimum wage introduction. Column 3 shows the average wage increase in sectors A and B that would result from the uprating of all wages lower than 8.50€ in the year 2014 to the new minimum wage in 2015. All other wages that were at least as high as 8.50€ per hour in 2014 are assumed to stay constant in this calculation. At this stage, no employment reaction or reduction of hours is assumed.

Sector A of Table 1 comprises all such industries with an above-average (>= 13%) share of workers earning less than 8.50 € per hour before the minimum wage introduction, while sector B comprises all such industries with a below-average share of those workers (<13%). Using this categorization, we had to leave out a considerable number of industries because their markets are price-coordinated (such as most governmental services in the widest sense), in which cases the foregoing analysis does not

**Table 1** Industries comprising sector A and sector B

| Industries | Share of minimum wage earners | Average wage increase |
|---|---|---|
| Sector A | 28.1% | 4.4% |
| Crop and animal production, hunting and related services | 23.6% | |
| Fishing and aquaculture | 36.8% | |
| Manufacturing of food products | 23.9% | |
| Manufacturing of tobacco products | 89.1% | |
| Manufacturing of textiles | 15.8% | |
| Manufacturing of wearing apparel | 28.3% | |
| Manufacturing of leather and related products | 66.1% | |
| Manufacturing of furniture | 13.8% | |
| Wholesale trade, except of motor vehicles and motorcycles | 15.0% | |
| Accommodation | 25.3% | |
| Water transport | 46.1% | |
| Rental and leasing activities | 33.2% | |
| Sports activities and amusement and recreation activities | 16.5% | |
| Other personal service activities | 47.2% | |
| Activities of households as employers of domestic personnel | 48.5% | |
| Sector B | 6.1% | 0.7% |
| Forestry and logging | 1.2% | |
| Coal mining | 0.0% | |
| Extraction of oil and gas | 0.0% | |
| Other mining and quarrying | 0.0% | |
| Manufacturing of wood and of products of wood and cork, except furniture, straw and plaiting materials | 3.0% | |
| Manufacturing of paper and paper products | 2.7% | |
| Printing and reproduction of recorded media | 7.7% | |
| Coke, refined petroleum products | 0.0% | |
| Manufacturing of chemicals and chemical products | 1.4% | |
| Manufacturing of rubber and plastic products | 6.4% | |
| Manufacturing of other non-metallic mineral products | 9.8% | |
| Manufacturing of basic metals | 1.8% | |
| Manufacturing of fabricated metal products, except machinery and equipment | 4.3% | |
| Machinery and equipment | 2.5% | |
| Manufacturing of computer, electronic and optical products | 0.0% | |
| Manufacturing of electrical equipment, subsector [31] | 2.3% | |
| Manufacturing of electrical equipment, subsector [32] | 2.7% | |
| Manufacturing of electrical equipment, subsector [33] | 6.8% | |
| Manufacturing of motor vehicles, trailers and semi-trailers | 5.0% | |
| Manufacturing of other transport equipment | 7.6% | |
| Energy supply | 6.2% | |
| Wholesale trade, except of motor vehicles and motorcycles | 8.9% | |

**Table 1** (continued)

| Industries | Share of minimum wage earners | Average wage increase |
|---|---|---|
| Land transport and transport via pipelines | 9.7% | |
| Air transport | 9.5% | |
| Auxiliary traffic services | 12.3% | |
| Telecommunications and postal services | 12.0% | |
| Credit | 1.6% | |
| Insurances | 3.3% | |
| Data processing | 2.4% | |
| Research and development | 7.4% | |
| Services mainly for other firms | 22.1% | |

GSOEP v33.1, 2014 cross section, own calculations

apply.[20] White-collar workers in construction[21] (6% MW affectedness), workers in renting of machinery and equipment (33% MW affectedness) and real estate services (11% MW affectedness) were also not considered as part of sector B. The latter two sectors represent mainly rental costs and, therefore, past investment not influenced by the minimum wage in the short to medium term. Construction, on the other hand, can be thought to deliver fixed investment mainly to real estate services. For reasons of consistencey we also take this industry out of consideration. Sector B also comprises a number of industries that are mainly producing investment goods. According to the OECD input-output table, those are are mainly delivered to industries of sector B and, thus, stay in the sector. Altogether, about 66% of workers eligible for the minimum wage worked in sectors A and B.

Moreover, there is one exception from the higher wage systematic of Sector B in the last line of the Table 1. The sector "other services mainly for firms" is included, which shows an above-average level of affectedness (22%) by the minimum wage. According to OECD input-output tables, this sector produces fairly little for final consumption of households (16% of output) and the value of intermediate goods that are produced in this sector for high wage industries is 3.9 times the value of input goods produced for low wage industries.[22] In part, this may be a result of outsourcing, which has been used by high wage firms in order to reduce wage costs. For these reasons, we consider this industry as part of sector B. As reported in Table 1, on average 28.6% of the employees in sector A were affected by minimum wages, whereas only 6.1% of the employees in sector B were affected. As a result, the average nominal wage increase in sector A due to

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[20] We excluded the following sectors based on the SOEP nace classification: waste and recycling, water supply, public administration, education, health services, interest groups.
[21] Blue-collar workers are covered by a sectoral minimum wage that is higher than the statutory minimum wage.
[22] In all other cases where there was a low (<20%) share of private household consumption in the sectoral production according to the input-output table, a regard for the composition of inputs for sectors A/B (with higher household consumption share) did not change the sector classifications given by the share of workers below the minimum wage.

the introdcution of the minimum wage in 2015 was 4.6%, while it was only 0.6% in sector B.

The introduction of a minimum wage distorts the wage structure at the lower end, increasing nominal, real and relative wages for the least paid laborers. This, again, distorts relative costs and prices of goods according to their exposure to minimum wage labor. Relative price developments in typical low wage industries as food production (using mainly input from agriculture, which is also characterized by low wages), leisure and culture as well as hotels and restaurants developed dynamically after the minimum wage introduction (in leisure and culture already before 2015, see Fig. 4) while this is not the case for goods/services the largest spending categories from sector B (traffic including cars and goods for personal hygiene). The resulting effect on overall and sectoral output and employment depends ultimately on the allocation of effective demand across the sectors. Changes in effective demand – due to changes in wages and the wage structure – will cause output and employment changes as well as a change in the sectoral allocation of effective demand. The scale and direction (positive or negative) of such changes and the outcome with respect to output and employment depend on the magnitude of the demand elasticities involved.

Therefore, no universally valid quantitative prediction of the employment effects can be made. However, there is good reason to believe that the most likely effect of a generally binding minimum wage on overall employment is negligible or at least very small (see Heise 2017). In order to make a more precise quantitative estimation for the German case (and to test this general prediction), we estimated price and income elasticities using the EVS (*Einkommens- und Verbrauchsstichprobe*) dataset and consumption price deflator sub-categories, both supplied by the German Federal Statistical Office (*Statistisches Bundesamt*). The EVS contains rich household information about categories of consumer spending, income, sociodemographic information as well as the industry of occupation of the main earner in the years 2003 and 2013. For the estimations, only households with workers from sectors A and B were considered. Real consumption of goods from sector A and B and two combined goods price indices were calculated (base year 2010). Income and price elasticities were then estimated with log-normal equations including logs of real spending for goods of sectors A/B, real household income and the relative price indices.

Table 2 reports the results: Income elasticities of demand for goods from sector A are lower than those for goods from sector B, indicating that sector A provides goods for more basic needs than sector B (including a high share of food expenditure). Moreover, demand for goods from sector B is markedly price-elastic, while demand for goods from sector A is price-inelastic. This finding corresponds with the above characterization of goods from sector A as being more basic than those from sector B.

### 3.3 Estimation of employment effects

As the result of a statutory minimum wage introduction, both sectors face an increase in nominal wage cost and final demand. Due to the higher exposure of sector A to minimum wage earners, prices will increase relatively more in sector A than in sector B. Due to the lower income-elasticity of demand for goods from sector A than for sector B, it is to be expected that the positive "income effect" of an introduction of minimum wages in Germany on sector A will be outweighed by a negative

**Fig. 4** Selected good price indices (2010 = 100%). Source: Tabelle 61,111–0003, German Federal Statistical Office

"substitution effect" of absolutely and relatively rising prices – i.e. a loss in employment appears likely. In the case of sector B, the relation of both effects is less clearly to be predicted – the expected employment effect may bear both signs.

As reported in Table 3, relying on the empirical elasticities for the two sectors for Germany, sector A will have experienced an employment loss of about 27,080 jobs or −0.4% of its employment level prior to the minimum wage introduction. Sector B faces a gain in employment of about 600 jobs or + 0.005% of total employment in this sector. This means that the introduction of a general, binding minimum wage of 8.50 € in 2015 has caused an overall drop in employment of about −26,500 jobs or − 0.1% of total dependent employment and a small structural shift from sector A to sector B. These

**Table 2** Price and income elasticities for Germany

| Elasticities | Magnitude |
| --- | --- |
| $\eta_{A,A}$; Income elasticity of demand of workers from sector A for goods from sector A | 0.62 |
| $\eta_{B,A}$; Income elasticity of demand of workers from sector A for goods from sector B | 0.77 |
| $\eta_{B,B}$; Income elasticity of demand of workers from sector B for goods from sector B | 0.72 |
| $\eta_{A,B}$; Income elasticity of demand of workers from sector B for goods from sector A | 0.56 |
| $\varepsilon_{A}$; Price elasticity of demand for goods from sector A | −0.24 |
| $\varepsilon_{B}$; Price elasticity of demand for goods from sector B | −1.99 |

EVS and consumption price deflators (German Federal Statistical Office), own calculations

incremental changes are entirely in line with the results from the above-mentioned meta-studies on minimum wages showing indiscernable effects on employment.

However, some qualifications are in order: the study is concerned with only 66% of total dependent employment (not subject to lasting excemptions to the minimum wage). With respect to the determination of employment in governmental services, the implicit assumption may hold, that minimum wages are of no concern here. This is less obvious in the case of the semi-public health care sector and employment in construction and rental services. Yet, in order to include employment in these sectors, the model would have to be extended by some kind of input-output analysis and additional assumptions on price effects on consumption of public health services etc. – something which must be left for further modelling. Furthermore, it can be argued that the minimum wage may have resulted in productivity effects, this in turn may have reduced the need to increase prices. Indeed, results of Pusch and Rehm (2017: 413) Mindestlohnkommission (2016) indicate that work intensification has been one of the major adjustments to the minimum wage introduction at the plant level (for the US: see also Hirsch et al. 2015). If this effect is especially pronounced in mainly industrial plants of sector B that were affected by the minimum wage, the induced price effect might be lower and the employment increase of sector B (high price elasticity) considerably higher. Also, the consideration of cross-price elasticities may enhance the inter-sectoral shift of jobs.

Moreover, the minimum wage introduction was accompanied by a marked drop in the number of mini-jobs (Mindestlohnkommission 2016) and a re-regulation of agency work, raising its wages especially in eastern Germany above the minimum wage threshold. The latter can be seen as part of the wider discussion about distriubtion, labor market re-regulation and setting limits to the growth of atypical work in Germany. As has been argued by Kleinknecht et al. (2006), the extensive use of flexible work arrangements may harm productivity growth at the plant level. Thus, the minimum wage introduction (and the wider policy package) may have lasting effects on productivity growth.

What could make our results a bit too pessimistic regarding the net number of lost jobs is that we could just calculate marginal consumption elasticities for all workers of sectors A/B (not just minimum-wage earners), as the calculation of hourly wages in EVS is currently not possible. Therefore, income elasticities of Table 3 can rather be seen as the lower bound of actual income elasticities. Higher income elasticities would make real job losses in sector A even smaller, whereas employment gains in sector B would increase further. Finally, the magnitude of jobs losses can also be smaller in reality than estimated here because of the large number of firms that do not comply with the

**Table 3** Employment effect of minimum wage in Germany

| Sector | Employment share in % | Employment effect | Employment effect in % of total employment |
| --- | --- | --- | --- |
| Sector A | 22.1 | −27,080 | −0.4% |
| Sector B | 44.1 | +589 | 0.0% |
| Total | 66.2 | −26,491 | −0.09% |

GSOEP, EVS, CPI sub-categories (German Federal Statistical Office), own calculations
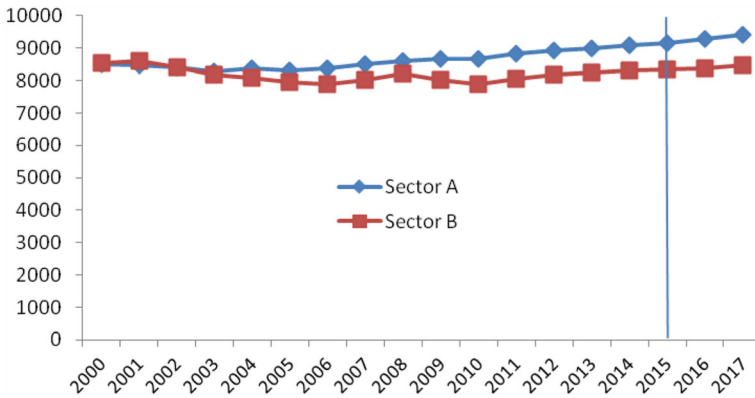
**Fig. 5** Trends of dependent employment in sector A and B (1000); 2000–2017. Source: Fachserie 18, Reihe 1.1, Federal Statistical Office Germany, own calculations

minimum-wage legislation (in 2016 there have been violations of the minimum wage for about 8% of eligible employees or 2.2 million workers, see Pusch 2018).

## 4 Conclusion

As shown in Table 3, the impact of the introduction of an economy-wide, binding minimum wage on overall employment in a Post Keynesian perspective is most likely to be negligible or at least very small, provided no contractionary monetary reaction is triggered and the parameter constellation is as it is in the German case. The picture may, however, look different if single industries or sectors are taken separately. This result is very much in line with the empirical findings of the above-mentioned meta-studies and appears to fit reality with respect to deviant industry results (see e.g. Machin et al. 2003; König and Möller 2007) and first, preliminary empirical findings for the recent German case (see e.g. Bossler and Gerner (2016) who estimated 60,000 lost jobs due to the minimum wage introduction[23]). It also fits empirically better than either the neoclassical labor market model of perfect competition or of monopsony.

Moreover, the employment trends of both sectors A and B do not show any apparent structural break after 2014 attributable to the introduction of the statutory minimum wage (see Fig. 5) – yet another piece of empirical evidence which resonates with the Post Keynesian predictions of fairly low job losses/gains in sector A and B.[24]

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[23] Although this number is reasonably close to our simulation and much nearer to the above-mentioned forecasts of job losses in the range of one million and more, it should be noted that the DiD design of Bossler and Gerner refers more or less to gross job losses in our sector A. Moreover, work time effects were not taken into account. Simultaneous to the minimum wage introduction there has been a substantial conversion of mini-jobs with low working time into longer working time employment subject to social insurance (albeit mainly part time) as recent results have shown (vom Berge et al. 2017).

[24] Sectors A and B here deviate slightly from the compilation of section 4. The reason is data availability in the most recent statistics of the German Federal Statistical Office. Sector A of fig. 5 comprises agriculture, hotels, restaurants and transportation. Sector B of fig. 5 comprises manufacturing and telecommunication/postal services.

**Compliance with ethical standards**   The authors declare that they have no conflict of interest.

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