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Job Protection Renders Minimum Wages Less Harmful

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Abstract

Individual labour productivities are often unobservable for firms when hiring new workers. Job protection may prevent firms ex post from using information about labour productivities. We show that a binding minimum wage introduced in the presence of job protection will lead to lower unemployment levels than predicted by the standard labour market model with heterogeneous labour and full information.

JEL Classification: J2, J3, H5, L5

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1. Introduction

The minimum wage may be a costly redistributive tool when it causes unemployment among the least productive workers. Standard labour market theory provides clear-cut predictions that minimum wages above market-clearing levels cause unemployment. The empirical studies on the labour market effects of minimum wages are less unequivocal.[1] Overall, however, the empirical studies more or less confirm that minimum wages reduce employment although the estimates for the negative employment effects differ substantially.

While there is a broad consensus that minimum wages are harmful, the impact of job protection on employment is largely inconclusive. For instance, even if job protection reduces the flexibility of firms, this disadvantage can be offset by lower wages. Both theoretical analysis and empirical studies indicate that measures of job protection are roughly neutral for employment.[2]

We analyse the interaction of these two policy measures in a setting where the one measure – the minimum wage – is harmful as in the standard labour market model, while the other measure – job protection – has no impact on aggregate employment. If the minimum wage legislation is accompanied by job protection, the complementary measure may alleviate the destructive effects of the minimum wage on employment. When employers cannot distinguish *ex ante* between high- and low-ability workers, they are not able to pay different wages. Once employers learn about the true productivities of their workers, they will adjust employment or wages accordingly, if there is no job protection. Job protection, however, makes such adjustments more difficult or even impossible for firms. If firms cannot make use of the information gathered after hiring a worker, they will alter their labour demand. In the presence of job protection, firms do not compare the marginal productivity of a low-ability worker with the minimum wage when hiring new workers. Rather, the firms compare the (higher) expected marginal productivity with the minimum wage. This change in the firms' hiring pattern renders the minimum wage less harmful when complementary job protection

[1] See Neumark and Wascher (2008) for a comprehensive survey on the labour market impact of minimum wages.

[2] This is the conclusion of e.g. Cahuc and Zylberberg's (2004) chapter on employment protection that summarizes the theoretical and empirical findings from among others Lazear (1990), Bertola (1990), Nickell (1997), Elmeskov et al. (1998), OECD (1999), Addison and Teixeirea (2003).

measures are at work. The effect of a minimum wage is thus not only determined by the market structure (e.g., atomistic or monopsonistic) but also by additional government interventions in the labour market. A minimum wage, when combined with job protection measures, can be the higher the larger the share of high-ability workers is and the larger the productivity differences between low-ability and high-ability workers are.

To develop the argument, we set up a simple model with two types of labour, which differ with respect to their abilities (or productivities). In general, firms do not know a worker's productivity in a particular job *ex ante* and only learn about the worker's productivity over time (see Jovanovic 1979). We model this feature similar to Kugler and Saint-Paul (2004) and Blumkin and Sadka (2005), who assume that prior to hiring, firms cannot observe the productivities of applicants but detect the productivity of the worker after hiring.[3] In the scenario without job protection, firms will observe individual abilities *ex post* and adjust wages accordingly. In the scenario with job protection, firms cannot discriminate *ex post* between ability types anymore and, therefore, have to pay a uniform wage. Thus, job protection prevents firms from exploiting information, which is gained after a newly hired worker has started to work in the firm.

The paper is organized as follows. In Section 2, we set up the model and describe the equilibrium without job protection. Section 3 introduces the scenario with job protection. We compare the outcomes in the two scenarios with respect to employment in Section 4. Section 5 concludes.

2. A standard labour market model without job protection

There are two types of workers, low- and high-ability workers, who are endowed with q_l and q_h efficiency units of labour ($q_l < q_h$).Without loss of generality, we normalize both the total number of workers and the total number of firms to unity. The share of high-ability workers in

[3] Blumkin and Sadka (2005) analyse a labour market where workers *ex ante* can provide some costly signal about their individual productivities. In Kugler and Saint-Paul (2004), firms can learn from the employment status of applicants. As we are interested in the complementarity of minimum wages and job protection, we abstract from such strategies.

the population is given by h.[4] L_l and L_h denote actual employment of low- and high-ability workers, respectively.

High- and low-ability workers are substitutes in the production process, where each firm produces according to $f(q_h L_h + q_l L_l)$ with $f' > 0$ and . Different productivities are not due to differences in (observable) education but rather due to *ex ante* unobservable productivity differences such as ability, reliability or work morale. All firms behave competitively and take the output price $p = 1$ and the wage rates w_l and w_h for the low- and high-ability workers as given. Profit maximization yields the first-order conditions

$$\frac{\partial \pi}{\partial L_j} = f'(q_h L_h + q_l L_l) q_j - w_j = 0 \qquad \text{for } j = h, l,$$

which define the labour demand for high- and low-ability workers. In equilibrium, all workers have to be paid at least the legal minimum wage b ($w_j \geq b$, $j = h, l$). Depending on the magnitude of the minimum wage, we can distinguish four cases.

Case A (non-binding minimum wage): If the minimum wage is below $b_s^{full} \equiv f'(q_h \cdot h + q_l \cdot (1-h)) \cdot q_l$, wages ($w_h, w_l$) can fully adjust so that the wages reflect the productivity differences: $w_h / w_l = q_h / q_l$. Firms are indifferent whether to hire low-ability or high-ability workers. In equilibrium, all workers will be employed and we have $L_h = h$ and $L_l = 1 - h$. This critical level b_s^{full}, above which a statutory minimum wage becomes binding, depends on the productivities of both low- and high-ability workers and their respective shares. Figure 1 depicts the outcome in the labour market with the share of high-ability workers *h* on the horizontal axis and the minimum wage *b* on the vertical axis. All points below the b_s^{full}-curve are characterized by full employment (area A), all points above are associated with unemployment. The b_s^{full}-curve is downward sloping, i.e. the critical minimum wage will be lower with a larger fraction *h* of high-ability workers. An increase in *h* reduces marginal productivity as more efficiency units of labour are employed. This leads to lower employment levels for a given wage. As the wage for the low-productivity workers cannot be adjusted downwards, they are the first to be laid off.

[4] To focus on the impact of the minimum wage and job protection on the hiring decision of firms, we abstract from possible supply side effects by assuming fixed labour supply for each type of labour.

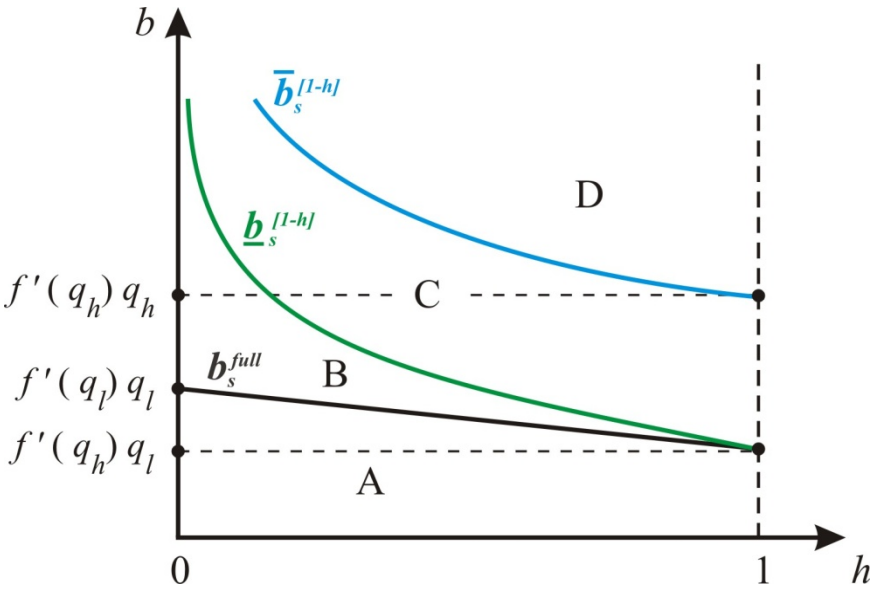
The following three cases consider binding minimum wages in the standard setting.

Case B: If the minimum wage is slightly above b_s^{full}, unemployment occurs but affects low-ability workers only. The wages of the high-ability workers will fully adjust ($w_h = b \cdot q_h / q_l$) so that the firms' demand equals the supply of high-ability workers.[5] Starting from b_s^{full}, unemployment among the low-ability types is increasing in *b*. The last low-ability worker is laid off when $\underline{b}_s^{[1-h]} = f'(q_h \cdot h) \cdot q_l$. In the interval $[b_s^{full}; \underline{b}_s^{[1-h]}]$, employment amounts to:

$$L_h = h \text{ and } 0 < L_l = f'^{-1}\left(\frac{b}{q_l}\right)\frac{1}{q_l} - \frac{q_h}{q_l} \cdot h < 1 - h, \qquad (1)$$

where L_l is obtained by inverting the firms' optimality condition that marginal labour productivity equals the minimum wage. Area B in Figure 1 spans the interval $b_s^{full} < b \leq \underline{b}_s^{[1-h]}$ where high-ability workers are fully employed, but where low-ability workers face unemployment.

Figure 1: Employment without job protection



Case C: Above the $\underline{b}_s^{[1-h]}$-curve, the minimum wage becomes so high that no low-ability worker will be employed. As long as the marginal productivity of the last high-ability

[5] Note that the wages of the high-ability workers are strictly proportional to the minimum wage.

worker is above the minimum wage, the minimum wage is not binding for high-ability workers and the firm will not lay off this type of worker. Thus, within the range $\underline{b}_s^{[1-h]} < b \leq f'(q_h \cdot h) \cdot q_h \equiv \bar{b}_s^{[1-h]}$, it pays to employ all high-ability workers but it is not profitable to hire any low-ability workers:

$$L_h = h \text{ and } L_l = 0. \tag{2}$$

In area C of Figure 1, a further increase in the minimum wage level does no additional harm.

Case D: For $b \geq \bar{b}_s^{[1-h]}$, even the high-ability workers face unemployment. The employment levels fall to

$$L_h = f'^{-1}\left(\frac{b}{q_h}\right) \cdot \frac{1}{q_h} < h \text{ and } L_l = 0. \tag{3}$$

Area D in Figure 1 contains all cases where the minimum wage becomes binding even for high-ability workers.

3. Job protection

Now we turn to the case with job protection. When employers can distinguish between high- and low-ability workers before hiring, job protection has no impact. Firms would pay differentiated wages and the analysis of the preceding section would continue to hold.

When, however, employers cannot distinguish *ex ante* between high- and low-ability workers, they are not able to pay different wages. While they will adjust employment or wages when they learn about the true productivities of their workers if there is no job protection, they cannot make such adjustments in the presence of job protection. Employment protection laws prevent firms from firing workers whose productivity is below the wage paid. Furthermore, employers will not raise the wage for the high-ability workers whose productivity exceeds the wage rate as long as these high-ability workers cannot signal their true productivity to other potential employers in the market. This creates an environment with hidden information for the firms at the hiring stage. All firms decide simultaneously on the

size of their workforce.[6] From the point of view of an individual firm, the distribution of productivities follows a binomial distribution. As we are interested in the impact of pooling heterogeneous workers and not so much in the stochastic process itself, we facilitate the analysis by assuming that each firm is sufficiently large and could hire a share *h* of high-ability workers for sure. The average productivity amounts to $q_a = q_h h + q_l(1-h)$ and the representative firm maximizes $\pi = f(q_a L) - wL$ with respect to employment. The first-order condition immediately yields the labour demand $L = f'^{-1}(w/q_a)/q_a$.

In the presence of job protection we can distinguish two cases.

Case I (non-binding minimum wage): A wage below the average productivity will ensure full employment. The maximum non-binding minimum wage that just ensures full employment ($L=1$) with job protection is $b_a \equiv f'(q_a)q_a$.

Case II (binding minimum wage): For $b > b_a$ firms will hire fewer workers and employment falls to

$$L_a = f'^{-1}\left(\frac{b}{q_a}\right)\frac{1}{q_a}. \tag{4}$$

The level of the critical minimum wage b_a depends on the share of high-ability workers and the productivity differences between low-ability and high-ability workers.

Proposition 1. *With hidden information, raising the share of high-ability workers h or the productivity q_h allows the government to raise the minimum wage without harming employment, if .*

Proof. Taking the derivative of b_a with respect to *h* and q_h, we immediately obtain

$$\partial b_a/\partial h = (q_h - q_l)[f''(q_a)q_a + f'(q_a)]\left\{\begin{matrix}>\\<\end{matrix}\right\}0 \;\Leftrightarrow\; f''(q_a)\cdot q_a + f'(q_a)\left\{\begin{matrix}>\\<\end{matrix}\right\}0.$$

$$\partial b_a/\partial q_h = h[f''(q_a)q_a + f'(q_a)]\left\{\begin{matrix}>\\<\end{matrix}\right\}0 \;\Leftrightarrow\; f''(q_a)\cdot q_a + f'(q_a)\left\{\begin{matrix}>\\<\end{matrix}\right\}0.$$

[6] This simplifying assumption is in contrast to models of job search where a stock of workers is only gradually replaced by new hires. Our setting is equivalent to an immediate switch to the new steady state.

For , an increase in *h* or q_h raises the *expected* marginal productivity.[7] This effect is not outweighed by the increase in efficiency units of labour so that the firms will hire more workers if *h* or q_h increases. This is in contrast to the scenario without job protection, where an increase in both *h* or q_h always reduces the marginal productivity of the low-ability workers.

4. Comparing employment levels

Do minimum wages generate the same unemployment patterns in the two scenarios? The comparison of the critical levels where the minimum wage becomes binding immediately yields

> ***Proposition 2.*** *The level, at which the minimum wage becomes binding with job protection, always exceeds the respective level without job protection.*

Proof. The critical levels are $b_a = f'(q_a)\cdot q_a$ and $b_s^{full} \equiv f'\left(q_h \cdot h + q_l \cdot (1-h)\right)\cdot q_l$. As we focus on full employment, we have $f'(q_a) = f'(q_h \cdot h + q_l \cdot (1-h))$. Hence, the comparison of the critical levels yields $b_a = q_a / q_l \cdot b_s^{full}$. As $q_a > q_l$, the critical minimum wage is always higher with job protection.

It follows from Proposition 2 that, if the minimum wage does not cause unemployment without job protection, it will never cause unemployment with job protection. If the minimum wage is so low that it does not even prevent the employment of the last low-ability worker, it also cannot distort the allocation of labour with job protection.

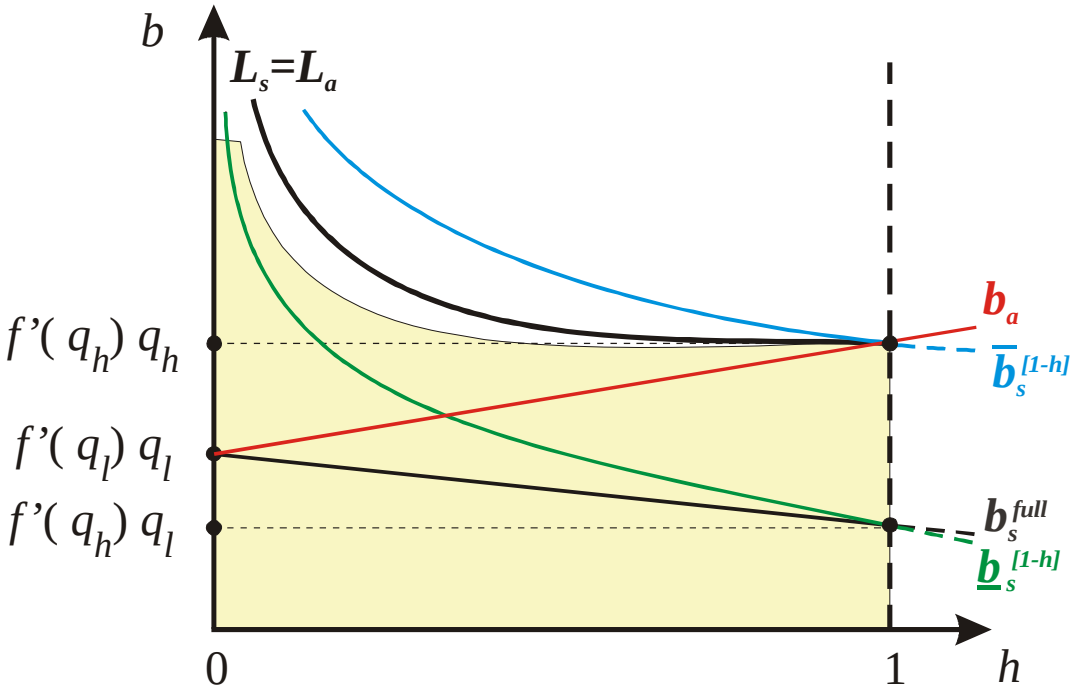
If the minimum wage is between the marginal productivity of the last low-ability worker and the expected marginal productivity at full employment, firms have no incentive to hire all low-ability workers in the scenario without job protection but would still hire all workers when all workers have to be paid the same wage (with job protection). This is summarized in the following corollary:

[7] This condition is satisfied, e.g., for the Cobb-Douglas production technology.

Corollary. *Any minimum wage that is between the marginal productivity of the low-ability worker and the expected marginal productivity at full employment is binding in the absence of job protection, while it is non-binding in the presence of job protection.*

In Figure 2, we add the b_a-curve to the lines introduced in Figure 1.[8] For minimum wages below the b_a-curve, we have full employment with job protection. Therefore, employment is at least as high as without job protection. As we observe unemployment in the scenario without job protection for $b > b_s^{full}$, the area above the b_s^{full}-curve and below the b_a-curve indicates the combinations of *h* and *b* where the minimum wage is fully neutralized by job protection while causing unemployment without job protection.

Figure 2: Employment levels – with and without job protection



A standard argument as to why the minimum wage may not be as harmful refers to monopsonistic structures in the labour market [Manning (2003)]. Proposition 2 and the Corollary provide an additional argument: job protection has a softening effect on the detrimental impact of minimum wages in otherwise functioning labour markets because firms

[8] Figure 2 is drawn for the case $f''(q_a)q_a + f'(q_a) > 0$. In the alternative case, the b_a–curve is downward sloping; see Proposition 1.

focus on expected marginal productivity rather than the lower marginal productivity of the low-ability type.

Proposition 2 and the Corollary describe the outcomes in the area below the b_a-curve, where job protection is always beneficial as a complementary measure in terms of employment. Is job protection also helpful with a higher minimum wage that causes unemployment in the presence of job protection? We can formulate

Proposition 3. *If the minimum wage is low enough to allow the employment of some low-ability workers in the absence of job protection, introducing job protection will always increase employment.*

Proof. All low-ability workers will be unemployed, when the minimum wage reaches $\underline{b_s}^{(1-h)}$. Employment with and without job protection are implicitly given by $f'(q_a \cdot L_a) \cdot q_a = b_s^{(1-h)}$ and $f'(q_h \cdot h) \cdot q_l = \underline{b_s}^{(1-h)}$. As $q_l < q_a < q_h$, we get $h < L_a$.

As long as the minimum wage is below the $\underline{b_s}$-curve, there is still some employment of low-ability workers even without job protection. Proposition 3 demonstrates that in all cases below the $\underline{b_s}$-curve, employment can be increased by introducing job protection. Finally, we are interested in the question whether employment with job protection can ever fall below the employment level without job protection.

Proposition 4. *(a) For* $f''(x)x + f'(x) > 0$*: There is a critical level for the minimum wage above which employment is lower with additional measures of job protection. (b) For* $f''(x)x + f'(x) < 0$*: The minimum wage will always be less harmful with job protection.*

Proof. (a) We show that there is a critical minimum wage $\underline{b_s} < \tilde{b} < \bar{b}_s$, where employment with job protection falls below the level without job protection. For such a minimum wage, employment is constant at $L_s = h$ without job protection. With job protection, employment decreases in *b* in this interval At $b = \underline{b_s}^{(1-h)}$, employment is higher with job protection: $L_a > h$ (see Proposition 3). At $b = \bar{b}_s^{(1-h)}{}_s$, the employment levels are implicitly given by $f'(q_a \cdot L_a) \cdot q_a = \bar{b}_s$ and $f'(q_h \cdot h) \cdot q_h = \bar{b}_s$ with and without job protection. Implicit differentiation

of $f'(q_i \cdot L_i) \cdot q_i = \bar{b}_s$ yields $\frac{dL_i}{dq_i} = -(f(q\_i \cdot L\_i) \cdot q\_i \cdot L\_i + f'(q\_i \cdot L\_i)) / (f(q_i \cdot L_i) \cdot q_i^2)$ with *i*=*h*, *a*. For $f''(x)x + f'(x) > 0$, higher productivity goes along with higher employment $\frac{dL_i}{dq_i} > 0$. As $q_a < q_h$, employment is lower with job protection ($L_a < h$) at $b = \bar{b}_s$. Hence, there must be one critical minimum wage , above which job protection becomes detrimental for employment. (b) A critical minimum wage $\tilde{b}$, above which job protection becomes detrimental, would have to satisfy $f'(q_a \cdot \tilde{L}) \cdot q_a = \tilde{b} = f'(q_h \cdot \tilde{L}) \cdot q_h$. As higher productivity goes along with lower employment: $\frac{dL_i}{dq_i} < 0$ for $f''(x)x + f'(x) < 0$, there cannot exist any employment level $\tilde{L}$ satisfying the condition above. Hence, employment is always higher with job protection ($L_a > L_s$).

Proposition 4(a) is illustrated in Figure 2. The $L_s = L_a$-curve, on which employment levels are the same in both scenarios, must be above the $\underline{b}_s^{[1-h]}$-curve and below the $\bar{b}_s^{[1-h]}$-curve. Below the $L_s = L_a$-curve, employment is always larger with job protection. For high minimum wages above the $L_s = L_a$-curve, the minimum wage is more harmful in the scenario with job protection.[9] For moderate minimum wages, which only affect the low-ability workers, job protection renders a statutory minimum wage less harmful. Only with high minimum wages, the economy may achieve higher employment levels when firms can operate without job protection. Thus, the negative employment effects of a minimum wage can be alleviated in the presence of complementary regulatory measures such as job protection.

5. Conclusion

The standard economic analysis stresses that a minimum wage above the full employment wage for low-ability workers causes unemployment. Our analysis has shown that this may not be true in the presence of complementary regulatory measures such as job protection. When firms cannot exploit information on workers' productivities *ex post*, they are forced to focus on average rather than marginal productivities when hiring workers. A statutory minimum wage below the average productivity at full employment allows the government to raise the wage of low-ability workers without distorting the labour market. High minimum wages,

[9] Along the $L_s = L_a$-curve, output is higher without job protection because only high-ability workers are employed. The iso-output line is below the $L_s = L_a$-curve.

however, also cause unemployment with job protection. Eventually, the existence of complementary policy measures becomes detrimental.

References

Addison, John T. and Paulino Teixeira (2003): "The Economics of Employment Protection", *Journal of Labor Research* 24, 85-129.

Bertola, Giuseppe (1990): "Job Security, Employment and Wages", *European Economic Review* 34, 851-886.

Blumkin, Tomer and Efraim Sadka (2005): "Compensation Policy and Optimal Income Taxation – The Case of Minimum Wage", *International Tax and Public Finance* 12, 713-722.

Cahuc, Pierre and André Zylberberg (2004): *Labor Economics*, MIT Press, Cambridge, MA.

Elmeskov, Jörgen, John P. Martin and Stefano Scarpetta (1998): "Key Lessons for Labor Market Reforms: Evidence from OECD Countries' Experiences", *Swedish Economic Policy Review* 5, 205-253.

Jovanovic, Boyan (1979): "Job Matching and the Theory of Turnover." *Journal of Political Economy* 87, 972-990.

Kugler, Adriana D. and Gilles Saint-Paul (2004): "How Do Firing Costs Affect Worker Flows in a World with Adverse Selection?" *Journal of Labor Economics* 22, 553-584.

Lazear, Edward (1990): "Job Security Provisions and Employment", *Quarterly Journal of Economics* 114, 977-1023.

Manning, Alan (2003): *Monopsony in Motion – Imperfect Competition in Labor Markets*, Princeton University Press, Princeton, NJ.

Neumark, David and William Wascher (2008): *Minimum Wages*, MIT Press, Cambridge, MA.

Nickell, Stephen (1997): "Unemployment and Labor Market Rigidities", *Journal of Economic Perspectives* 3, 55-74.

OECD (1999): "Employment Protection and Labor Market Performance", in *Employment Outlook* Chapter 2, Paris: OECD.

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