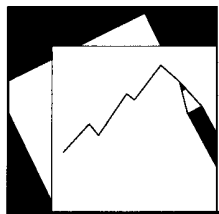


Labor Tax Cuts and Employment: A General Equilibrium Approach for France



IMF Working Paper

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Raphael Espinoza and Esther Pérez Ruiz

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European Department

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Prepared by Raphael Espinoza and Esther Pérez Ruiz

Authorized for distribution by Edward Gardner

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Abstract

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

The paper presents a simple supply side, general equilibrium model to estimate the macroeconomic effects of labor tax cuts. The model assumes that output is produced using capital, unskilled and skilled workers, and public servants. Wage formation for skilled workers features a Blanchflower-Oswald wage curve, while the labor supply for unskilled workers is very elastic around the minimum wage for small changes in employment. The model is calibrated for France and used to estimate the output and employment effects induced by two recent tax reforms: the *Crédit d'Impôt pour la Compétitivité et l'Emploi* (CICE) and the *Pacte de Solidarité Responsabilité* (RSP). We find that the tax cuts, if not offset by other fiscal measures, would contribute overall to creating around 200,000 jobs in the short run (600,000 jobs in the long run). Since the model abstracts from demand side effects, the results should be interpreted as providing estimates of the effect of tax measures on potential output and potential employment.

JEL Classification Numbers: E32, E62, E61, H20, H5, H60, E1

Keywords: social security contributions ; minimum wage ; Responsibility Pact; pacte de responsabilité; crédit d'impôt pour la compétitivité et l'emploi; CICE

Author's contact information: respinoza@imf.org; eperezruiz@imf.org

Contents

I. INTRODUCTION.....	3
II. A WALK THROUGH MEMORY LANE	4
III. ANALYTICAL FRAMEWORK.....	8
A. The Model.....	8
IV. SIMULATION RESULTS	15
A. Short-Run Results: Social Security Reduction without Offsetting Spending Cuts	15
B. Short-Run Results: Budgetary Neutral Reductions of Social Security Taxes	18
C. Long-Run Results.....	22
V. RESULTS IN LIGHT OF OTHER STUDIES.....	26
VI. CONCLUSION	26
APPENDIX A.....	28
APPENDIX B	31
VII. REFERENCES.....	34

I. INTRODUCTION¹

France has a high labor tax wedge, and it also has a long tradition of offsetting it with subsidies and tax breaks, from the Balladur and Juppé reforms in the 1990s, through the Aubry and Fillon tax breaks in the subsequent decade, to the more recent tax credits proposed by President Hollande. The academic and political debate on the effectiveness of such measures continues to be intense. The latest initiative is a cut in the tax wedge (worth EUR 30 billion over 2013-17) aimed at reversing deteriorating employment and competitiveness. The major share of the amounts involved, channeled through the *Crédit d'impôt pour la compétitivité et l'emploi* (CICE) and the *Responsibility and Solidarity Pact* (RSP), are intended to reduce labor costs for wages up to 2.5 to 3.5 times the minimum wage.

To estimate the macroeconomic effects of these two packages we calibrate a basic supply-side general equilibrium model for the French economy. Because tax cuts are primarily intended as a labor cost reducing measure, we abstract from demand-side effects. As such, the simulations presented in this paper shed light on the effects on potential output and potential employment induced by these measures, with an emphasis on the skilled versus unskilled trade offs and alternative financing schemes. Simulations show results prior to any capital response (short run) and after full adjustment of capital (long run). No specific time frame is provided, however, given that the time over which employment and activity gains are realized will depend on demand conditions and its dynamics, which are not modeled in this exercise.

The model has the simplest structure compatible with the need to study the effects of tax reform on the labor market. It assumes an open, price-taking economy, with capital, skilled and unskilled labor, involuntary unemployment, and full capital mobility. The goods and capital markets are perfectly competitive but the labor market is subject to frictions. Wage formation differs across the two labor market segments. Unskilled workers' labor supply is infinitely elastic at the minimum wage level. By contrast, wages for skilled workers are negatively related to unemployment, thus their labor supply is upward sloping.² The scope for employment gains from labor tax cuts is dictated by conventional tax incidence theory ("Dalton's law"): the more inelastic the labor supply, the more labor appropriates the "room" created by the reduction in the tax wedge through higher wages, and the smaller capital accumulation and the employment impact as a result. The demand side need not be specified, as equilibrium in the model is consistent with any combination of consumption and exports.

¹ We are grateful to Clémence Berson, Jörg Decressin, Edward Gardner, Michael Kumhof, Pierre Lissot, Camille Thubin, as well as seminar participants at the French Treasury. We thank Derek Mason for excellent research assistance.

² This can be rationalized by a variety of models, including bargaining, efficiency wage, and implicit contract models.

The simulations indicate that, in the short run, around 200,000 jobs could be created by a EUR 30bn reduction in employers' social security contributions, and the long run gains could reach 600,000 jobs. Following an intense debate on how best to allocate the subsidies, the CICE and RSP schemes will not target the lowest skilled as similar measures adopted in the past. Two main effects suggest that targeting tax cuts on the low skilled is likely to increase the effect of subsidies on employment. First, base effects imply that the labor cost reduction induced for equal budgetary costs is relatively higher for wages close to the minimum wage. Second, the empirical elasticity of labor supply with respect to wages is expected to be higher for unskilled workers.³ Of course, there are other reasons why less targeted tax cuts could be preferable, including avoiding distortions in the relative prices of the factors of production that would favor the non-tradable sector, for instance.

The main aim of this paper is to analyze the effect of tax cuts on employment and not the relative impacts on the tradable and non-tradable sectors, which is also an issue of concern in the public debate.⁴ We find that the employment benefit of targeting low skilled workers is significant. Tax cuts targeted to low wage workers have 2.3 times as large an effect on employment as untargeted reductions for equal budgetary cost (1.5 times as large in the long run). The lower employment impact from untargeted cuts stems from the fact that labor cost reductions for high-wage earners are partly appropriated through higher wages. This offsetting effect does not operate at the low end of the wage distribution, given the high incidence of unemployment amongst unskilled workers.

The rest of the paper is structured as follows. Section II reviews past episodes of tax wedge reductions undertaken by the French authorities. Section III describes the model's main features (developed in detail in Appendix A) and discusses the baseline calibration for the French economy. Section IV presents the simulation results for alternative targeting and financing schemes of the tax wedge cuts and conducts sensitivity analyses to key model parameters. Section V contrasts the results obtained in this paper with the results obtained from other models of the French economy. Section VI concludes.

II. A WALK THROUGH MEMORY LANE

Minimum wages have important benefits: they ensure that low-skilled workers earn a living wage and reduce social exclusion. Indeed, minimum wages were, from their creation, thought as a contribution to basic labor protection. The first minimum wage laws were voted in the twentieth century following laws constraining child labor and protecting workers against

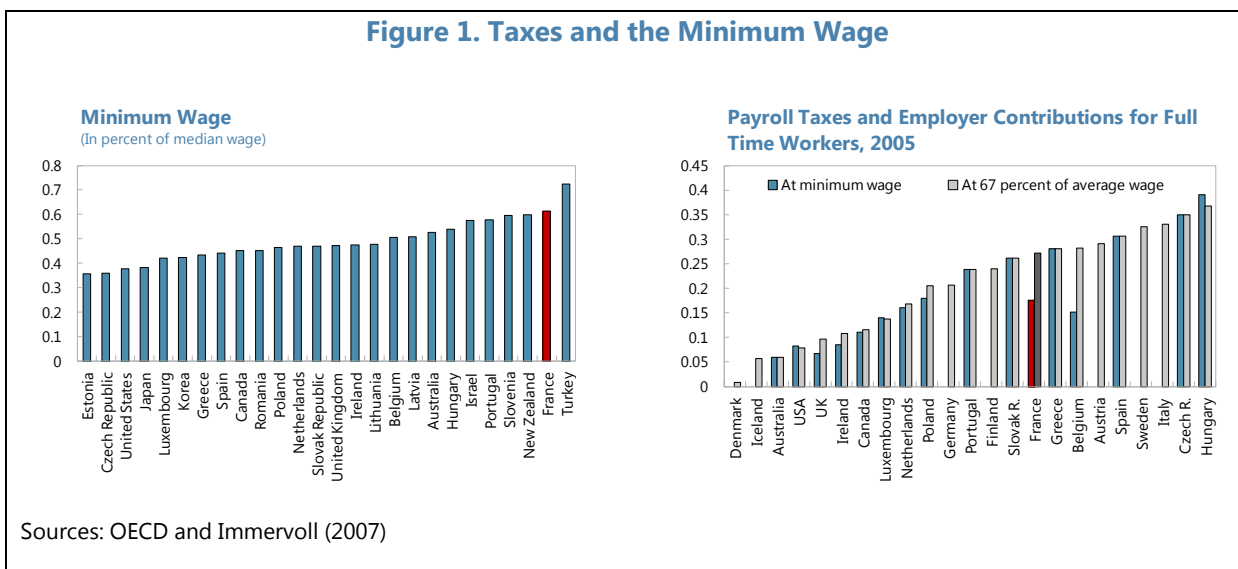
³ With high concentration of measures on unskilled workers (i.e. a highly progressive tax wedge) the cost of labor increases more than proportionally with wages. This can slow career progression for unskilled workers and lock them in a "low wage trap" (as employers face steep increases in labor costs when raising wages, see Malinvaud, 1998), making untargeted scheme more efficient. This effect is not taken into account in this paper.

⁴ The competitiveness channel is not explored here.

poor working conditions. In addition, minimum wages act as efficiency wages, enhancing incentives of workers to raise productivity. Minimum wages also participate to the social contract by reducing income inequality.⁵

Nevertheless, high minimum wages increase unemployment for those whose productivity falls below the total labor cost paid by the firm. France, where the minimum wage is amongst the highest within the OECD, has offset this by reducing social security contributions, especially at the minimum wage (Figure 1), since 1993, when the unemployment rose to 10 percent of the active population. At the time overall labor costs were not particularly high relative to peers, but the gap between the cost of labor at the minimum and at the median wage levels was particularly narrow. For many, minimum wages were out of line with productivity developments, hence the high unemployment rates amongst unskilled workers. In an attempt to contain firms' labor costs while preserving workers' purchasing power, the government therefore decided to reduce social security contributions (SSC) for low-wage earners.

Figure 1. Taxes and the Minimum Wage

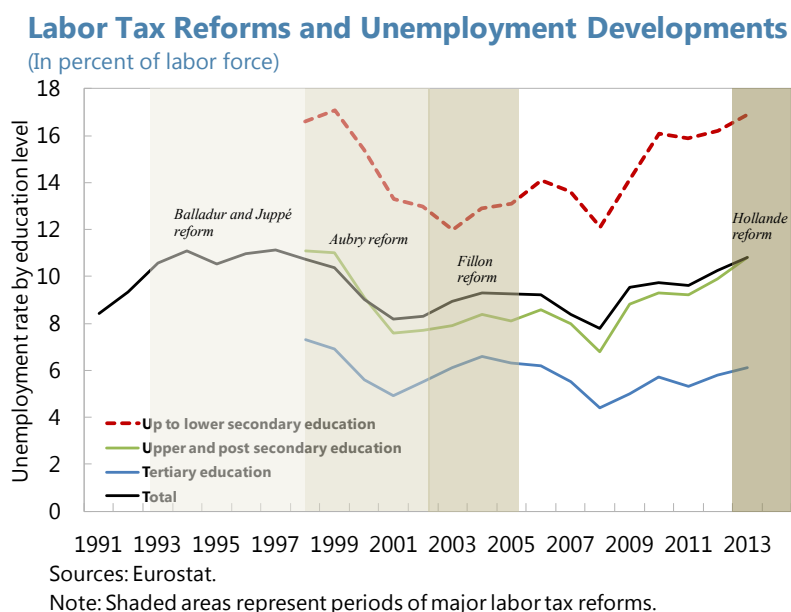


A number of labor tax cuts targeted on low-wage earners have been introduced since then, principally in four stages:

- *1993—1998*: the Balladur and Juppé reforms reduced labor costs for (gross) wages up to 1.2—1.33 times the minimum wage (SMIC) for all enterprises.

⁵ Although the prime reason to reduce inequality is one of social justice, low levels of inequality are also thought to contribute to growth performance (see e.g. Ostry and others, 2014).

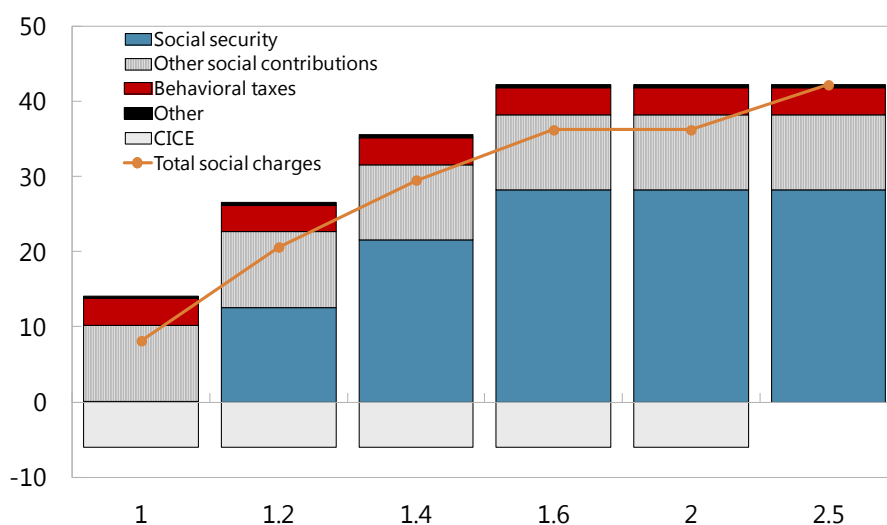
- *1998—2002 and 2003—2005*: cuts in social security contributions under the Aubry and Fillon tax breaks increased from 18.2 to 26 percent of gross wages for the SMIC, and then converging toward zero for wages at 1.6 times the SMIC. The primary aim was to offset the effects on labor costs brought about by the 35-hour workweek and the parallel increase in the hourly minimum wage introduced to preserve workers' purchasing power.
- *2007—2012*: The tax relief policy inherited from the past was marginally adjusted for various purposes. In July 2007, tax cuts at the SMIC level increased to 28.1 percent of gross wages for firms with fewer than 20 employees. In October 2007, the formula to calculate the rate of exemption was changed so as not to discourage overtime. As of January 2011, the amount of tax relief was reduced by factoring in the exceptional bonuses in the calculation of the exemption.
- *2013 onwards*: Against the backdrop of deteriorating employment and competitiveness, President Hollande put forward further tax wedge cuts worth EUR 30 billion over 2013-2017. Two thirds of that amount, channeled through the CICE, will reduce labor compensation for wages up to 2.5 times the SMIC (80 percent of workers) by 2015. The remaining EUR 10 billion (to kick in after the CICE) will target workers earning up to around 3.5 times the minimum wage.



Altogether, labor cost reducing measures adopted in France since the early 1990s have resulted into a gradual increase in the exit threshold from tax reliefs (from wages close to the SMIC in the early 1990s up to wages at 2.5 times the SMIC under the CICE). Still, the tax wedge structure is highly progressive, with social charges starting at 8.2 points for the SMIC and reaching 42.3 at 2.5 times the SMIC.

Social Charges by Wage Levels^{1/}

(Social charges as a percent of gross wages; wage levels in ratio of the minimum wage)

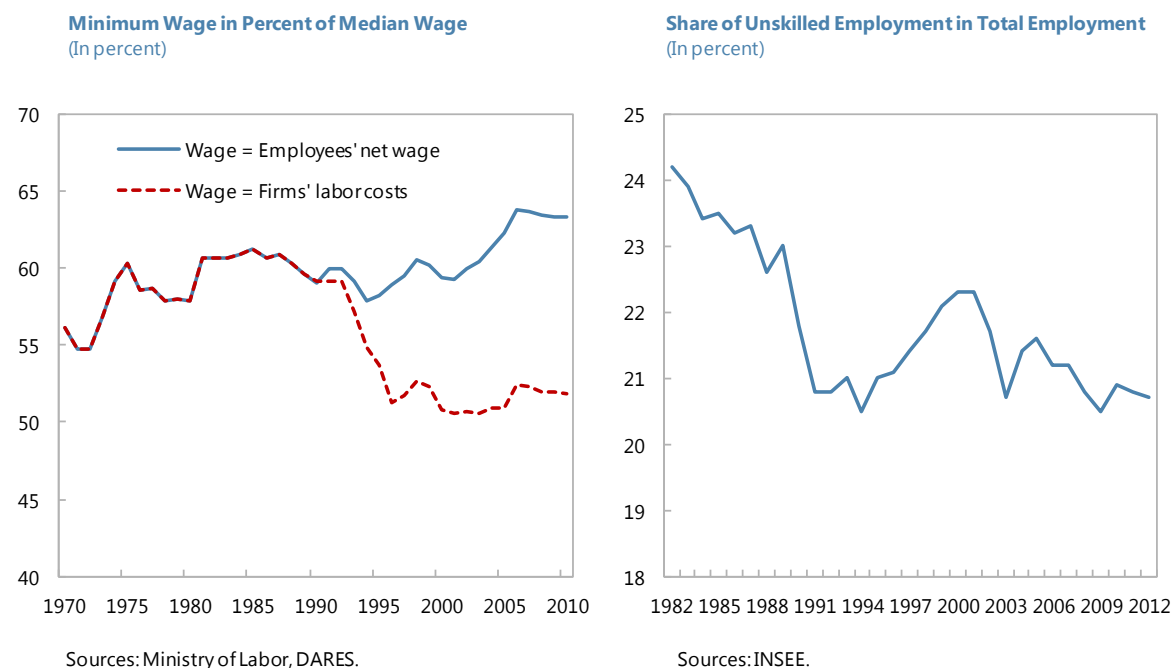


Source: DARES

1/ Social security contributions (government) cover pensions, family, and health benefits; other social contributions (social partners) cover extra-pensions and unemployment benefits; behavioral taxes (social partners) cover vocational training and work accidents; CICE is a tax credit for enterprises reducing labor compensation for wages up to 2.5 times the minimum wage.

The fiscal cost of these measures has been significant. It amounted to around EUR 22.2 billion in 2009 (1.2 percent of GDP). Almost half of this total was due to measures taken to counter the cost of moving to the 35-hour week; the remaining half reflected the update of tax reliefs introduced by the Balladur and Juppé reforms. Recent labor cost reductions committed under the CICE and the RSP imply EUR 30 billion (1.5 percent of GDP) of additional labor tax cuts over 2013-17.

Despite their fiscal cost, French economists have noted that these policies may have borne fruit (Figure 2). Starting in 1993, the cost of labor at the SMIC level relative to the median wage decreased sharply and the share of unskilled workers in total employment improved quickly in 1994-95, notwithstanding the economic slowdown (Duchene and others, 1996).

Figure 2. France: Impact of Reductions in Employers' Social Security Contributions

III. ANALYTICAL FRAMEWORK

A. The Model

We develop a one-sector, four-factor general equilibrium model with different wage-setting mechanisms for skilled and unskilled labor, and with a productive role for public spending.⁶ This allows us to simulate the effect of reduced employers' social security contributions, compensated with expenditure measures, in line with current authorities' plans. The model is solved for the short run, where capital is fixed, and for the long run, where capital is allowed to adjust until its return is equal to the world interest rate. For small variations in the demand for unskilled labor, wages of the unskilled are determined by the minimum wage. Wages of the skilled are determined by a labor supply function which is determined by unemployment and the real (after tax) wage. There are workers willing to take up jobs (involuntary unemployment) at all wage levels, but the amount of unused labor force is highest at the minimum wage level. Both the skilled and unskilled labor forces are constant. The model structure is discussed below.

⁶ The proposed setup draws on Van Rijckenghem (1997), which we further extend with a public good. Other general equilibrium calculations calibrated to France and with a similar labor skill disaggregation include Laffargue (1996) and Sterdyniak (2007).

Output is produced by means of a two-stage CES production function using four factors of production: skilled workers, unskilled workers, private capital, and a public good, which is an externality to the private factors of production (see Baxter and King, 1993). The first stage combines effective labor with private capital and the public good to produce output with an elasticity of substitution $\sigma_1 = 1/(1-\rho_1)$:

$$Y = G^\gamma (\delta_\ell L^{\rho_1} + \delta_k K^{\rho_1})^{\frac{1}{\rho_1}}$$

where Y , K , G , L denote output, private capital, the public good, and effective labor. Effective labor is a CES combination of skilled and unskilled workers with elasticity of substitution $\sigma_2 = 1/(1-\rho_2)$:

$$L = (\delta_{\ell s} L_s^{\rho_2} + \delta_{\ell u} L_u^{\rho_2})^{\frac{1}{\rho_2}}$$

where L_s and L_u are skilled labor and unskilled labor. The formulation implies constant returns to scale in the private factors of production and equal degrees of substitution between private capital and the different types of labor. The public good is produced with a constant returns to scale combination of public skilled workers (L_g) and goods (M), with a production elasticity of ω :

$$G = M^{1-\omega} L_g^\omega$$

Firms are assumed to maximize profits, equal to the returns on capital:

$$RK = \pi = Y - (1 + T_{p,u})W_u L_u - (1 + T_{p,s})W_s L_s$$

where π , R , W_u , W_s , and T_p represent profits, the gross rate of return on capital, unskilled wages, skilled wages, and the employers' social security tax rate. The output price, wages, tax rate, and capital stock are taken as given by the firm. The output price is taken as the numeraire and is set equal to one. The first order conditions for profit maximization are:

$$\begin{aligned} \frac{\partial Y}{\partial L_u} &= LC_u = (1 + T_{p,u})W_u \\ \frac{\partial Y}{\partial L_s} &= LC_s = (1 + T_{p,s})W_s \end{aligned}$$

Substituting the expressions for marginal products from the CES production function and using the chain rule for differentiation one obtains the following labor demand functions:

$$\begin{aligned} LC_s &= (G^\gamma)^{\rho_1} \delta_\ell \delta_{\ell s} Y^{1-\rho_1} L^{\rho_1-\rho_2} L_s^{\rho_2-1} \\ LC_u &= (G^\gamma)^{\rho_1} \delta_\ell \delta_{\ell u} Y^{1-\rho_1} L^{\rho_1-\rho_2} L_u^{\rho_2-1} \end{aligned}$$

Wage formation for skilled workers is featured by a “wage curve” (Blanchflower and Oswald, 1994), which can be rationalized by a variety of models, including bargaining, efficiency wage, and implicit contract models. After-tax wages for skilled workers are assumed to be a positive function of the reservation wage, which is equal to the (constant) after-tax unemployment benefit and a negative function of the unemployment rate of the skilled labor force:

$$W_s = \frac{S(\theta_s, V_s)}{1 - T_n - T_{pe}}$$

The unemployment rate for skilled workers is defined as:

$$V_s = \frac{U_s}{L_s + L_g + U_s} = \frac{U_s}{N_s}$$

where V_s , θ_s , T_n , and T_{pe} stand for the unemployment rate of skilled workers, the after-tax unemployment benefit,⁷ income, and employee social security tax rates respectively. U_s , the number of unemployed skilled workers, is equal to the skilled labor supply (N_s , exogenous) minus the number of skilled workers employed in the public sectors (L_g , exogenous) and in the private sector (L_s , solved in equilibrium).

After-tax wages for unskilled workers are assumed to be fixed to the minimum wage \underline{W} , except for large increases in the employment rate L_u (see discussion on the calibration for F in next section):

$$W_u = \underline{W} F(L_u)$$

Investment, I , is assumed to be a positive function, g , of the ratio of the after-tax rate of return on capital, R , to the foreign rate of return, R_f . This presumes that a larger the rate of return differential is associated with greater incentives for investment:

$$I = g\left((1 - T_n) \frac{R}{R_f}\right)$$

The budget surplus is given by:

$$B_s = T_n RK + (T_{p,u} + T_n + T_{pe})W_u L_u + (T_{p,s} + T_n + T_{pe})W_s L_s - \theta_u U_u - \theta_s U_s - LC_s L_g - M$$

⁷ The unemployment benefit system in France seems generous than average. Stovicek and Turrini (2012) find that France unemployment subsidies feature more lenient eligibility conditions, higher replacement rates, longer duration of benefits, and lower degressivity than the EU average. For calibration purposes, we focus on the replacement rate dimension (Section III.C).

where it is assumed that the labor cost of public servants is equal to the labor cost of skilled workers employed in the private sector. Other components of the budget are not included as they are not affected by the variables in the model.

We report simulation results in deviations from baseline. To this aim, the model is log-linearized. The log-linearized equations are presented in Appendix A.

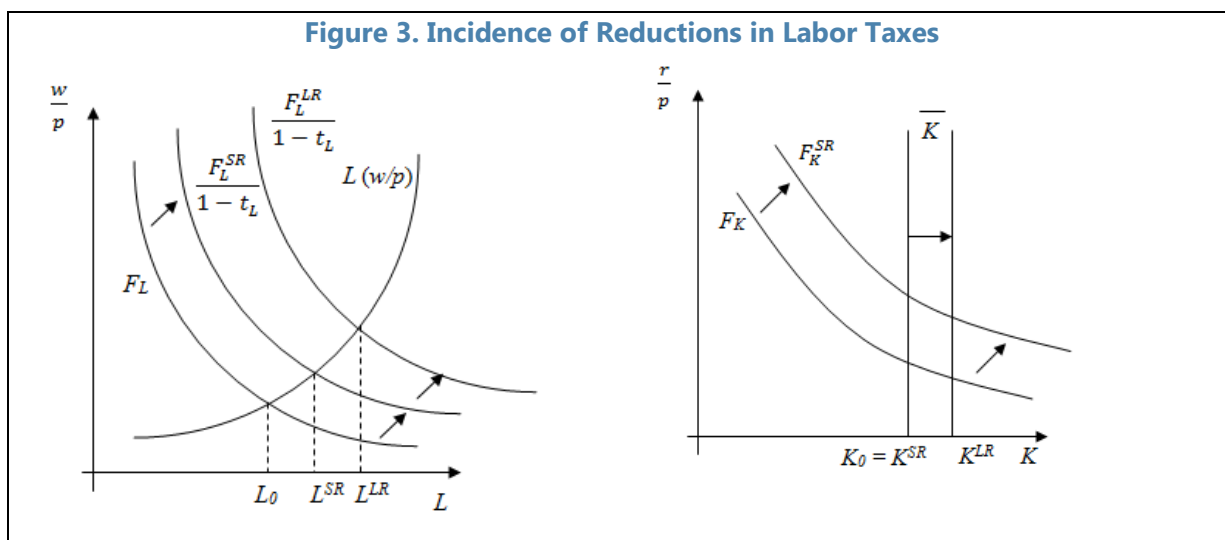
B. Short- and Long-Term Solutions

We describe here succinctly the model's behavior over both a short- and a long-term horizon.

Short term solution. The short-run solution is computed assuming capital does not adjust. Employment and output respond to tax reform through the interaction of labor demand and supply. As postulated by conventional tax incidence theory ("Dalton's law"), the employment effects depend critically on the elasticities of labor demand and supply (Figure 3).⁸ The more inelastic, e.g., the labor supply, the more labor appropriates the "room" created by a reduction in social security taxes through higher wages, thus the smaller the employment impact. Simply put, a factor which is provided inelastically bears the full burden of a tax (in this case, it appropriates the full benefit of a tax reduction).

Long term solution. The long-run solution is computed assuming capital has reached a new steady-state, where the rate of return on capital is equal to an exogenous world interest rate (and is thus unchanged by the fiscal measures). In the long run, capital receives positive impetus as a result of the tax reform, which amplifies the employment effects from tax wedge reductions. The higher employment generated in response to the labor costs reductions will increase the marginal productivity of/rate of return on capital. Capital will therefore rise to eliminate any excess returns. As capital increases, the marginal product of labor will in turn be given a positive boost, which will stimulate job creation and so on. The potential for job creation ultimately depends on the elasticities of labor and capital supply and demand, which we also assume are different in the long run following EC (1994). Focusing on labor, if labor supply is, e.g., infinitely elastic, as postulated for unskilled workers, wages will remain constant in response to labor tax cuts, employment gains will be large, and so will be the increase in the marginal productivity of capital. By contrast, the tax cuts will be fully appropriated by workers with no positive effects for employment if the labor supply is inelastic.

⁸ For a formalization of the so-called "Dalton's Law" of proportionality between incidence and relative elasticities of demand and supply of various factors see Keller (1980).



What distinguishes the segmented approach taken in this paper from the labor market scheme presented in Figure 2 is the presence of threshold effects. In the actual calibration for France (see Section III.B below), it is assumed that the labor supply is truncated at a wage level equal to 1.5 times the minimum wage. The labor supply is highly elastic up to that level in the wage distribution, but upward sloping thereafter.

C. Calibration

The calibration challenge is fitting labor supply into the two “stylized” groups of low skilled (infinite elastic supply) and higher skilled (more inelastic supply). The criterion chosen to divide the population between the two groups is observed wage behavior. Estimates put the breaking point (where wages move from being dominated by the minimum wage to responding to market conditions) at 1.5 times the minimum wage (Aeberhardt and others, 2012; Goarant and Muller, 2012). This cutoff point implies that the share of unskilled workers is 44 percent and the share of unskilled labor costs in total labor costs is 28 percent (DARES).

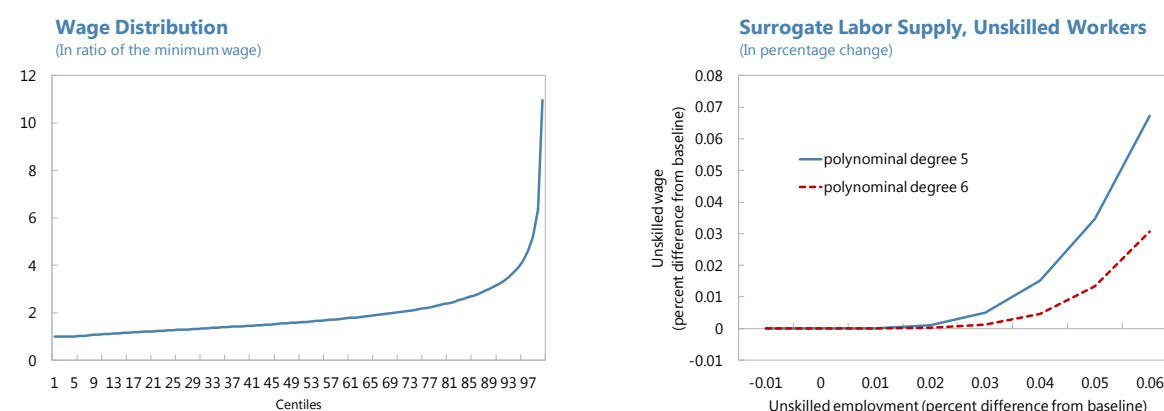
The differential wage elasticities to unemployment between the two classes of workers reflect the different market conditions they face. Employment rates are lower for low-wage earners⁹ and sectors employing unskilled workers tend to face a higher elasticity of demand with respect to prices, thus a smaller proportion of labor cost reductions can be appropriated by employees in the form of wage increases. The lower incidence of unemployment and

⁹ The unemployment rate for workers with a level of education lower than secondary school stood at 16.9 percent in 2013, against 10.8 and 6.1 for workers with upper secondary and tertiary education, respectively (INSEE). 55 percent of unemployed workers have levels of education lower than secondary school (Unedic).

more prevalent use of open-ended contracts, would lend skilled workers higher power in wage bargaining negotiations, justifying a relatively steep labor supply curve.

Our baseline calibration assumes that this elasticity (ψ) is -0.15 (Table 1) for skilled workers.¹⁰ For unskilled workers, the function F was calibrated as a higher-order polynomial such that: (i) for small changes in employment, the wage is unchanged (reflecting the constraint of the minimum wage) (ii) for ‘large’ changes in unskilled employment (in practical terms, these are changes that occur in the long run), the baseline calibration is a 5th degree polynomial, which implies that for 400,000 jobs created, half of the tax cut is passed through to higher wages.¹¹

Figure 4. Wage Distribution and Labor Supply Assumptions



Sources: France Ministry of Labor (DARES), and Staff estimates.

Finally, the elasticity of output to the public good (θ) was calibrated using the meta-analysis of Bom and Ligthart (2013), who concluded that growth literature had, on average, found the output elasticity of public capital to be around 0.1. Comparative statics exercises have shown that the other model parameters are less important to the model findings (see Appendix B). Their calibration is reported table 1.

¹⁰ Note that a wage-curve elasticity of -0.15 relating unemployment rate and the real wage, implies a labor supply elasticity of 0.67 for a baseline unemployment rate of 10 percent, thus not so far from the labor supply elasticity typically used in business cycle models (around 0.5).

¹¹ We later present results for different assumptions on the pass-through, which imply choosing different supply curves.

Table 1. Model Parameterization for France

Parameter	Calibrated value	Description	Source
Quantitative results are highly sensitive to:			
λ_l	0.6	Labor's share in total costs	National accounts
λ_s	$(1-0.28) * \lambda_l$	Share of skilled labor costs in total costs	DARES 1/
EUR_s	21.5	Employment to unemployment ratio, skilled workers	Labor Force Survey, Unedic
EUR_u	5.3	Employment to unemployment ratio, unskilled workers	
ψ	-0.15	Wages' elasticity to unemployment (skilled workers)	Meta analysis (Nijkam and Poot, 2005) 2/
Quantitative results are less sensitive to:			
σ_1 , short term	0.14	Elasticity of substitution between effective labor and capital	EC (1994)
σ_1 , long term	0.4		
σ_2 , short term	0.43	Elasticity of substitution between skilled and unskilled labor	
σ_2 , long term	1.4		
T_n	0.146	Average income tax rate	OECD
T_p	0.44	Average employer social security tax rate	OECD
T_{pe}	0.137	Average employee social security tax rate	OECD
ϑ_s	$0.65 * (1 - T_n - T_{pe})$	After-tax unemployment benefit level, skilled workers	DARES, Unedic, OECD
ϑ_u	$0.72 * (1 - T_{pe})$	After-tax unemployment benefit level, unskilled workers	
ε	1	Elasticity of investment with respect to relative rates of return	Calibrated to 1 for simplicity (unconsequential for results)

Source: Staff.

1/ Underlying gross wage distribution was provided by DARES (direction de l'animation de la recherche, des études et des statistiques, France Ministry of Labor)

2/ Nijkam and Poot's meta-analysis covers a wide range of countries. The mean estimate is -0.12. We nevertheless take a larger elasticity because our focus is on the wage curve for skilled workers. Studies on French data have not reached a consensus on whether the elasticity in France is lower or higher than in other countries (Montuenga et al., 2003 ; Gianella, 2005; Estevao and Nargis, 2001; Delteil et al, 2004) .

IV. SIMULATION RESULTS

The model is used to explore the impact of cuts in employer social security taxes on potential output and potential employment, abstracting from the possible ‘Keynesian’, demand-side, effects of fiscal policy. We first investigate the short-run impact of the measure, i.e. for a time horizon of 2-3 years over which the accumulated effect of (additional) investment on the capital stock remains small and can be ignored. We present results for different types of tax cuts, focusing on whether the tax cut is targeted at low-skilled workers (section IV.A.) and on alternative financing, spending cuts measures (section IV.B.). We finally present the impact of the measures over the long-run, i.e. for a time horizon of 10-15 years over which the capital stock has time to adjust to a new steady-state (section IV.C.) and we show the sensitivity of these results to different financing schemes and alternative assumptions on the pass-through of tax cuts to higher wages for the unskilled workers.

A. Short-Run Results: Social Security Reduction without Offsetting Spending Cuts

Table 2 shows the impact of tax subsidies¹² worth 1.5 percent of GDP (EUR 30 billion) for different targeting schemes. “Untargeted” tax cuts are taken to be tax reductions that benefit all workers paid up to 2.5 times the SMIC (i.e., 82 percent of workers), whereas tax cuts benefiting exclusively workers paid less than 1.5 times the SMIC are labeled as “targeted”. The CICE (EUR 20 billion) was an “untargeted” tax cut and there were discussions initially on whether the RSP would be targeted only to low-skilled workers. Although the final proposal for the RSP has been to keep the EUR 10 billion scheme as an “untargeted” tax cut, we use our simulations to highlight the main consequence of the different targeting for the tax cut. The first simulation in Table 2 reflects the effects of the CICE (EUR 20 billion), which spans both skilled and unskilled workers. The second and third simulations estimate the effects of the additional EUR 10 billion in tax cuts committed under the RSP, for the two different targeting assumptions. Note that, as the model used for simulations is mostly linear, the results for the RSP under the untargeted assumption are simply half of those for the CICE.

If EUR 10 billion were to target workers paid up to 1.5 times the SMIC (i.e. 44 percent of workers), the tax wedge for low-wage earners would be reduced by 5.1 percentage points and labor costs would fall by 3.5 percent (Table 2, third column). Since the model assumes that for small changes in labor demand, workers at the SMIC level do not bargain on wages and are simply paid the minimum wage, all the reduction in labor costs accrues to companies. The impact on unskilled employment is large, at 1.4 percent (around 160,000 thousand jobs). In the short-run, profits increase by 1.6 percent, but the effect on output is moderate

¹² A tax subsidy shock in the model is featured as a reduction in the employers’ social security contributions rate.

(+0.2 percent) since it takes time for capital to be accumulated and expansion effects to materialize.

Job creation for skilled labor induced by tax subsidies operate through two distinct channels, pulling in opposite directions. First, the company reacts to the decline in the relative cost of unskilled labor by replacing skilled labor (substitution effect, as captured by the degree of substitution between factors in the model). Second, the initial decline in labor costs allows firms to increase their profits and increase investment, which results in an increase of labor demand benefiting all skill levels (expansion effect, as captured by the slope of the marginal cost function).¹³ The effect on skilled employment is, therefore, ambiguous. In our baseline calibration, the effects offset each other in the short run and the impacts on skilled employment and wages are negligible. Unit labor costs decline by around 1 percent as a result of the tax cut and the small decline in wages for skilled workers.

If the tax cut is broad-based, the ‘base effect’, as alluded in the introduction of the paper, implies that the reduction in the tax wedge is much more limited: EUR 10bn of tax cut implies a relatively small reduction in the SSC rate, by only 1.5 percentage points. In addition, since the demand elasticity is lower for skilled workers, employment gains for the unskilled and total employment gains are lower (only 67,000 jobs). The sum of the CICE and the (untargeted) RSP would thus create 200,000 jobs in the short-run. This estimate is of course fairly sensitive to the elasticity of labor demand to its cost (which is also the elasticity of substitution between labor and capital in the production function, and is calibrated as $\sigma_1 = 0.15$ in the baseline parameterization). For an elasticity of 0.4, as assumed in the 2002 version of the French model MESANGE (Allard-Prigent et al. 2002), 350,000 jobs would be created.¹⁴ Finally, note that targeting the tax cuts to the low skilled could have had multiplied the impact of the reform on employment, by 2.3 in the short run. The effect on output would also be 1.6 times stronger.

¹³ See Johansen (1972) for a derivation of the elasticity of factor demand in terms of expansion and substitution effects.

¹⁴ For an elasticity of 0.75 as assumed in the 2010 version of the French model MESANGE (Klein and Simon, 2010), a EUR 30bn untargeted tax cut would generate 400,000 jobs.

Table 2. Short-Run Response to Employer Social Security Tax Reduction without Offsetting Spending Cuts
(Percent change, unless otherwise indicated)

	<i>Crédit d'impôt pour la compétitivité et l'emploi</i> (EUR 20 billion)	<i>Responsibility pact</i> (EUR 10 billion)	
	3 ppt reduction in employers' social security contributions for wages up to 2.5 times the SMIC	1.5 ppt reduction in employers' social security contributions for wages up to 2.5 times the SMIC	5.1 ppt reduction in employers' social security contributions for wages up to 1.5 times the SMIC
Income tax	0.00	0.00	0.00
Fiscal deficit (percent of GDP)	-1.00	-0.50	-0.50
Output	0.27	0.14	0.23
Capital stock	0.00	0.00	0.00
Total employment 1/	0.45	0.23	0.38
Employment, skilled	0.33	0.16	-0.04
Employment, unskilled	0.78	0.39	1.44
Total employment	134.4	67.2	155.9
Employment, skilled (thousands)	46.7	23.4	-5.1
Employment, unskilled (thousands)	87.6	43.8	161.0
Labor income, skilled	1.14	0.57	-0.13
Labor income, unskilled	0.19	0.10	0.35
Rate of return	1.95	0.97	1.61
Labor costs 1/	-1.30	-0.66	-1.07
Labor costs, skilled	-1.00	-0.50	-0.12
Labor costs, unskilled	-2.06	-1.03	-3.54
Wages, skilled	1.06	0.53	-0.12
Wages, unskilled	0.00	0.00	0.00
Net wages, skilled	1.06	0.53	-0.12
Net wages, unskilled	0.00	0.00	0.00
Investment	1.95	0.97	1.61

Source: Staff estimates.

1/ Weighted average of skilled and unskilled components.

B. Short-Run Results: Budgetary Neutral Reductions of Social Security Taxes

In the simulations presented above, the reduction in social security contributions under the RSP was not financed, and thus led to a worsening of the fiscal balance in the short term of 0.5 percent of GDP *ex post*. In this section, the fiscal cost of the tax cut is offset through spending cuts, calibrated *ex ante*.¹⁵ We present the results for both the targeted tax cut (Table 3) and for the untargeted tax cut (Table 4). Spending compensating measures fall into the three categories described below.¹⁶

Cuts in public goods (excluding public employment). Such cuts would have negative effects on GDP, labor productivity, and thus employment in the short run (Table 3, columns (a) and (b)). The demand for labor is reduced, affecting both skilled wages and reducing employment gains by 40,000 jobs (+117,000 jobs against 156,000 jobs when the tax cut was not financed). The fall in output (-0.5 percent) hampers tax collection and increases unemployment benefits (relative to simulation in the first column), thus the cut in spending falls short, *ex post*, of what is needed to balance the budget. The effect of the cuts in the provision of public goods is independent of whether the tax cut was targeted (Table 3) or untargeted (Table 4). Overall, in the short run, the budget deficit remains contained and the tax reform financed by spending cuts remains beneficial for output and employment, the more so if the tax cut is targeted.

Cuts in public employment: Cuts in public employment could be achieved by attrition, as has been historically the case in France. However, the simulation assumes that job cuts take place upfront in order to finance the tax cut. The simulations conducted (columns (c) and (d) in Table 3 and Table 4) assume that 246,000 public service jobs are destroyed to finance the EUR 10 billion tax cut. Public employment participates to the provision of public goods (with an elasticity γ), and thus the channel linking spending cuts and GDP, as highlighted in the previous paragraph, would remain relevant. In addition, the cut in public employment contributes to a major wage moderation in the private sector in the short run, since fewer workers are hired by the government and thus more skilled workers are looking for jobs in the private sector. 158,000 skilled workers lose their jobs on impact, skilled unemployment increases by 24 percent, and skilled wages fall by 3.6 percent given a wage curve elasticity ψ of -0.015. Wage moderation contributes in turn to the creation of 88,000 skilled jobs and 125,000 unskilled jobs, and GDP increases by 0.3 percent. In the short run, however, the increase in private hiring would not compensate for the jobs lost in the public sector, thus leaving 33,000 more workers unemployed. In addition, as labor income would be reduced drastically, the fiscal benefits of the spending cut would be, *ex post*, more than offset by the fall in revenues from automatic stabilizers, thus leading to a larger deficit of -1.0 percent of

¹⁵ The *ex ante* calibration allows us to interpret the simulated fiscal balance as the effect of the automatic stabilizers.

¹⁶ Since the model is approximately linear, the outcome for a specific combination of these three categories can be calculated as the weighted averages of the individual scenarios.

GDP. The results are independent on whether the tax cut was targeted or untargeted (Table 4 vs. Table 3).

The previous set of results is sensitive to the elasticity of output to public employment. In the short-run, if public employment is highly productive (column (d) of Table 3), the reduction in public employment is more harmful to growth and the overall effect of the combined tax cut/spending cut is on GDP and employment turns negative.

Cuts in transfers (unemployment benefits, retirement, family benefits, etc.). Although the government has not considered transfers as compensating measures, reductions in pensions or benefits, reforms to retirement or to unemployment benefits could increase labor supply. On the other hand, reforms to family benefits, supporting the employment of women in particular, could have the opposite effect. These effects are not taken into account in our model.

Table 3. Short-Run Response, Budgetary Neutral Targeted Tax Cut
(Percent change, unless otherwise indicated)

	<i>Responsibility pact - EUR 10bn targeted tax cut</i>			
	(5.1 ppt reduction in employers' SSC for the unskilled offset with cut in public spending)			
	No spending cut (baseline)	Spending cut on public goods 2/	Cut in public employment ($\gamma = 0.1$) 3/	Cut in public employment ($\gamma = 0.3$) 3/
	(a)	(b)	(c)	(d)
Fiscal balance (percent of GDP)	-0.50	-0.18	-1.02	-1.16
Output	0.23	-0.46	0.29	-0.59
Capital stock	0.00	0.00	0.00	0.00
Total employment 1/	0.38	0.24	1.12	0.93
Private employment, skilled	-0.04	-0.13	1.12	0.96
Private employment, unskilled	1.44	1.21	1.11	0.83
Public employment	0.00	0.00	-3.82	-3.82
Total employment (in thousands)	156.1	117.0	-34.0	-78.1
Private employment, skilled (in thousands)	-5.1	-19.0	87.7	75.1
Private Employment, unskilled (in thousands)	161.3	136.0	124.7	93.2
Public Employment, (in thousands)	0.0	0.0	-246.4	-246.4
Labor income in the private sector, skilled	-0.13	-0.46	-3.03	-3.35
Labor income in the private sector, unskilled	0.39	0.32	0.29	0.21
Rate of return	1.62	1.96	5.37	5.68
Labor costs (private sector, skilled-adjusted) 1/	-1.08	-1.31	-3.58	-3.79
Labor costs, skilled (private sector)	-0.12	-0.43	-3.59	-3.87
Labor costs, unskilled (private sector)	-3.55	-3.56	-3.57	-3.57
Wages, skilled (private sector)	-0.12	-0.43	-3.59	-3.87
Wages, unskilled (private sector)	0.03	0.02	0.01	0.00
Net wages, skilled (private sector)	-0.12	-0.43	-3.59	-3.87
Net wages, unskilled (private sector)	0.03	0.02	0.01	0.00
Investment	1.62	1.96	5.37	5.68
<i>Memorandum item: pass-through to unskilled wages</i>	0.0	0.0	0.0	0.0

Source: Staff estimates

1/ Weighted average of skilled and unskilled private sector components.

2/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 0. The cut in spending was calibrated so that the ex-ante change in deficit is 0. This implies a reduction in spending by 6.1 percent

3/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 1. The cut in public employment was calibrated so that the ex-ante change in deficit is 0 when $\gamma = 0.1$. This implies a reduction in public employment of 246,000

Table 4. Short-Run Response, Budgetary Neutral Untargeted Tax Cut
(Percent change, unless otherwise indicated)

	Responsibility pact - EUR 10bn Untargeted tax cut (1.5 ppt reduction in employers' SSC for all workers with cut in public spending)			
	No spending cut (baseline)	Spending cut on public goods 2/	Cut in public employment ($\gamma = 0.1$) 3/	Cut in public employment ($\gamma = 0.3$) 3/
	(a)	(b)	(c)	(d)
Fiscal balance (percent of GDP)	-0.50	-0.18	-1.02	-1.17
Output	0.14	-0.55	0.23	-0.65
Capital stock	0.00	0.00	0.00	0.00
Total employment 1/	0.23	0.10	1.02	0.82
Private employment, skilled	0.17	0.07	1.39	1.23
Private employment, unskilled	0.40	0.16	0.05	-0.23
Public employment	0.00	0.00	-3.82	-3.82
Total employment (in thousands)	67.9	28.1	-132.0	-176.4
Private employment, skilled (in thousands)	23.6	9.8	108.6	96.0
Private Employment, unskilled (in thousands)	44.3	18.4	5.8	-26.0
Public Employment, (in thousands)	0.0	0.0	-246.4	-246.4
Labor income in the private sector, skilled	0.57	0.24	-2.49	-2.81
Labor income in the private sector, unskilled	0.10	0.04	0.01	-0.06
Rate of return	0.99	1.32	4.93	5.23
Labor costs (private sector, skilled-adjusted) 1/	-0.66	-0.88	-3.28	-3.49
Labor costs, skilled (private sector)	-0.51	-0.82	-4.16	-4.44
Labor costs, unskilled (private sector)	-1.04	-1.04	-1.04	-1.04
Wages, skilled (private sector)	0.53	0.22	-3.11	-3.40
Wages, unskilled (private sector)	0.00	0.00	0.00	0.00
Net wages, skilled (private sector)	0.53	0.22	-3.11	-3.40
Net wages, unskilled (private sector)	0.00	0.00	0.00	0.00
Investment	0.99	1.32	4.93	5.23
<i>Memorandum item: pass-through to unskilled wages</i>	0.0	0.0	0.0	0.0

Source: Staff estimates

1/ Weighted average of skilled and unskilled private sector components.

2/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 0. The cut in spending was calibrated so that the ex-ante change in deficit is 0. This implies a reduction in spending by 6.1 percent

3/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 1. The cut in public employment was calibrated so that the ex-ante change in deficit is 0 when $\gamma = 0.1$. This implies a reduction in public employment of 246,000

C. Long-Run Results

Table 5 presents the results of the model for a targeted EUR 10 billion tax cut, looking at the long-run solution and its sensitivity to different assumptions on the pass-through of the tax cuts to unskilled wages and to different financing assumptions (Table 6 presents the results for untargeted cuts). In the long run, capital adjusts in response to higher profits, and equilibrium is where the rate of return of capital is back to the (exogenous) world rate of interest. The effect of tax cuts in the long run is much larger than in the short run, because relatively small changes in labor costs have large effects on the stock of capital, and thus on equilibrium output and employment. However, there is a higher degree of uncertainty on the results since alternative assumptions lead to significantly different results.

In the baseline simulation with no spending cuts, targeted subsidization leads to a large increase in output in the long run (+1.3 percent). This stimulates employment of the unskilled (+ 4 percent) with unskilled wages increasing by 1.6 percent (unskilled labor costs fall by just 1.9 percent). The employment of skilled labor increases marginally (by 0.2 percent), since increased demand also raises skilled labor costs by 0.8 percent. In the long run, the increase in skilled workers' wages limits the initial gains in external competitiveness achieved with this measure and labor costs are unaffected by tax policy¹⁷. The reduction in social security taxes leads to budgetary savings in the long run, which results from the combination of increases in the tax base and savings on outlays for unemployment insurance. The latter are substantial for a country such as France, given high replacement ratios in the first year of unemployment. Although the finding of a self-financed targeted tax cut in the long run appears robust to different assumptions on the wage curve¹⁸, budgetary savings are however lower if the tax cut is untargeted (Table 6 vs. Table 5, column (a)), since the employment effect of the measure is smaller when the tax cut is untargeted.

Results are also sensitive to the assumption of the financing of the tax cut. If the EUR 10 billion tax cut (as under the RSP) is combined with a reduction in spending on public goods, the growth effect is lower than initially estimated (+0.9 versus +1.3 percent increase in GDP, Table 5 column (e) versus column (d)). However, employment is not affected by the cut in public spending since, from the factor price frontier, the relative cost of labor to capital is constant in the long run (Appendix A). Since the cost of capital is anchored by the world interest rate, the labor cost is thus unchanged by the cut in public spending, and so is employment. Finally, if the cut in the tax wedge is combined with a cut in public employment (column (f)), the wage moderation effect of public dismissals on firms' profitability, capital accumulation, and thus output is very large. In the long run, labor demand adjusts so that labor costs remain constant, private skilled employment increases by

¹⁷ This result can be deduced from the factor price frontier (see Appendix A).

¹⁸ Such finding is also present in similar general equilibrium models (Van Rijeckeghem, 1997; Sterdyniak, 2007; Batyra and Sneessens, 2010).

roughly as much as the initial cut in public employment and total skilled employment is unchanged. The increase in capital and private sector skilled employment boosts demand for unskilled workers by around 800,000.

Overall, the model suggests that the combined employment effect of the CICE and (untargeted) RSP, if unfinanced by spending cuts, would reach around 600,000 jobs (Table 6, column (d), Table 6).¹⁹ As expected, the results are sensitive to the slope of the wage curve for unskilled workers. When only a third of the labor cost reduction is passed into higher wages, the increase in employment thanks to the CICE and RSP reaches 720,000 (Table 6, column (e)). An upper bound estimate of the CICE and RSP package of one million jobs is generated by an infinitely elastic labor supply for unskilled workers—an otherwise unrealistic assumption, despite the anchor given by the minimum wage (column (f)).

¹⁹ Note that under the baseline supply curve for unskilled workers, the model is not linear, and thus the results in for the EUR 10bn RSP (Table 6, column (a)) are *not* a third of the results obtained for the combined EUR 30bn of the CICE and RSP (column (d)).

Table 5. Long-Run Response to Targeted Employer Social Security Tax Reduction, Alternative Financing Schemes and Alternative Labor Supplies for Unskilled Workers
(Percent change, unless otherwise indicated)

	<i>Responsibility pact</i> (5.1 ppt reduction in employers' SSC for the unskilled workers)					
	Pass-through to unskilled wages			Pass-through to unskilled wages		
	50 percent	35 percent	0 percent	50 percent		
	no spending cut			no spending	Spending cut	Spending cut
	<i>baseline</i>			<i>baseline</i>	on goods 2/	(produced with skilled workers, $\gamma = 0.1$) 3/
	(a)	(b)	(c)	(d)	(e)	(f)
Fiscal balance (percent of GDP)	0.69	0.91	1.60	0.69	1.22	1.97
Output	1.31	1.58	2.38	1.31	0.94	4.31
Capital stock	1.31	1.58	2.38	1.31	1.92	4.92
Total employment 1/	1.31	1.58	2.38	1.31	1.31	4.54
Private employment, skilled	0.24	0.29	0.43	0.24	0.24	3.55
Private employment, unskilled	4.06	4.90	7.39	4.06	4.06	7.07
Public employment	0.00	0.00	0.00	0.00	0.00	-3.82
Total employment (in thousands)	489.2	589.0	889.1	489.2	489.2	823.8
Private employment, skilled (in thousands)	33.8	40.8	61.5	33.8	33.8	277.5
Private Employment, unskilled (in thousands)	455.3	548.6	827.6	455.3	455.3	792.6
Public Employment, (in thousands)	0.0	0.0	0.0	0.0	0.0	-246.4
Labor income, skilled (private sector)	0.82	0.99	1.50	0.82	0.82	1.85
Labor income, unskilled (private sector)	2.47	2.31	1.86	2.47	2.47	3.37
Rate of return	0.00	0.00	0.00	0.00	0.00	0.00
Labor costs (private sector, skilled-adjusted)	0.00	0.00	0.00	0.00	0.00	0.00
Labor costs, skilled (private sector)	0.77	0.92	1.39	0.77	0.77	0.70
Labor costs, unskilled (private sector)	-1.97	-2.37	-3.58	-1.97	-1.97	-1.81
Wages, skilled (private sector)	0.77	0.92	1.39	0.77	0.77	0.70
Wages, unskilled (private sector)	1.61	1.21	0.00	1.61	1.61	1.77
Net wages, skilled (private sector)	0.77	0.92	1.39	0.77	0.77	0.70
Net wages, unskilled (private sector)	1.61	1.21	0.00	1.61	1.61	1.77
Investment	0.00	0.00	0.00	0.00	0.00	0.00
<i>Memorandum item: pass-through to unskilled wages</i>	0.5	0.3	0.0	0.5	0.5	0.5

Source: Staff estimates

1/ Weighted average of skilled and unskilled private sector components

2/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 0. The cut in spending was calibrate so that the ex-ante change in deficit is 0. This implies a reduction in spending by 6.1 percent

3/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 1. The cut in public employment was calibrate so that the ex-ante change in deficit is 0 when $\gamma = 0.1$. This implies a reduction in public employment of 246,000

Table 6. Long-Run Response to Untargeted Employer Social Security Tax Reduction, Alternative Financing Schemes
(Percent change, unless otherwise indicated)

	<i>Responsibility pact (EUR 10bn)</i>			<i>Responsibility pact and CICE (EUR 30bn)</i>		
	(1.5 ppt reduction in employers' SSC for all workers)			(4.5 ppt reduction in employers' SSC for all workers)		
	baseline surrogate supply curve			50 pc pass-through	35 pc pass-through	0 pc pass-through
	no spending cut <i>baseline</i>	Spending cut on goods 2/	Spending cut (produced with skilled workers, $\gamma = 0.1$) 3/	no spending cut <i>baseline</i>	no spending cut <i>baseline</i>	no spending cut <i>baseline</i>
	(a)	(b)	(c)	(d)	(e)	(f)
Fiscal balance (percent of GDP)	0.40	0.85	1.61	0.28	0.51	1.19
Output	1.01	0.55	3.94	1.97	2.24	3.03
Capital stock	1.01	1.53	4.55	1.97	2.24	3.03
Total employment 1/	1.01	0.92	4.17	1.97	2.24	3.03
Private employment, skilled	0.45	0.43	3.87	1.15	1.20	1.34
Private employment, unskilled	2.47	2.17	4.95	4.07	4.91	7.38
Public employment	0.00	0.00	-3.82	0.00	0.00	0.00
Total employment (in thousands)	340.8	304.8	610.6	620.4	720.9	1018.5
Private employment, skilled (in thousands)	64.0	61.5	302.1	164.1	171.0	191.6
Private Employment, unskilled (in thousands)	276.9	243.3	554.9	456.3	549.9	826.9
Public Employment, (in thousands)	0.0	0.0	-246.4	0.0	0.0	0.0
Labor income, skilled (private sector)	1.56	1.50	2.48	3.99	4.16	4.66
Labor income, unskilled (private sector)	0.62	0.68	1.68	2.48	2.33	1.88
Rate of return	0.00	0.00	0.00	0.00	0.00	0.00
Labor costs (private sector, skilled-adjusted)	0.00	0.00	0.00	0.00	0.00	0.00
Labor costs, skilled (private sector)	0.40	0.35	0.22	0.58	0.74	1.21
Labor costs, unskilled (private sector)	-1.04	-0.90	-0.56	-1.50	-1.91	-3.10
Wages, skilled (private sector)	1.45	1.39	1.26	3.71	3.87	4.33
Wages, unskilled (private sector)	0.00	0.15	0.48	1.62	1.22	0.02
Net wages, skilled (private sector)	1.45	1.39	1.26	3.71	3.87	4.33
Net wages, unskilled (private sector)	0.00	0.15	0.48	1.62	1.22	0.02
Investment	0.00	0.00	0.00	0.00	0.00	0.00
<i>Memorandum item: pass-through to unskilled wages</i>	0.0	0.1	0.5	0.5	0.4	0.0

Source: Staff estimates

1/ Weighted average of skilled and unskilled private sector components

2/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 0. The cut in spending was calibrate so that the ex-ante change in deficit is 0. This implies a reduction in spending by 6.1 percent

3/ The calculation is made assuming ω , the elasticity of public good provision to public employment is 1. The cut in public employment was calibrate so that the ex-ante change in deficit is 0 when $\gamma = 0.1$. This implies a reduction in public employment of 246,000

V. RESULTS IN LIGHT OF OTHER STUDIES

Nouveau and Ourliac (2012) review the empirical studies assessing the employment effects from reductions in social security contributions taken between 1993 and 2012 (Crépon and Desplat, 2001; Bunel and others, 2009; Barlet and others, 2010) and conclude that, altogether, they would have created or preserved between 400,000 and 800,000 jobs (for an *ex ante* cost of around 1.2 percent of GDP or EUR 22 billion).

In its March 2014 report, the *Haute Conseil du financement de la protection sociale* presents a suite of simulations for tax cuts worth EUR 10 billion (0.5 percent of GDP). The scenarios reported differ across four dimensions: the simulation tool used (MESANGE, e-mod.fr, and Nemesis)²⁰; the targeting scheme (across-the board social security reductions vs. degressive cuts benefiting wages up to either 1¾ or 2 times the SMIC); the financing measures (increases in the VAT or in the income tax); and behavior assumptions (on the pass through from costs to prices, the wage response, and employment to labor cost elasticity).

Key lessons emerge from these simulations which either confirm or complement our findings: (i) A uniform reduction in labor costs would deliver between 134,000 and 214,000 of additional jobs after 5 years depending on the type of model/behavior assumptions considered, with the employment response being higher the larger the pass through onto prices and the stronger the improvement in competitiveness (Nemesis); (ii) tax reliefs concentrated on low wages result in greater job creation, but less so in models with a tradable sector (Nemesis); (iii) the ex-ante funding of the tax cuts reduce their potential effects on employment to between 43,000 and 81,000 jobs depending on the model; and (iv) simulations result in an improvement in the government deficit as long as there are positive effects on employment.

Simulations conducted by the authorities (INSEE 2014, *Programme national de réforme*, 2014) put the number of jobs created by the CICE and the RSP at around 500,000 jobs altogether, in line with the baseline, long-run results presented in this paper. The effectiveness of these measures would therefore appear to be lower than similar measures adopted in the past. This would be largely explained by the fact that these schemes are less focused on low wages than past measures, owing to other considerations that went into their design, e.g., ensuring that the tax cuts also benefit exporting firms which tend to employ higher skill labor.

VI. CONCLUSION

Reduced social security contributions for low-wage earners are a key component of employment policy in France. First introduced in 1993, they have progressively been

²⁰ These models are respectively run by the Direction Générale du Trésor/INSEE; the Observatoire Français des Conjonctures Economiques; and the Erasme team in cooperation with the Direction Générale de la Compétitivité, de l'Industrie et des Services.

extended since then, with the CICE and the RSP (worth EUR 30 billion) as the latest such extension.

Simulations suggest that the impact of EUR 30 billion of labor tax cuts on employment is sensitive to the specific targeting scheme, financing measures, and wage dynamics. In all, results suggest that the uncertainty surrounding the impact of these measures is significant. But they also imply that there is room for influencing the final outcome, since targeting schemes, compensatory measures, and wage dynamics are all three within the reach of policy and social partners—hence the relevance of the *responsibility* element under the RSP.

Of course, the positive employment effects induced by labor tax cuts need to be weighed against any unintended microeconomic side-effects distorting the allocation of resources, and which are not taken into account in our model. For instance, the higher progressivity of labor taxation induced by the targeted tax cuts could lead to “low wage traps” as the cost of training and rewarding workers for higher productivity would become higher.²¹ This could eventually bias specialization toward activities which are relatively intensive in low skilled labor. Another consideration that may limit the effectiveness of the CICE is its design as a tax credit rather than an outright labor tax cut. Our model does not distinguish between the two approaches because they are equivalent in terms of economic impact; however, some observers have questioned the ability of enterprises to see the equivalence.²² Last, but not least, the tax cuts come into effect at a time where profit margins are at their lowest, which may prompt firms to use the CICE/RSP to improve their financial situation relatively more than when similar measures were adopted in the 1990s and 2000s.

Finally, while this paper focuses on labor tax cuts as an instrument of job creation, employment outcomes depend on the interaction among various other policies, including social benefits, unemployment insurance, and the level of the minimum wage (SMIC). A broader welfare analysis would be needed to assess the merits of using alternative policy mixes in pursuit of greater employment and social integration.

²¹ The evidence of low wage traps is, however, inconclusive (see, e.g., Lhommeau and Rémy, 2010, and Rioux et al., 2011 for contrasting findings on the issue).

²² Because the CICE tax credit is based on the wage bill it replicates exactly the impact of a labor tax cut. However, because the CICE is received as part of the annual corporate tax settlement, some observers have raised the possibility that the hiring incentive will be lessened compared to a situation where labor costs are reduced directly.

APPENDIX A

All equations are written in percent change deviations around an initial path. The deviations from this path are equal to zero, except following a disturbance, which here will take the form of changes in payroll taxes. In the notation which follows, all variables in lower case represent percent changes from the corresponding capitalized notation, with the exception of tax rates, t_n , t_p , and t_{pe} , which represent point changes, and the budget surplus, bs , which is expressed in percent of GDP.

The production function can be re-written in percentage change terms as follows:

$$x = \lambda_l \ell + (1 - \lambda_l)k + \gamma g$$

$$\text{where } \ell = \frac{\lambda_s}{\lambda_l} \ell_s + \left(1 - \frac{\lambda_s}{\lambda_l}\right) \ell_u$$

and λ_l is the percent change in output corresponding to a one percentage change in the labor. Similarly, λ_s is the percent change in output corresponding to a one percentage change in skilled labor. Given equality between factor costs and marginal products the different λ 's also correspond to the share of factors in output.

The percent change in labor demand can be expressed in terms of the elasticities of substitution between effective labor and capital, and between skilled and unskilled labor:

$$\begin{aligned} \frac{1}{\sigma_2} \ell_s &= \gamma g \left(1 - \frac{1}{\sigma_1}\right) - lc_s + \frac{1}{\sigma_1} y + \left(\frac{1}{\sigma_2} - \frac{1}{\sigma_1}\right) \ell \\ \frac{1}{\sigma_2} \ell_u &= \gamma g \left(1 - \frac{1}{\sigma_1}\right) - lc_u + \frac{1}{\sigma_1} y + \left(\frac{1}{\sigma_2} - \frac{1}{\sigma_1}\right) \ell \end{aligned}$$

where lc_s , and lc_u stand for percent change in labor costs, which can also be expressed as a function of their components:

$$lc_u = w_u + \frac{t_{pu}}{1 + T_p}$$

$$lc_s = w_s + \frac{t_{ps}}{1 + T_p}$$

The rate of return on capital corresponds to the part of output not paid out to other factors:

$$\begin{aligned} r = & -k + \frac{y}{1 - \lambda_l} - (1 + T_p) \frac{\lambda_l - \lambda_s}{1 - \lambda_l} (w_u + \ell_u) - t_{pu} \frac{\lambda_l - \lambda_s}{1 - \lambda_l} \\ & - (1 + T_p) \frac{\lambda_s}{1 - \lambda_l} (w_s + \ell_s) - t_{ps} \frac{\lambda_s}{1 - \lambda_l} \end{aligned}$$

Substitution the production function into this expression yields the factor price frontier:

$$r = \frac{-(\lambda_l - \lambda_s)lc_u - \lambda_s lc_s}{(1 - \lambda_l)}$$

In percent change terms, the investment equation can be written as follows, assuming a constant foreign rate of return:

$$i = \varepsilon \left(r - \frac{t_n}{1 - T_n} \right)$$

where ε is the elasticity of investment with respect to the rate of return.

The assumptions for wage determination of skilled workers and of a constant minimum wage applicable to unskilled workers translate into the following expressions:

$$w_s = -\psi \left(\ell_s \frac{L_s}{U_s} + g \frac{L_g}{U_s} \right) + \frac{t_n + t_{pe}}{1 - T_n - T_{pe}}$$

where ψ is the unemployment elasticity of the wage, L_s/U_s is the ratio of private sector employment to unemployment for skilled workers, and L_g/U_s is the ratio of public sector employment to unemployment for skilled workers. Finally, the change in the government budget surplus (as a percent of GDP), bs , can be expressed in terms of changes (in income tax and) social security tax rates. Writing first in levels, and then taking first differences and expressing in percentage terms yields:

$$\begin{aligned} b_s = & T_n(r + k)(1 - \lambda_l) + t_n(1 - \lambda_l) + \frac{\theta_u}{W_u}(\lambda_l - \lambda_s)\ell_u + \frac{\theta_s}{W_s}\lambda_s\ell_s - (g + lc_s)\frac{LC_s G}{X} \\ & + (T_p + T_n + T_{pe})((\lambda_l - \lambda_s)(w_u + \ell_u) + \lambda_s(w_s + \ell_s)) + (t_p + t_n + t_{pe})\lambda_l \end{aligned}$$

Depending on the policy experiment, employer and employee social security tax rates are assumed unchanged:

$$t_p = 0$$

or

$$t_{pe} = 0$$

This 12 equation model is then solved for the 14 variables, bs , t_p , t_n , t_{pe} , y , k , r , l , l_s , l_u , lc_s , lc_u , w_s , w_u , and i . The restriction $i=0$ in the long run or $k=0$ in the short run constitutes the 13th equation. The budget constraint, $bs=0$, or an assumption for some other tax rate (for non-balanced budget exercises) constitutes the 14th equation. Net-of-tax wages, w_{snet} and w_{unet} , and labor incomes (which include income from unemployment benefits), in_s and in_u , then follow readily. EUR represents the ration of employment to unemployment.

$$w_{snet} = w_s - t_n \cdot \frac{1}{1 - T_n - T_{pe}}$$

$$w_{unet} = w_u - t_n \cdot \frac{1}{1 - T_{pe}}$$

$$in_s = \frac{W_s \cdot (1 - T_n - T_{pe}) \cdot EUR_s}{W_s \cdot (1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot w_{snet} + \frac{[W_s \cdot (1 - T_n - T_{pe}) - \theta_s] \cdot EUR_s}{W_s \cdot (1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot l_s$$

$$in_u = \frac{W_u \cdot (1 - T_{pe}) \cdot EUR_u}{W_u \cdot (1 - T_{pe}) \cdot EUR_u + \theta_u} \cdot w_{unet} + \frac{[W_u \cdot (1 - T_{pe}) - \theta_u] \cdot EUR_u}{W_u \cdot (1 - T_{pe}) \cdot EUR_u + \theta_u} \cdot l_u$$

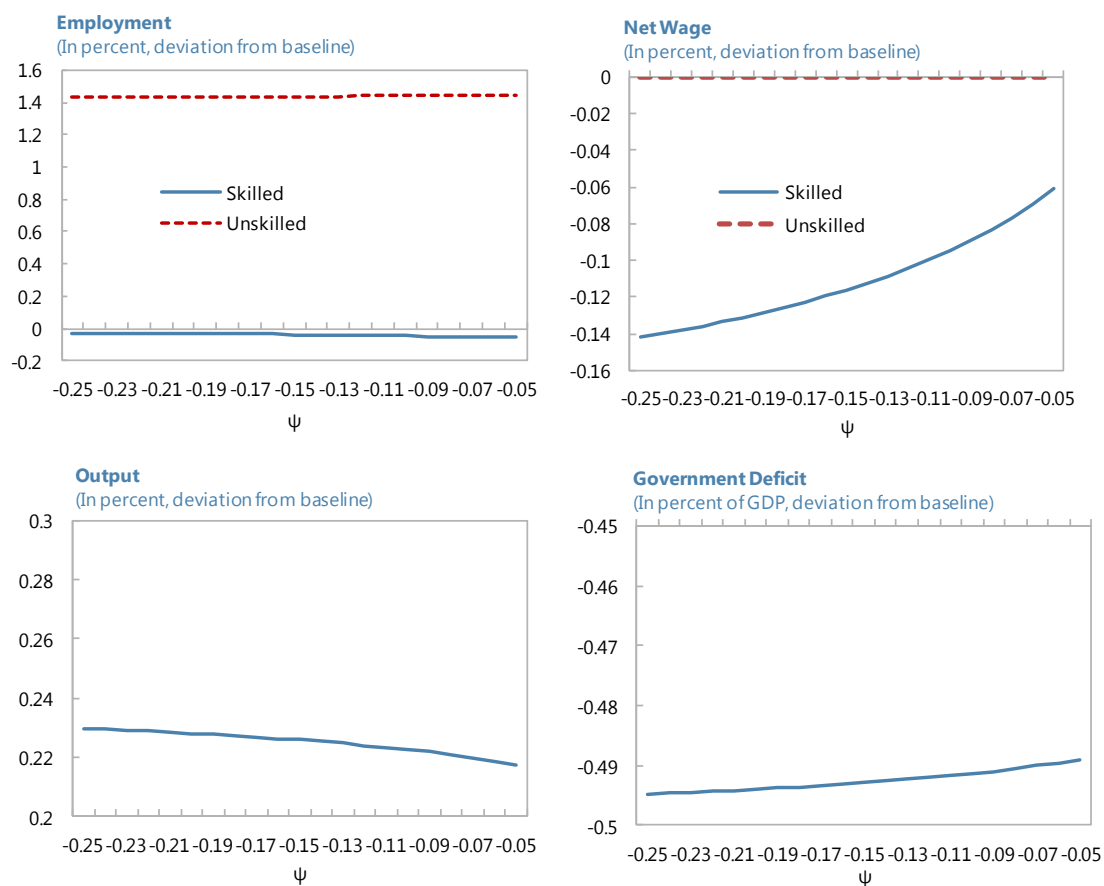
APPENDIX B

We describe here the comparative statics on some key parameters for the baseline simulation, showing the short-term impact of the targeted tax cut.

Wage curve elasticity for skilled workers (ψ) (Figure 3). Our baseline calibration assumes $\psi = -0.15$ (Table 1). The literature on the wage curve (e.g. the meta-analysis of Nijkamp and Poot, 2005) suggests most studies estimate this elasticity between -0.05 and -0.25. Since this parameter is of importance for the results of the model, some comparative statics exercise are shown for the such range of values. In equilibrium, the reduction in skilled wages is higher the higher the sensitivity of wages to unemployment for skilled workers (i.e. the more negative ψ). On the other hand, the larger wage loss for skilled workers (and thus reduced labor cost) benefits skilled employment. Output is also slightly higher for a more sensitive wage curve. Finally, the budget impact of the tax measure is mostly insensitive to the wage curve elasticity.

Share of workers for which wages are driven by the minimum wage (λ_s) (Figure 4). In the baseline calibration, the share of workers for which wages was sensitive to unemployment (skilled workers) was set to 0.56 (implying that λ_s , the share of labor costs for skilled workers would be 0.72). The calibration is predicated on the empirical findings that salaries of workers earning up to 1.5 times the minimum wages are affected by the minimum wage, but as indicated earlier, salaries for workers earning 1.2 or 1.3 times the minimum wage are also partly affected by labor market tightness. It is thus important to analyze the robustness of the results to the share of workers for which wages are pinned down by the minimum wage policy. The simulations show that employment in the different subgroups is insensitive to λ_s . This implies that the impact on total employment is a decreasing function of λ_s since the size of the unskilled group (for which the employment response to the tax cut is positive) is increasing in $1 - \lambda_s$. As a result, the impact on output is also a decreasing function of λ_s .

Figure B.1. Comparative Statics: Wages' Elasticity to Unemployment
 (Short-run response, EUR 10 bn targeted tax cut in employers' social security contributions 1/)

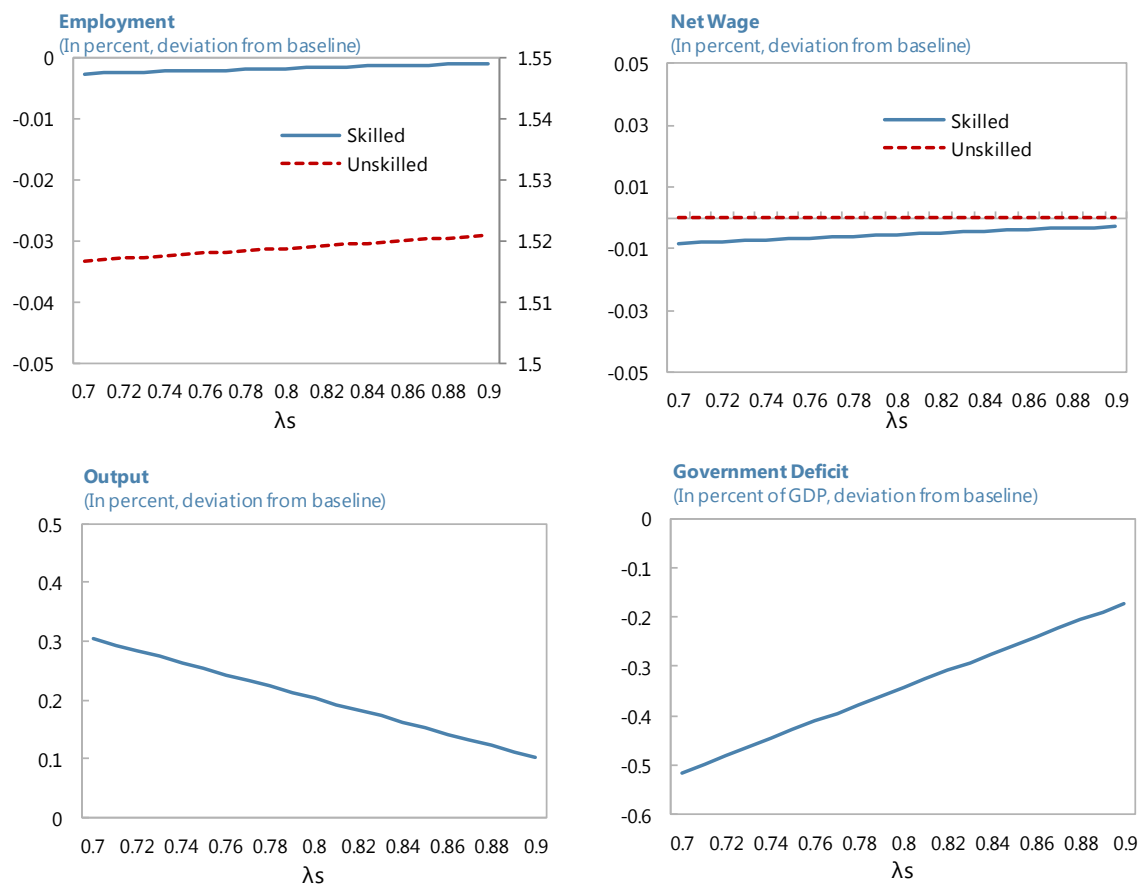


Source: Staff simulations.

1/ Equivalent to 5.1 ppt reduction in employers' SSC for unskilled workers or 0.5 percent of GDP *ex post*.

Figure B.2. Comparative Statics: Skilled Labor Share over Total Labor Share

(Short-run response, EUR 10 bn targeted tax cut in employers' social security contributions 1/)



Source: Staff estimates.

1/ Equivalent to 5.1 ppt reduction in employers' SSC for unskilled workers or 0.5 percent of GDP *ex post*.

VII. REFERENCES

- Aeberhardt, R., P. Givord, and C. Marbot, 2012, “Spillover Effect of the Minimum Wage in France: An Unconditional Quantile Regression Approach”, INSEE Document de Travail G2012/07.
- Allard-Prigent, C., C. Audenis, K. Berger, N. Carnot, S. Duchêne and F. Pesin, 2002, Présentation du Modèle Mésange, Direction de la Prévision, Document de Travail, Ministère de l’Economie, des Finances et de l’Industrie.
- Barlet M., D. Blanchet, and T. Le Barbanchon, 2010, “Microsimulation and agent models : an alternative approach to the evaluation of employment policies,” *Economie et Statistique* no. 429-430.
- Batyra, A. and H.R. Sneessens, 2010, “Selective Reductions in Labor Taxation: Labor Market Adjustments and Macroeconomic Performance,” *Journal of Policy Modeling*, Vol. 32(4), pp. 531-543.
- Baxter M. and R.G. King, 1993, “Fiscal Policy in General Equilibrium,” *American Economic Review*, Vol. 83 (3), pp. 315-334
- Bom. P.R.D and J. E. Ligthart, 2013, “What have we learned from three decades of research on the productivity of public capital?,” *Journal of Economic Surveys*.
- Bunel, M., F. Gilles and Y. L’Horty, 2009, “The effects of reductions in social security contributions on employment and wages: an evaluation of the 2003 reform,” *Economie et Statistique* no. 429-430, pp. 77-105.
- Crépon B. and R. Desplatz, 2001, “A new evaluation of the effects of reductions in social security contributions on low wages,” *Economie et Statistiques*, no. 348, p. 1-24, August.
- Delteil V., A. Pailhé and D. Redor, 2004, “Comparing individual wage determinants in Western and Central Europe: on the way to convergence? The cases of France and Hungary,” *Journal of Comparative Economics*, Vol. 32, pp. 482–499.
- Estevao M. and N. Nargis, 2002, “Wage Moderation in France,” IMF WP 02/151, Washington DC: International Monetary Fund
- European Commission, 1994, “Economie Européenne, Rapport Economic Annuel 1994” , No 56, Annexe, pp. 182-190.

Gianella, C., 2002, "Wages and Local Unemployment Rates", *Economie et Prévision*, Vol. 155.

Goarant, C., and L. Muller, "Les effets des hausses du Smic sur les salaires mensuels dans les entreprises de 10 salariés ou plus de 2006 à 2009," Dossier - Les effets des hausses du Smic sur les salaires mensuels.

Haut Conseil du Financement de la Protection Sociale, 2014, "Point d'étape sur les évolutions du financement de la protection sociale," March 2014.

INSEE, 2014, "What effects should we expect from the Tax Credit for Encouraging Competitiveness and Jobs (CICE) in 2014?," in *Conjoncture in France – A laboured recovery*, INSEE, December 2013.

Johansen, Leif, 1972, *Production Functions* (Amsterdam: North Holland)

Immervoll, H., 2007, "Minimum Wages, Minimum Labour Costs and the Tax Treatment of Low-Wage Employment," IZA Discussion Paper No. 2555

Keller, W. J. , 1980, *Tax Incidence : A General Equilibrium Approach*, Amsterdam: North Holland).

Klein C. and O. Simon, 2010, "Le modèle MÉSANGE réestimé en base 2000," Document de Travail G2010/03, Institut de la Statistique et des Etudes Economiques (INSEE).

Laffargue, J.P., 1996, "Fiscalité, Charges Sociales, Qualifications et Emploi, Etude à L'Aide du Modèle d'Equilibre Général Calculable de l'Economie Française : "Julien"" *Economie et Prévision*, Vol.125, pp. 87-105.

Lehmann, E., F. Marical and L. Rioux, 2011, "Labor Earnings Respond Differently to Income-Tax and Payroll-Tax Reforms," IZA Discussion Papers 6108, Institute for the Study of Labor (IZA).

Lhommeau B. and V. Rémy, 2010, « Les politiques d'allègements ont-elles un effet sur la mobilité salariale des travailleurs à bas salaire? » » '(Do reduced social security contributions have an effect on wage mobility of low-wage workers?), *Économie et Statistique*, no. 429-430, pp.21-49.

Malinvaud, E., 1998, "Les cotisations sociales à la charge des employeurs : analyse économique," *Rapport du Conseil d'Analyse Economique*, La Documentation Française.

Montuenga V., I. Garcia and M. Fernandez, 2003, “Wage flexibility: evidence from five EU countries based on the wage curve,” *Economics Letters*, Vol. 78, pp. 169-174.

Nijkam P. and J. Poot, 2005, “The Last Word on the Wage Curve?,” *Journal of Economic Surveys*, Vol. 19 (3), pp. 421 -450.

Nouveau, C. and B. Ourliac, 2012, “Les allègements de cotisations sociales patronales sur les bas salaires en France de 1993 à 2007”, Documents d’Etude, DARES 169/2012.

Ostry, J.D., A. Berg and C.G. Tsangarides, 2014, “Redistribution, Inequality, and Growth,” IMF Staff Discussion Note, SDN 14/02, Washington DC: International Monetary Fund.

Programme national de réforme, 2014, Direction Générale du Trésor.

Sterdyniak, H., 2007, “Low-skilled Jobs: The French Strategy,” in EUROFRAME, *Economic Assessment of the Euro Area: Forecasts and Policy Analysis*. Spring Report: Growth and Employment in the EU15.

Stovicek, K., and A. Turrini, 2012, “Benchmarking Unemployment Benefit Systems,” *European Economy, Economic Papers 454*, Directorate-General for Economic and Financial Affairs, May.

Van Rijckenghem, C., 1997, “Social Security Tax Reform and Unemployment: A General Equilibrium Analysis for France,” IMF WP 97/59, Washington DC: International Monetary Fund.