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How Do Fiscal and Labor Policies in France Affect Inequality?

by Raphael Espinoza, Esther Pérez Ruiz

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How Do Fiscal and Labor Policies in France Affect Inequality?

Prepared by Raphael Espinoza and Esther Pérez Ruiz

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Abstract

This paper explores the impact of fiscal and labor market policies on efficiency, inequality, and fiscal outcomes in France. We extend the general equilibrium model calibrated for France by Alla and others (2015), with measures of labor and capital income for different groups in the economy (the unemployed, unskilled workers, skilled workers, public servants). For each of these groups we combine data on the income distribution with the outcomes of policy simulations to assess the impact of a suite of stylized policies on output, the fiscal balance, the Gini coefficient, and the shape of the Lorenz curve. We find that most types of fiscal expansions, while adding to the deficit and debt in the near term, generally reduce inequality, the main exception being capital income tax cuts. A reduction of the minimum wage has an ambiguous impact on the income distribution: the Gini coefficient increases, but the lowest income quintile improves its relative position in the income distribution thanks to positive employment effects. The paper also finds scope for "win-win" policy packages that could improve overall efficiency, inequality, and fiscal outcomes, for instance if targeted labor tax reductions are offset by cuts in the public wage bill.

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APPENDIXES

I. INTRODUCTION[1]

Context. Income inequality has become a growing concern in Europe, especially as policies adopted during the crisis years may have had adverse effects on the income distribution (see, e.g., Hoeller and others, 2014). Equality is an especially important concept in France. Evaluating the merits of any policy change should therefore consider not only the impact on output, employment, and the fiscal balance, but also on the income distribution. However, the existing literature (see, e.g., Checchi and García-Peñalosa, 2008, and the references therein) lacks a consistent method to systematically assess the impact of policies across all these dimensions in France. This paper attempts to close this gap.

French inequality profile. In France, inequality of disposable income—as measured by the Gini coefficient—increased by 1.7 percentage points during 2007−11, and now broadly matches the OECD average of about 0.3.[2] By comparison, pre-policy inequality rose by 2.9 percentage points over the same period to 0.51—compared with an OECD average of 0.47. French redistribution policies therefore play an important role in countering market-driven inequality. This is primarily achieved through a combination of policies such as the minimum wage that compress wage dispersion and a heavy tax and transfer system that reduce inequality of disposable income.

Challenges to the French redistribution model. The traditional equality enhancing policies such as large social services and the minimum wage may have reached their limits as unemployment has become entrenched at around 10 percent and budgets have been severely stretched, with spending rising to 57½ percent of GPD and public debt to 95½ percent of GDP by 2014.

Objective. The aim is to understand better how different policies affect efficiency and inequality. There is an ample literature on the link between France's tax and transfer system and inequality *ex post*, but the relationship between labor and fiscal policies and market income inequality has featured less prominently. The aim here is to shed light on two broad trade-offs. First, some policies aimed at lowering inequality come at an efficiency cost, not just budgetary but also possible losses in output and employment ("efficiency"). Second, while some policies may reduce inequality ex post, they may worsen somewhat market income inequality—in other words, part of the policy is self-defeating. To assess these trade-offs, it is necessary to look at the general equilibrium effects —which is the main contribution of our paper to the literature.

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[2] For a comprehensive review of inequality metrics, see Appendix A.

Research questions. How do policies aimed at boosting employment and output affect inequality? How efficient are policies aimed at reducing inequality? Is there room for fiscally neutral ("win-win") policies that improve output, employment, and the income distribution?

Methodology. We extend the general equilibrium model calibrated for France by Alla, Espinoza, and Pérez Ruiz (2015) with an inequality block, including a Lorenz curve and a Gini index constructed from French data on labor, capital income, and publicly provided goods (health and education). We then shock the model to inspect how a suite of stylized labor and fiscal policies affect output, the fiscal deficit, and inequality through the entire income distribution.

Structure of the paper. Section II briefly discusses French inequality profile in international comparison. Section III presents the general equilibrium model and the empirical Lorenz curves used to gauge the impact of policy shocks on efficiency, inequality, and fiscal outcomes. Section IV presents the simulation results for a suite of stylized policy measures akin to the ones recently adopted to (or being considered by) the authorities. Section V concludes.

II. INEQUALITY IN FRANCE: A SNAPSHOT

France's inequality profile. France's labor income inequality is lower, and capital income inequality is higher, than the OECD average, reflecting a high concentration of capital income at the top. This results in overall market income inequality that is relatively high in France. A heavy tax and transfer system then brings the degree of (post-fiscal policy/disposable) income inequality to around the OECD average.

Pre- and Post-Policy Household Income Inequality
(In Gini index, 0 to 1; impact in difference in Gini)

Source: Joumard and others, 2012.
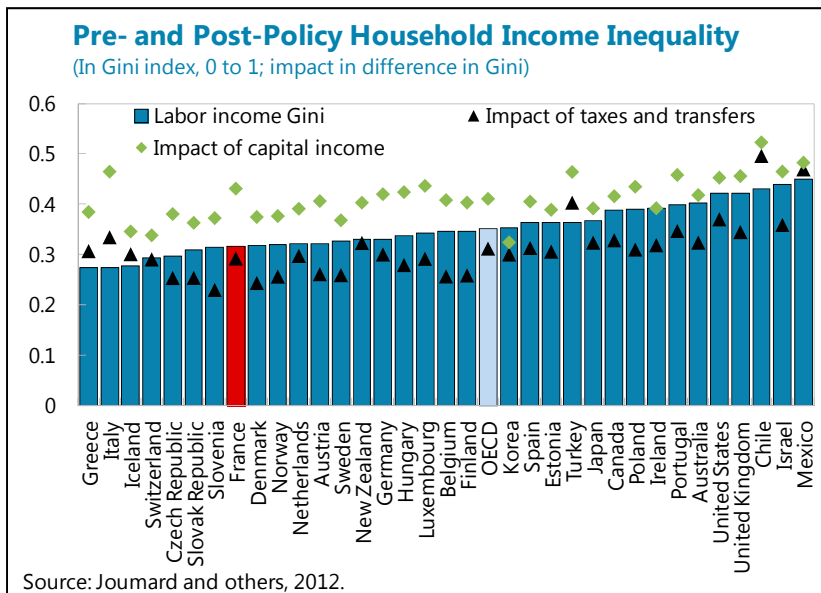
Labor income inequality. Labor income inequality (among the working-age population) is comparatively low in France. This reflects a number of factors including wage compression

(partly due to minimum wage policies) and low part-time employment.[3] Among the OECD countries, labor income inequality in 2011 was highest in Mexico, Israel, Chile, the United Kingdom, and the United States, while Greece, Italy, Iceland, Switzerland, and the Czech Republic were the most equal countries.

*Market (or pre-fiscal policy) income inequality.* Significant capital income concentration at the top more than offsets the relatively low labor income inequality in France. Piketty (2008) relates the upward trend in capital income inequality over the last 30 years to the rise in inheritances and *inter vivos* gifts,[4] as capital income and wealth taxes came down. As a result, household market income inequality is above the OECD average.

Disposable income (post-policy) inequality. Relying on a heavy transfer system, disposable (or post-policy) income inequality is brought down to around the OECD average. Among the OECD countries, post-policy inequality in 2011 was highest in Chile, Mexico, Turkey and Italy, while Denmark, Belgium, Finland, and Slovenia were the most equal countries. While France relies on a number of significant large transfers and

Size and Progressivity of Transfers

$y = -0.01x + 0.73$
$R^2 = 0.30$

Source: Joumard and others, 2012.

medium-sized transfers, the overall progressivity of the system remains below the OECD average (Figure 1).[5] On the expenditure side, less progressive old-age pensions dominate more progressive cash transfers. On the revenue side, the tax mix relies more heavily on consumption taxes than on personal income taxes, compared with other countries.

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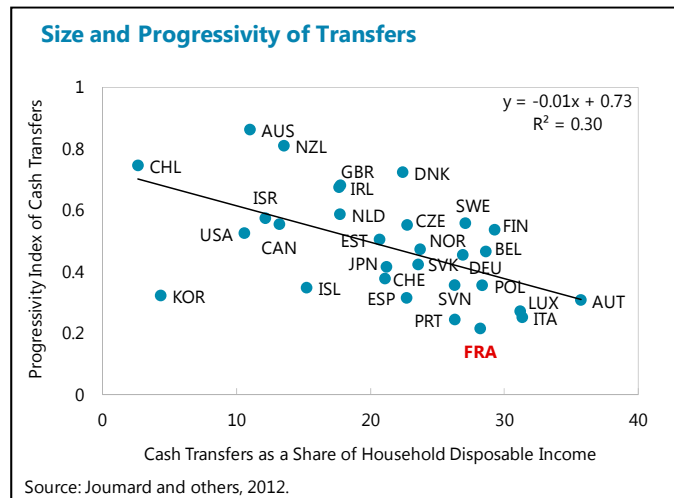
[3] The more compressed the wage distribution the lower the Gini coefficient. The higher part-time employment and the lower employment rates, the higher the Gini coefficient, given large income differentials for these groups with full-time workers (unemployed individuals and the inactive enter the calculation with zero income as transfers are not taken into account). For France, the D1/D9 ratio for full time workers has been decreasing over time and is low by OECD comparison.

[4] A gift that takes effect during the lifetime of the donor and donee and that is irrevocable once made.

5 The redistributive impact of any tax and transfer system (the reduction in the Gini index from transfers/taxes scaled by the share of transfers/taxes in households' disposable income) depends on the size and progressivity of each component.

Figure 1. France: Inequality Indicators

France's average inequality outcomes owe to a heavy transfer system...

Public Cash Transfers to Households
(In percent GDP; right scale in percent disposable income)

...coupled with an average-sized tax system

Household Taxes
(In percent of household disposable income)

However, low progressive taxes and transfers ...

Progressivity
(In index)

...hamper redistribution efficiency

Redistributive Impact of Taxes and Transfers[1]

Source: OECD.

1/ Percentage point reduction in the Gini index scaled by the share of transfers/taxes in households' disposable income.

III. ANALYTICAL FRAMEWORK

A. The Lorenz Curve

Lorenz curve and Gini coefficient. We construct Lorenz curves for labor force participants from actual French data on labor, capital income, and publicly provided health and education services. While the Gini coefficient provides a simple snapshot of overall income dispersion, Lorenz curves allow us to inspect the income redistribution for the whole population. This is particularly relevant when pre- and post-policy Lorenz curves intersect. In such cases, different redistribution configurations may be associated with the same overall change in the Gini coefficient, making the Lorenz curve a more informative way to assess inequality, with "winners" and "losers" from the simulated policy measure.

Labor income distribution. An empirical Lorenz curve is constructed using detailed net of taxes labor income data for different groups of workers (Figure 2, left chart). The labor force

is broken down into unemployment benefits recipients (Unedic), workers in private and state-owned enterprises (INSEE), and public servants (INSEE and the 2014 finance law LPF). This dataset is then used to generate the income distribution for the combined group of workers (taking into account the size of each group). Where centile data is not directly available (all groups except workers in private and state-owned enterprises), decile data was linearly interpolated to generate centile data.

Income distribution inclusive of capital and public goods (Figure 2, right chart). Capital income and the income equivalent of the provision of two key public goods (education and health services) were also added to the net labor income distribution to construct a more comprehensive view of inequality in France. Decile data from INSEE (*Enquête Revenus fiscaux et sociaux 2012 et séries longues*) on capital income distribution and quintile data from Amar and others (2008) on the provision of public services for households were interpolated to complete the income distribution of net market income inclusive of public goods (Figure 2).

Figure 2. France Income Distribution, 2011

Source: Unedic, INSEE, 2014 finance law, and IMF Staff calculations.
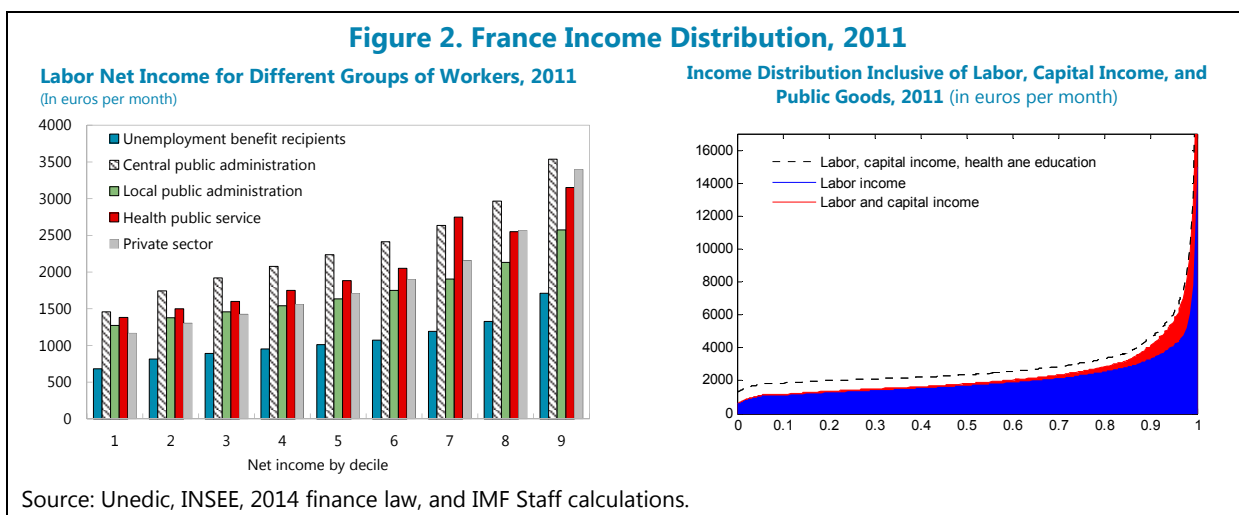
Inequality by labor, capital income, and publicly provided goods. The Gini coefficient for the Lorenz curve on net labor income is estimated at 0.28 (Table 1, Figure 3). Recipients of unemployment benefits have the lowest average net income (EUR 1,200 per month), around half of the most favored group (public servants in the central administration). The average net wage in the private sector is around 10 percent lower than the wage of public servants in the central administration. This group is the most heterogeneous, with a Gini coefficient of 0.29, significantly higher than the Gini coefficients in the public sector of around 0.18. Capital income makes the income distribution more unequal, given capital income concentration on wealthier individuals—the Gini index increases to 0.35, up from a labor income Gini coefficient of 0.28. By contrast, publicly provided education and health services goods make the distribution of income more egalitarian—the Gini index declines to 0.27(see Figure 3 for the Lorenz curves).

Table 1. Labor Net Income for Different Groups of Workers
(Summary Statistics 2011)

	Population (millions)	Mean net income (euros)	Std. dev. of net income	Gini coefficient
Unempl. benef. recipients	2.66	1201	686	0.25
Private sector	20.88	2188	1700	0.29
Central public admin.	2.46	2412	772	0.18
Local public admin.	1.88	1869	697	0.18
Health public service	1.16	2171	773	0.19
Total labor force	29.03	1968	1085	0.28

Sources: 2014 finance law LPF, INSEE, and Unedic.

Figure 3. Lorenz curves for different groups and different measures, 2011
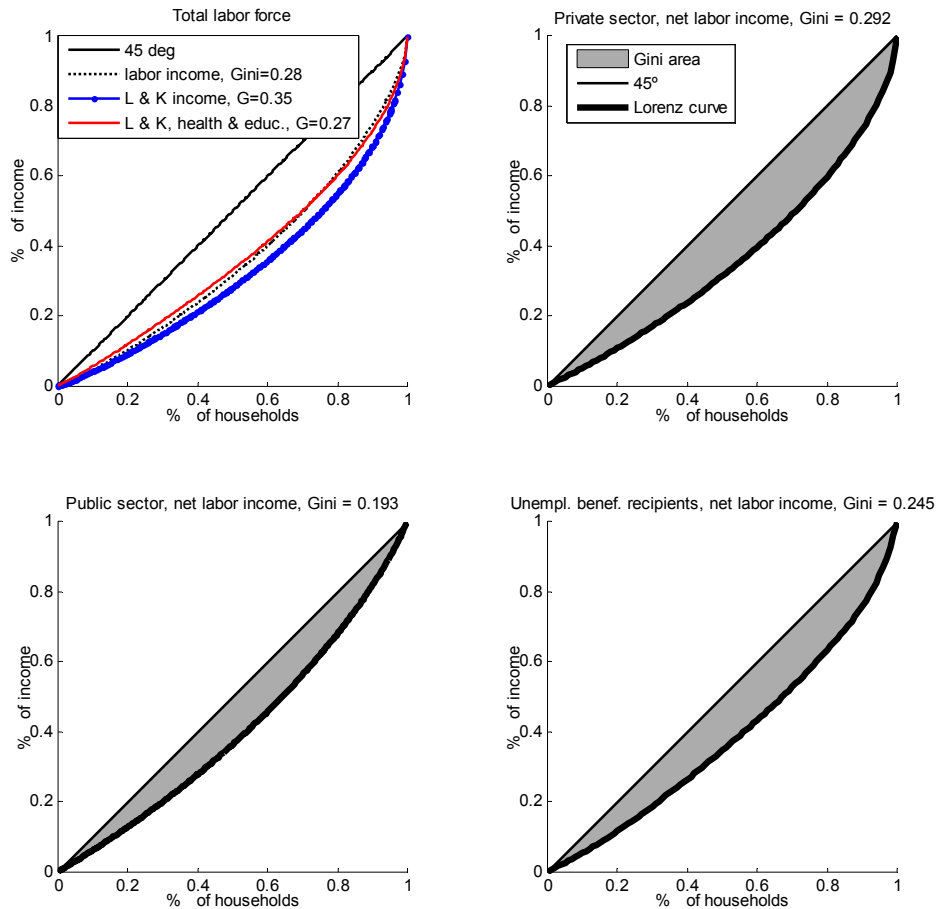
Note: Lorenz curves based on French data for unemployment benefits, net-of-tax labor income (for private sector workers, public servants, and workers in state-owned enterprises), net-of-tax capital income, and income equivalent of the provision of health and education services.
Source: INSEE, Unédic, 2014 finance law LPF, and Amar and others (2008).

B. The Model

Model's overview. 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 (Alla, Espinoza and Pérez Ruiz, 2014).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.

Output and the labor market. 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 $\sigma_1 = 1/(1-\rho_1)$:

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

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

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

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 Cobb-Douglas functional form and parameter ω:

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

We assume all public servants are qualified (around 85 percent of new public servants have completed three years of higher education (DGAFP, 2012)). Public workers' wages are assumed fixed in the short-run, and follows the private skilled workers wages in the long-run.

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 $T_{p,u}$, $T_{p,s}$, represent profits, the gross rate of return on capital, unskilled wages, skilled wages, and the employers' social security tax rate, differentiated for unskilled and skilled workers. 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 imply that the labor costs, differentiated by type of worker (LC_u, LC_s) equalize marginal productivity:

$$\frac{\partial Y}{\partial L_u} = LC_u = (1 + T_{p,u})W_u$$

$$\frac{\partial Y}{\partial L_s} = LC_s = (1 + T_{p,s})W_s$$

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:

$$LC_s = \left(G^\gamma\right)^{\rho_1} \delta_\ell \delta_{\ell s} Y^{1-\rho_1} L^{\rho_1 - \rho_2} L_s^{\rho_2 - 1}$$

$$LC_u = \left(G^\gamma\right)^{\rho_1} \delta_\ell \delta_{\ell u} Y^{1-\rho_1} L^{\rho_1 - \rho_2} L_u^{\rho_2 - 1}$$

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 an increasing function of the reservation wage, which is equal to the (constant) after-tax unemployment benefit and a decreasing function of the unemployment rate of the skilled labor force:

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

where V_s, θ_s, T_n, and T_{pe} stand for the unemployment rate of skilled workers,[6] the after-tax unemployment benefit,[7] personal income and employee social security tax rates respectively.[8]

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[6] The unemployment rate for skilled workers is defined as $V_s = U_s / (L_s + L_g + U_s) = U_s/N_s$. 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).

[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.D).

Skilled wages are not sensitive to the minimum wage in the short run and depend on the minimum wage with an elasticity η_{MW} of 0.2 in the long run. The (short- and long-run) wage elasticity to unemployment benefits is set at 0.2[9] (Graafland and Huizinga, 1999).

Unskilled wages formation differs according to the time horizon under consideration. In the short run, after-tax wages for unskilled workers (W_u) are assumed to depend exclusively on the minimum wage $\underline{W}$, with an elasticity of η_{MW} calibrated at 0.2 (see Aeberhardt and others, 2012, Cette and others, 2012). In the long run, we assume unskilled (real) wages depend on the minimum wage with an elasticity η_{MW} of 0.4, twice as high as that for skilled[10].

$$\text{Short run: } W_u = A\underline{W}^{\eta_{MW}}$$

$$\text{Long run: } W_u = A\underline{W}^{\eta_{MW}} \frac{S(\theta_u, V_u)}{1 - T_n - T_{pe}}$$

The accumulation of capital is very important for our results. We distinguish two horizons for the results, and a crucial difference is in what is assumed about capital accumulation (see below for more details).

The government. Finally, the budget surplus is given by:

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

where T_k is the capital income tax rate (which is added to the personal income tax to capture the entire tax burden on capital income), and 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.

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[8] The calibration strategy discussed in Section III.D does not differentiate the personal income tax rate by skills. The effects from a progressive tax system is explored in the model via social security contributions.

[9] The empirical evidence on this elasticity is scant and so simulation results for changes to unemployment benefits should be taken with caution.

[10] The assumption of different values for skilled and unskilled wages elasticity to the minimum wage implies that the relative wage of unskilled to skilled workers increases with the minimum wage, as confirmed by the evidence. The exact elasticities of the skilled and low skilled wages to the minimum wage vary across studies. Bazen and Martin (1991) found an elasticity of 0.2 for overall wages, and about twice higher for low skilled workers. Cette and others (2011) find higher elasticities for nominal wages (0.4 to 0.8), while noting that increases in the minimum wage have systematically been followed by higher price inflation. This suggests a theoretical prior that the real wage elasticity to the minimum wage must be significantly smaller than for nominal wages, as we assume in our calibration strategy. In the context of our model, a doubling of the real unskilled and skill wage elasticities (and thus a doubling of the difference between the two elasticities) would simply double the baseline results for the simulated shock to the minimum wage (see table 4 in robustness section).

We report simulation results in deviations from baseline. To this aim, the model is log-linearized. The log-linearized equations are presented in Appendix B. In the results tables, all variables represent percentage changes, with the exception of the budget surplus, *bs*, which is expressed in percent of GDP.

C. Short- and Long-Term Solutions

We describe here 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 have time to adjust. Although in the short run investment will be reacting to economic conditions, the impact on the stock of capital of changes in the investment rate will be marginal and can be neglected. Nevertheless, to illustrate the impact of fiscal measures on investment, we present in all simulations the variations in investment (although investment does not have a feedback effect on the other variables). Investment, *I,* is simply 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:

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

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).[11] The more inelastic 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). Inversely, the more elastic the labor supply, the larger the effect of tax changes on employment. In particular, the assumption that in the short run unskilled wages are fixed to the minimum wage means that the unskilled labor supply is fully elastic and thus employment responses are maximal.

Long-term solution. The long-run solution is computed assuming capital has reached a new steady-state, where the rate of return on capital (net of the capital and personal income taxes) is equal to an exogenous world interest rate (and is thus unchanged by the fiscal measures). The equalization of the net rate of return on capital to this exogenously given world interest rate pins down the new steady-state stock of capital. The baseline assumption that the real rate of return on capital always comes back to its initial value is arguably extreme, and its foundation—the hypothesis that rates of return are equalized across countries—has been

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[11] 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).

found to be violated in empirical data (see, e.g., Frankel 1985). It is natural to thus check the robustness of our results to different assumptions on the convergence of real rates of return (section IV. C).

- Labor tax reform. In the long run, capital receives positive impetus as a result of a labor 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 labor tax cuts will be fully appropriated by workers with no positive effects for employment if the labor supply is inelastic.

- Capital tax reform. A higher tax wedge on capital income (coming from specific capital income taxes or from the personal income tax) requires a long-term increase in the gross rate of return on capital (to equalize net returns) and thus on the marginal product of capital, which leads to a fall in the stock of capital and in output. This reduction of output lowers labor demand and eventually wages and employment.

What distinguishes the segmented approach taken in this paper from standard general equilibrium models is the presence of differentiated labor supplies. In the calibration for France (see Section III.D below), we 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.

D. Calibration

Calibrated parameters in the model are reported in Table 2.

Calibration challenge. The calibration challenge is fitting the 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).

Wage elasticities to unemployment. 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 earners[12] 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. In addition, the minimum wage acts as an anchor in this segment of the labor force. The lower incidence of unemployment and 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 −0.10 (Table 2) for skilled workers.[13] For unskilled workers, we assume that wages: (i) are fixed in the short run (reflecting the constraint of the minimum wage) (ii) adjust in the long run with the same elasticity than skilled workers wages $\psi_u = \psi = -0.1$. In the baseline solution, such a calibration implies that half of the tax cut is passed through to higher wages.[14]

As explained above, we divide the private labor force using the fact that the share of unskilled workers is 44 percent. We also use DARES data to identify the share of unskilled unemployment in total unemployment, based on the reference wage. Finally, the employers' social security tax rates are separately calibrated for skilled and unskilled labor using the wage and tax distribution's (DARES).

Elasticities of substitution between production factors. The elasticity of output to the public good (γ) 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 0.10. The share ω of public skilled workers ($L_{g,}$) is then calibrated to match the expenditure shares of public skilled workers and goods in public spending. Using IMF (2013), we calibrate ω to 0.61.

Finally, the elasticity of substitution between skilled and unskilled labor will be crucial in our approach to assess the respective tax cuts impact on skilled and unskilled workers. We then follow Jamet (2005) that gives a recent and robust estimate for this parameter (0.3 in the short run and 1 in the long run).

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[12] 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). This implies that around 33 percent of the labor force has a level of education lower than secondary school.

[13] Note that a wage-curve elasticity of -0.10 relating unemployment rate and the real wage, implies a labor supply elasticity of 0.53 for a baseline unemployment rate of 10 percent, similar to the labor supply elasticity typically used in business cycle models (around 0.5).

[14] We later present results for different assumptions on the pass-through, which imply choosing different values for ψ_u.

Table 2. Model Parameterization for France

Parameter	Calibrated value	Description	Source
λ_l	0.42	Private labor's costs in total GDP	National accounts
λs	$(1\text{-}0.28)*\lambda_l$	Share of skilled labor costs in total private costs	DARES 1/
Ψ	-0.1 (0 for unskilled workers in the short run)	Wages' elasticity to unemployment (skilled and unskilled workers)	Meta analysis (Nijkam and Poot, 2005) 2/
ηMW (unskilled)	0.2 (short run) and 0.4 (long run)		
ηMW (skilled)	0 (short run) and 0.2 (long run)	Wages' elasticity to the minimum wages	Aeberhardt and others, 2012, Cette and others, 2012
$\sigma 1$	0.14 (short run) and 0.49 (long run)	Elasticity of substitution between effective labor and capital	EC (1994)
$\sigma 2$	0.3 (short run) and 1 (long run)	Elasticity of substitution between skilled and unskilled labor	Jamet (2005)
ω	0.61	Public workers remuneration as a share of compension of public employees, use of goods and services, and consumption of fixed capital	
Tn	0.15	Average income tax rate	OECD
Tps	0.43	Average employer social security tax rate, skilled workers	
Tpu	0.26	Average employer social security tax rate, unskilled workers	
Tpe	0.137	Average employee social security tax rate	
Tk	0.34	Statutory corporate income tax rate	OECD and Harding, 2013
θs	0.65* *(1-Tn - Tpe)*	After-tax unemployment benefit level, skilled workers	DARES, Unedic, OECD
θu	0.72* *(1-Tpe)*	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: sources as quoted and authors' calculations.

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 -0.07. We nevertheless take a larger elasticity because our focus is on the wage curve for skilled workers. The average elasticity is then -0.07 in the short term (unskilled workers wages are fixed). 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. POLICY SIMULATIONS: EFFICIENCY-INEQUALITY TRADEOFF OR SYNERGY?

A. Impact of Stylized Policies on Output, Inequality, and the Fiscal Deficit

Approach. We simulate the impact of a range of stylized policy measures (Table 3, Figure 4). Specifically, we explore:

- two variants to the enacted CICE (EUR 20 billion unfinanced labor tax cuts, targeted toward the low wage earners versus broad based);

- a series of other conventional fiscal measures, including stylized labor and capital income tax cuts, increases in public consumption and in publicly provided health and education services;

- changes in two central labor market instruments, namely the minimum wage and the generosity of unemployment benefits;

All simulations have equal *ex ante* cost of EUR 20 billion, except the minimum wage scenario, which is a 5 percent increase relative to the baseline, and the unemployment benefits simulation, which has an *ex ante* cost of EUR 5 billion. The discussion below focuses on the intuition underlying the main results, with a focus on the long run, once all variables have fully adjusted to policy shocks (for a comprehensive overview of the model's results at both short- and long-term horizons, see Appendix C).

Stylized findings. All fiscal expansions improve output, with the response being more pronounced in the long run where capital accumulation responds positively to the shock. While increases in the minimum wage, public employment, and health and education spending worsen the fiscal position in the long run, tax cuts are *de facto* self-financing. This owes to a very strong response of capital accumulation (hence output and employment) to tax cuts, particularly capital income tax cuts, under the model assumptions of perfect long-run capital mobility and perfect competition.[15] A crossing of the Lorenz curve occurs in about three quarters of the policy simulations, implying that value judgments about the impact on inequality impact of the policy depend on social redistribution preferences between segments of the income distribution, and cannot be captured by the Gini coefficient alone.

Simulation 1. EUR 20 bn unfinanced labor tax cuts (employer-paid social security contributions) for workers paid up to 1.5 times the SMIC. This measure cuts down the relative cost of unskilled labor and reduces unskilled unemployment considerably. By fostering profits and capital accumulation, targeted labor taxes can deliver significant output

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[15] In practice, capital market imperfections and competition restraining practices may considerably limit investment, even in the long run. For robustness with respect to the perfect capital mobility assumption, see section IV.C.

gains that are so significant to make the tax cuts fiscally self-financing in the long run.[16] This measure considerably reduces inequality overall, more markedly so at the lower end of the income distribution, given the boost to unskilled employment and the increase in unskilled relative wages (the targeted tax cut is partially pass through to wages in the long run).

Simulation 2. EUR 20 bn unfinanced labor tax cuts (employer-paid social security contributions) for workers paid up to 2.5 times the SMIC. A broad-based tax cut dampens the long-run output, fiscal, and distribution gains relative to the more targeted scheme above. This follows from stronger pass through to wages overall (given higher wage elasticity to employment for skilled workers)[17], hence the more muted capital accumulation and output response. Inequality gains are less pronounced too, overall and at the bottom of the distribution, given relatively lower employment creation and falling unskilled relative wages in the long run.

Simulation 3. EUR 20 bn cut in corporate tax revenues (2.2 percentage point cut in dividends income tax rate). By boosting profits and capital accumulation (wages are fixed in the short run), this measure has a strong impact on output in the long run, thus becomes fiscally de facto self-financing. The strong impact of the corporate tax rate on output in the model is due to the assumption of perfect capital mobility over the long run. Inequality is worsened overall (in terms of the Gini coefficient) but the income distribution is improved at the bottom given large employment gains for the unskilled, which more than offset falling unskilled relative wages. Lower unskilled relative wages owe to a relatively higher employment response (relatively lower wage response) than for skilled workers, given higher elasticity to employment for the latter.

Simulation 4. EUR 20 bn (or 1.4 percentage point cut) in average income tax rate.[18] The measure reduces the tax wedge on both capital and labor income. The effect of the cut in capital income taxation is similar to that described in simulation 3, with a sizable long-run effect on output, employment, and a worsening of unskilled relative wages and of income distribution. Despite the personal income tax cut being symmetric, it has a differentiated effect on skilled versus unskilled workers: unskilled labor costs are unchanged because of the minimum wage while skilled labor costs are reduced to some extent, thus boosting skilled employment. Overall, this measure boosts output and reduces inequality in the short run, but inequality in the long-run is worsened: unskilled relative employment is higher than in the baseline, but this is more than offset by the reduction in unskilled relative wages and the additional income accruing to capitalists as a result of capital accumulation.

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[16] This result stems from savings in unemployment benefits and a higher base for the labor tax income. It is in line with that of similar general equilibrium models, e.g. Van Rijckeghem, 1997; Sterdyniak, 2007; Batyra and Sneessens, 2010.

[17] Through the wage curve formulation.

[18] The tax rate on all personal income is reduced by the same rate, i.e. 1.4 percentage points.

Simulation 5. EUR 20 bn increase in the public wage bill by rising public employment by 390,000 workers. Higher public employment hampers capital accumulation, hence deteriorates output and the fiscal deficit in the long run. It has important redistribution effects for barely unchanged Gini coefficient. The initial positive output response (public employment participates to the provision of public goods) is more than reversed in the long run as rising skilled wages[19] increase labor costs in the private sector and profits are shrank. Inequality at the bottom is reduced because of the reduction in unemployment, but inequality at higher percentiles is worsened because of the increase in skilled relative wages (public employment benefits the skilled workers), even though capital owners suffer from the reduction in capital and output.

Simulation 6. EUR 20 bn increase in the public wage bill by rising public wages by 7.1 percent relative to baseline. While both higher employment and higher public wages affect the wage bill, the latter has no general equilibrium effects in the model. Increasing public wages worsens the income distribution at the bottom but improves it toward the top. The overall (Gini) inequality effect is small (positive for labor income only, negative when adding capital to the income distribution). There are no other effects in the model of this measure.[20]

Simulation 7. EUR 20 bn increase in health and education services. Public goods can raise long-run output and employment markedly, at modest fiscal costs, all the while leaving overall inequality unchanged and benefiting the poor. Extra output and jobs follow from positive externalities from public goods onto total factor productivity. Since the output effect is positive, this measure increases tax collection and decreases unemployment benefits, which partly offsets the initial increase in the fiscal deficit. Raising the provision of public goods benefits the poorer half of the population—those with higher propensity to consume *public* health and education services.

Simulation 8. A 5 percent increase in the minimum wage. By reducing profits and capital accumulation, a higher minimum wage worsens long-run output, the fiscal position, and inequality, particularly among the poor. Inequality becomes more pronounced *within* the poorest quintile of the labor force due to upsurge in unskilled unemployment, which outweighs redistributive effects from higher unskilled relative wages. However, the overall Gini coefficient improves as low-wage workers that remain employed earn higher wages. *Simulation 9. EUR 5 bn increase in the unemployment benefits.* Higher unemployment benefits boost income for the unemployed and increases the reservation wage for both skilled and unskilled workers. This raises the negotiation power of workers, thereby increasing net wages and labor costs. In the short run, labor income increases benefit all workers and

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[19] Public servants are taken to be skilled workers in the model, thus an increase in public employment pushes up skilled wages in the private sector.

[20] The model does not link public wages to their productivity or to other real effects.

income inequality is reduced, even though some jobs are lost by the increase in labor costs. In the long run, the reduction in output and employment is large because capital accumulation is hampered significantly by the increase in labor costs. Skilled wages suffer (whereas unskilled wages remain supported by the higher reservation wage). The effect on income distribution is a combination of higher unemployment (which hurts income in the lower two deciles), a smaller skill premium, and large losses for capital owners. Overall, in the long run the Gini coefficient is reduced but the employment losses are large.

Table 3. Simulated Results
(In percent change deviation from baseline, unless otherwise stated)

| | Targeted SSC cut | | Untargeted SSC cut | | Capital income tax cut | | Flat income tax cut | | Public employment | | Public wages increase | | Public good increase | | Minimum wage raise 5 percent | | Unemployment Benefits | |
| | Simulation 1 | | Simulation 2 | | Simulation 3 | | Simulation 4 | | Simulation 5 | | Simulation 6 | | Simulation 7 | | Simulation 8 | | Simulation 9 | |
	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
Output	0.25	3.06	0.21	2.34	0.00	6.38	0.11	5.18	0.20	-1.12	0.00	0.00	0.51	1.78	-0.03	-1.23	-0.25	-4.69
Employment																		
Private	0.61	3.06	0.50	2.34	0.00	4.08	0.26	3.97	-0.57	-1.86	0.00	0.00	0.09	0.98	-0.07	-1.23	-0.60	-4.69
Skilled	-0.10	1.17	0.28	1.59	0.00	3.36	0.38	3.27	-0.90	-2.37	0.00	0.00	0.08	0.81	0.01	-0.85	-0.45	-3.24
Unskilled	2.43	7.90	1.07	4.28	0.00	5.94	-0.06	5.78	0.28	-0.55	0.00	0.00	0.12	1.43	-0.28	-2.19	-0.97	-8.43
Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.11	7.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Employment (in thousands)	211	863	131	579	0	939	39	914	310	63	0	0	20	226	-25	-301	-142.64	-1152.79
Private	211	863	131	579	0	939	39	914	-80	-327	0	0	20	226	-25	-301	-142.64	-1152.79
Skilled	-12	137	33	186	0	393	44	383	-105	-277	0	0	9	95	1	-100	-53.16	-378.33
Unskilled	223	726	98	393	0	546	-6	531	25	-50	0	0	11	132	-26	-201	-89.49	-774.47
Public	0	0	0	0	0	0	0	0	391	391	0	0	0	0	0	0	0.00	0.00
Wages																		
Skilled	-0.17	1.88	0.45	2.55	0.00	5.41	-1.48	3.17	3.92	1.56	0.00	0.00	0.13	1.30	0.02	-0.37	2.02	-1.45
Unskilled	0.00	3.76	0.00	2.04	0.00	2.83	0.00	0.66	0.00	-0.26	0.00	0.00	0.00	0.68	1.00	0.96	3.75	3.74
Net wages																		
Skilled	-0.17	1.88	0.45	2.55	0.00	5.41	0.61	5.26	3.92	1.56	0.00	0.00	0.13	1.30	0.02	-0.37	2.02	-1.45
Unskilled	0.00	3.76	0.00	2.04	0.00	2.83	2.09	2.75	0.00	-0.26	0.00	0.00	0.00	0.68	1.00	0.96	3.75	3.74
Public servants	0.00	1.88	0.00	2.55	0.00	5.41	0.00	3.17	0.00	1.56	7.11	0.00	0.00	1.30	0.00	-0.37	0.00	-1.45
Labor costs private sector	-2.53	0.00	-2.09	0.00	0.00	4.68	-1.07	2.47	2.82	1.05	0.00	0.00	0.09	1.13	0.29	0.00	2.50	0.00
Skilled	-0.17	1.88	-1.35	0.75	0.00	5.41	-1.48	3.17	3.92	1.56	0.00	0.00	0.13	1.30	0.02	-0.37	2.02	0.00
Unskilled	-8.60	-4.84	-3.98	-1.94	0.00	2.83	0.00	0.66	0.00	-0.26	0.00	0.00	0.00	0.68	1.00	0.96	3.75	0.00
Labor income private sector																		
Skilled	-0.20	1.88	0.55	2.55	0.00	5.40	-1.29	3.88	7.40	5.23	0.00	0.00	0.16	1.30	0.02	-0.71	1.79	-2.72
Unskilled	0.27	4.07	0.12	2.21	0.00	3.06	-0.01	1.21	0.03	-0.28	0.00	0.00	0.01	0.74	0.81	0.57	3.06	2.21
Capital stock	0.00	3.06	0.00	2.34	0.00	8.01	0.00	6.04	0.00	-1.34	0.00	0.00	0.00	1.54	0.00	-1.23	0.00	-4.69
Investment	1.80	0.00	1.48	0.00	3.33	0.00	2.52	0.00	-1.26	0.00	0.00	0.00	0.74	0.00	-0.21	0.00	-1.78	0.00
Rate of return (gross)	1.80	0.00	1.48	0.00	0.00	-3.33	0.76	-1.76	-1.26	0.00	0.00	0.00	0.74	0.00	-0.21	0.00	-1.78	0.00
Rate of return (net)	1.80	0.00	1.48	0.00	3.33	0.00	2.52	0.00	-1.26	0.00	0.00	0.00	0.74	0.00	-0.21	0.00	-1.78	0.00
Surplus (in percentage points)	-0.67	0.61	-0.66	0.26	-0.98	2.00	-1.09	1.49	0.13	-0.80	-0.50	0.00	-0.90	-0.43	0.01	-0.70	-0.13	-2.79
Contribution from:																		
Income tax and capital income	0.12	0.20	0.10	0.15	-0.98	0.03	-0.50	0.26	-0.08	-0.09	0.00	0.00	0.05	0.10	-0.01	-0.26	-0.38	-1.01
Labor taxes, rate effect	-1.00	-1.00	-1.00	-1.00	0.00	0.00	-0.45	-0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Labor taxes, base effect	0.08	1.17	0.16	1.11	0.00	2.12	-0.17	1.50	0.96	0.45	0.50	0.00	0.04	0.51	0.04	-0.27	0.37	-1.03
Unemployment benefits	0.13	0.51	0.09	0.36	0.00	0.60	0.03	0.63	0.25	0.06	0.00	0.00	0.01	0.15	-0.02	-0.22	-0.11	-0.95
Public employment	0.00	-0.26	0.00	-0.36	0.00	-0.76	0.00	-0.45	-1.00	-1.22	-1.00	0.00	0.00	-0.18	0.00	0.05	0.00	0.20
Spending on public goods	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.00	-1.00	0.00	0.00	0.00	0.00
Income tax	0.00	0.00	0.00	0.00	0.00	0.00	-1.50	-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gini index (in percentage points)																		
Labor	-0.14	-0.75	0.02	-0.14	0.00	0.10	-0.22	0.07	0.46	0.19	0.05	0.00	0.01	0.03	-0.14	-0.03	0.05	-0.32
Labor and capital	-0.03	-0.62	0.08	-0.12	0.18	0.28	-0.08	0.18	0.13	-0.06	0.04	0.00	0.05	0.05	-0.14	-0.18	-0.32	-0.69
Labor, capital, and public goods	...	...	...	...	...	...	...	...	...	...	...	...	0.02	0.00	...	...	...	...

Source: IMF Staff calculations.

Note: All simulations have equal ex ante cost of EUR 20 billion except minimum wage, which is a 5 percent increase relative to the baseline, and unemployment benefits, which has an ex ante cost of EUR 5 billion.

Figure 4. Policies and the Income Distribution

(Long run impact on Lorenz curves based on labor and capital income; In percentage point difference from the baseline)
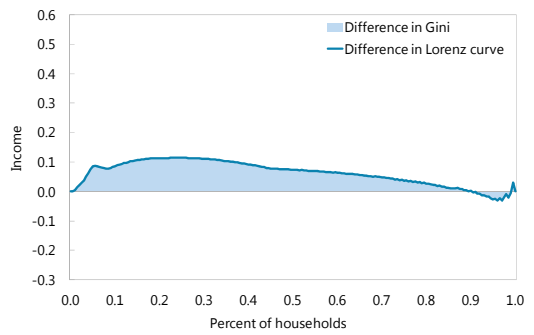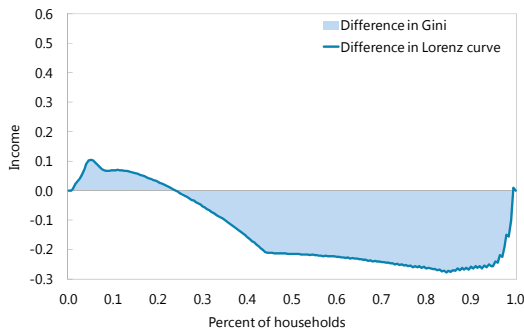
Targeted SSC Cut
Delta Gini (in pp) = -0.62
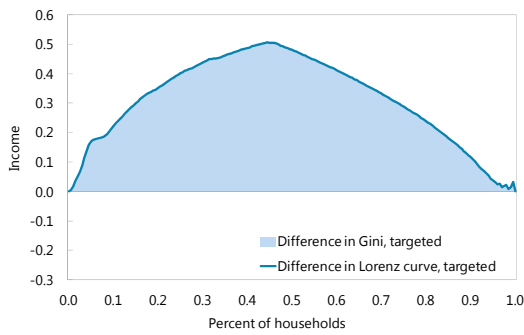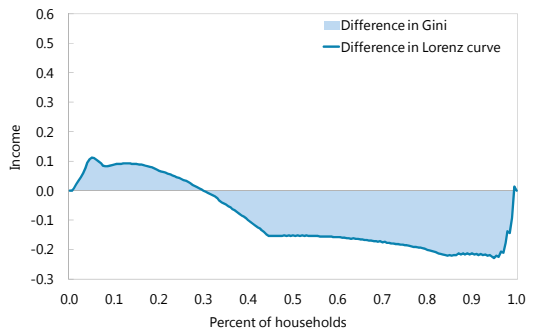
Untargeted SSC Cut
Delta Gini (in pp) = -0.12
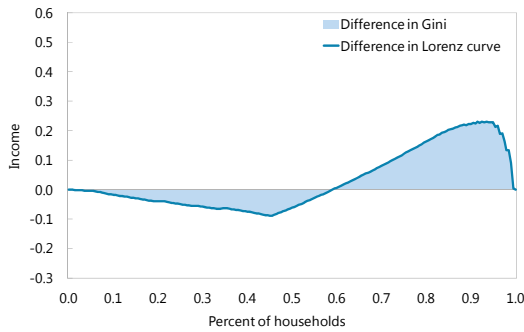
Capital Income Tax Cut
Delta Gini (in pp) = 0.28

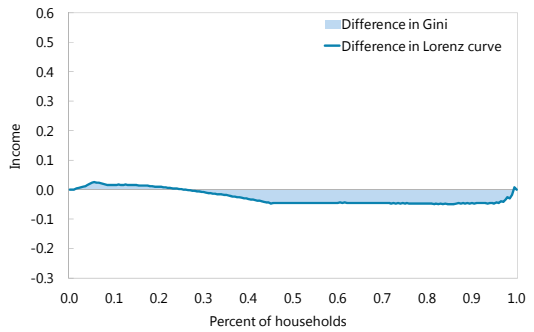**Flat Income Tax Cut**
Delta Gini (in pp) = 0.18

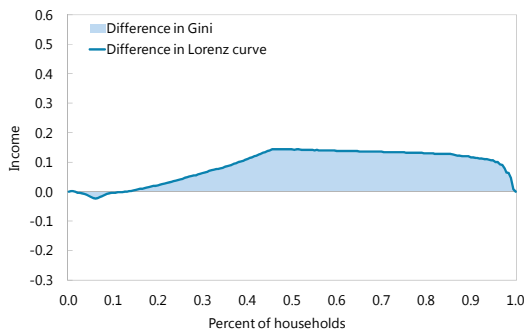**Public Employment Increase**
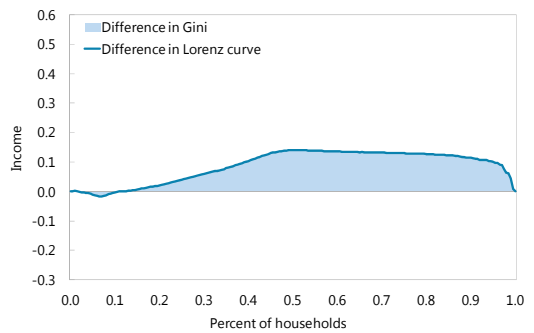Delta Gini (in pp) = -0.06

Public Good Increase
Delta Gini (in pp) = 0.05

Minimum Wage Increase
Delta Gini (in pp) = -0.18

Unemployment Benefits Increase
Delta Gini (in pp) = -0.69

Source: IMF Staff calculations.

Note: Charts show the difference from baseline cumulative income at each decile (a y-axis value of X at the *ith* decile indicates that the poorer *ith* decile individuals accumulate X percentage points more of total income relative to baseline). The difference in Lorenz curve is the difference between the post- and the pre-Lorenz curves. A positive shaded area indicates a reduction in inequality and vice-versa.

B.   Policy Implications

Efficiency-enhancing policies. Our long run simulation results suggest that, for a given *ex ante* EUR 20 bn fiscal cost, capital income tax cuts are best for boosting employment and output and improving the fiscal position, followed by flat income tax cuts, targeted labor tax wedge cuts, broad-based labor tax wedge cuts, and increases in public goods (Figure 5, top panel). However, when inequality is taken into account, targeted labor tax wedge cuts appear superior as they deliver sizable output and employment gains, all the while significantly reducing overall inequality and improving income distribution at the bottom. A higher provision of public goods could also have very beneficial effects, provided positive externalities from education and health are substantial. Turning to the short run, there are practically no tradeoffs involved between efficiency and inequality across the various policy instruments, given the tepid output response under fixed capital.

Revisiting conventional inequality instruments. Our simulations suggest that long-standing policies aimed at reducing inequality, in particular the minimum wage, may have unintended consequences on the income distribution. By squeezing profit margins, minimum wage increases discourage investment and depress output. As unskilled labor becomes relatively expensive, more unskilled workers lose their jobs. This worsens the income distribution at the bottom despite the increase in unskilled relative wages. If societal values gave priority to improving the situation of the poor, for example, the first quintile of the distribution, our results suggest the targeted labor tax wedge cuts are the most effective instrument, followed by untargeted labor tax wedge cuts, personal and corporate income tax cuts. Increases in public employment or the minimum wage hurt the poor (through lower unskilled relative wage and employment, respectively) (Figure 5, middle panel; and Figure 6).

Figure 5: Policies Impact on Output and Inequality

Source: Authors' calculations based on model results.
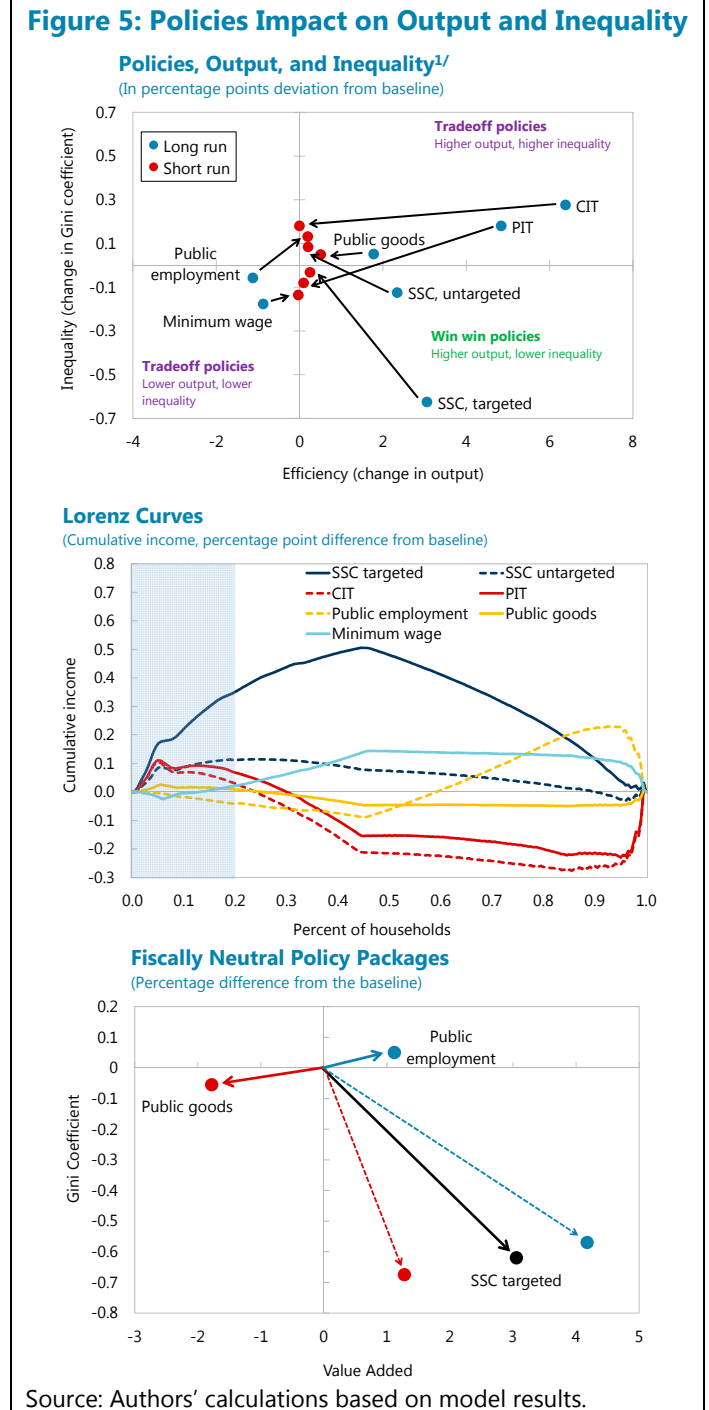
Fiscally neutral win-win policies. A package of targeted labor tax reductions offset, *ex ante*, by cuts in public employment (or wages) is a long-term "win-win" strategy in terms of efficiency, inequality, and fiscal outcomes, provided the higher fiscal deficit can be accommodated in the short run (Figure 5, bottom panel). An alternative package could consider cuts in public wages as an offsetting measure, provided those cuts do not hamper public servants motivation and productivity, as is assumed in our model.

Figure 6. Policies and the Income Distribution

(Long run impact total income by decile, x-axis; in percentage difference from the baseline, y-axis)

SSC Cut

Capital Income Tax Cut

Flat Income Tax Cut

Public Employment Increase

Public Good Increase

Minimum Wage Increase

Source: IMF Staff.
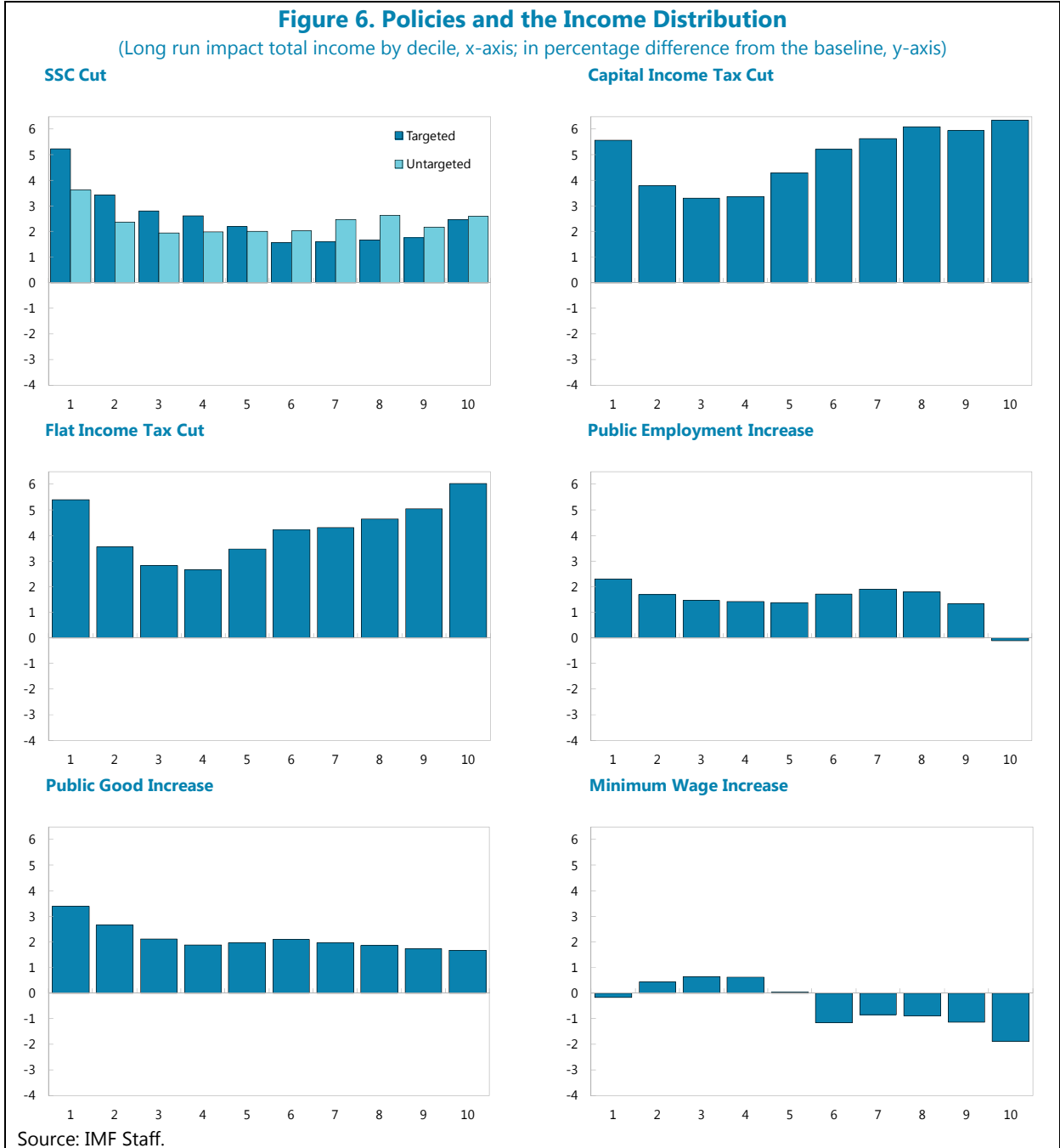
C. Robustness of Results

This section discusses the robustness of simulated results, in the long run, to key parameters in the model, including capital mobility, wages elasticity to unemployment (ψ), the elasticity of substitution between effective labor and capital (σ_1), the elasticity of output to the public good (γ), and the wages elasticity to the minimum wage (η_{WM}).[21] The results from these robustness checks are reported in table 4.

Capital mobility (ε_K). Capital market imperfections, risk-return characteristics in the allocation of portfolios, complementarity between the presence of physical capital and the ability to reach local markets, are all likely to reduce the sensitivity of capital accumulation and output to the tax rate on capital.[22] In addition, restrictions to competition in product markets may inhibit the capital response in the long run. The extent to which the net rate of return on capital converges back to its initial value (Figure 7, top panel) is found to be important for the ex-post levels of output and the fiscal deficit, but has relatively moderate effects on income inequality (Figure 7, middle and bottom panels). In general, the positive effects of fiscal expansions on the Gini coefficient are strengthened with imperfect capital mobility because the reduction in inequality due to the lower share of income accruing to capital owners dominates the worsening inequality owing to the more muted employment gains obtained when capital accumulation is hampered (Figure 8).

Figure 7: Robustness to Imperfect Capital Mobility

Net-of-tax Rate of Return on Capital
(In percentage point deviation from steady state over time, in years)
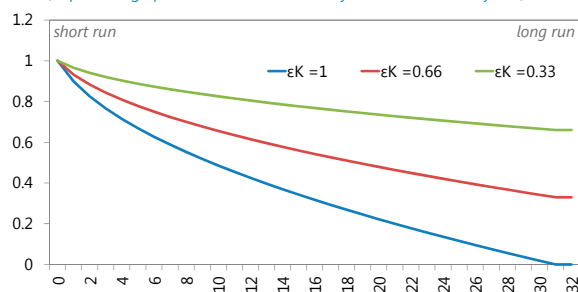
Note: Coefficient ε_k is the proportion of the short-term change in the capital rate of return that is resorbed in the long run via capital mobility. ε_k is bounded between 0 (immobile capital) and 1 (perfect capital mobility with full convergence of the rate of return to its pre-shock level).

Government Deficit
(Percent of GDP)
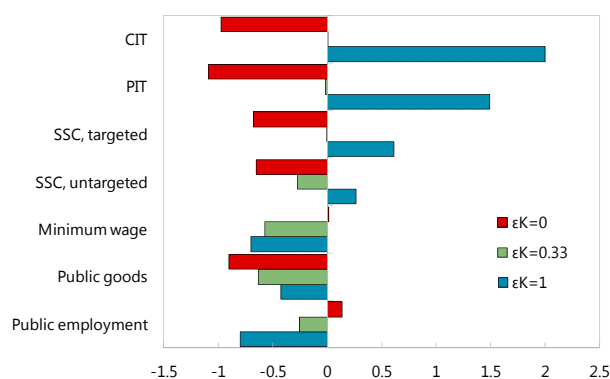
Policies, Output, and Inequality[1/]
(In percentage points deviation from baseline)
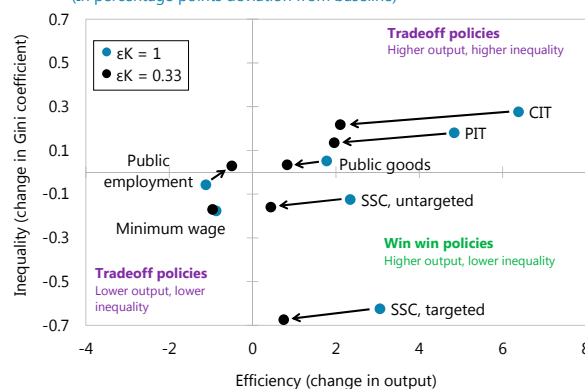
Source: Authors' calculations based on model results.

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[21] The model proved little sensitive to parameters others than reported in Table 4. A complete set of robustness tests is available upon request.

[22] The empirical evidence indeed shows that capital tend to flows towards countries where the marginal productivity of capital is low but where social capital is high (see e.g. Lucas, 1990, Alfaro et al, 2005 and Caselli and Feyrer, 2007).

Wage curve elasticity (ψ). The wage curve elasticity is found to be important to assess the long term employment and inequality impact of a targeted labor tax cut, although for realistic calibrations the measure is positive for output, it reduces inequality, and is self-financed. The same elasticity (for all workers) is also a sensitive parameter to assess the impact of an untargeted tax cut: for a high elasticity (in absolute values), untargeted tax cuts can significantly reduce inequality. The higher the elasticity the higher the pass though onto wages and the employment gains. In all, the former effect dominates, and workers gain relative to the owners of capital.

Elasticity of substitution between effective labor and capital (σ_1). The effect of a reduction in the corporate tax on inequality is relatively insensitive to the elasticity of substitution between labor and capital.[23]

Elasticity of output to the public good (γ). The productivity of public goods shapes the model response to spending on public employment and on public goods. We find that while employment and output gains are sensitive to this parameterization, the inequality impact of these measures is not.

Table 4. Robustness to Key Parameters
(Deviation from baseline)

Robustness to		Surplus in share of GDP (in percentage points)	Output (in percent change)	Total employment (in thousands)	Gini index (in percentage points) 1/
Capital mobility	Capital income tax cut (with σ1 long term = 0.49)				
	$\varepsilon_K = 1$	**2.00**	**6.38**	**939.00**	**0.28**
	$\varepsilon_K = 0.66$	0.99	4.21	619.55	0.25
	$\varepsilon_K = 0.33$	0.01	2.10	309.78	0.22
	Targeted SSC cut (with ψ unskilled = -0.1)				
	$\varepsilon_K = 1$	**1.07**	**3.06**	**863**	**-0.62**
	$\varepsilon_K = 0.66$	0.53	1.88	690.56	-0.65
	$\varepsilon_K = 0.33$	0.00	0.75	523.33	-0.67
Wage curve elasticity	Untargeted SSC cut				
	ψ (all) = -0.05	1.74	4.32	1012	-0.04
	ψ (all) = -0.1	**0.62**	**2.34**	**579**	**-0.12**
	ψ (all) = -0.15	0.22	1.65	420	-0.18
	Targeted SSC cut				
	ψ (unskilled) = -0.05	1.56	3.91	1104	-0.39
	ψ (unskilled) = -0.1	**1.07**	**3.06**	**863**	**-0.62**
	ψ (unskilled) = -0.15	0.76	2.51	708	-0.77
Elasticity of output between effective labor and capital	Capital income tax cut				
	σ1 (long term) = 0.40	1.84	5.96	939	0.24
	σ1 (long term) = 0.49	**2**	**6.38**	**939**	**0.28**
	σ1 (long term) = 0.60	2.19	6.89	939	0.32
Elasticity of output to the public good	Public employment increase				
	$\gamma = 0.05$	-1.38	-1.95	-42	-0.08
	$\gamma = 0.1$	**-1.01**	**-1.12**	**63**	**-0.05**
	$\gamma = 0.2$	-0.26	0.53	274	-0.01
	Public goods increase				
	$\gamma = 0.05$	-0.6	0.89	113	0.03
	$\gamma = 0.1$	**-0.2**	**1.78**	**226**	**0.05**
	$\gamma = 0.2$	0.61	3.56	453	0.1
Wages elasticity to the minimum wage	Minimum wage raise 2/				
	ηWM (long run, unskilled)= 0.2	-0.50	-0.87	-200.44	-0.08
	ηWM (long run, unskilled)= 0.4	**-0.70**	**-1.23**	**-300.73**	**-0.18**
	ηWM (long run, unskilled)= 0.6	-0.90	-1.58	-401.01	-0.28

Note: All simulations have equal ex ante cost of EUR 20 bn, except the minimum wage scenario, which is a 5 percent increase relative to the baseline. Central value corresponds to baseline and high and low values pertain to sensitivity analysis. All values are plausible according to the literature.
1/ Based on Lorenz curve on capital and labor income.
2/ ηWM (long run, skilled) is maintained at 0.2.

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[23] In the long run, employment gains are pinned down by the factor price frontier where this parameter does not play any role.

Wages elasticity to the minimum wage (η_{WM}). There is significant uncertainty on the value of η_{WM}. Since the impact of a shock to the minimum wage is a linear function of η_{WM}, it is straightforward to compute the sensitivity of model results to this parameter. Small changes in the wage elasticity to the minimum wage appear to have large efficiency costs, although the benefits in reducing income inequality are also sizeable.

Figure 8. Policies and the Income Distribution: Imperfect Capital Mobility

(Long run impact on Lorenz curves based on labor and capital income; In percentage point difference from the baseline)

Source: IMF staff calculations.

Note: Charts show the difference from baseline cumulative income at each decile (a y-axis value of X at the ith decile indicates that the poorer ith decile individuals accumulate X percentage points more of total income relative to baseline). The difference in Lorenz curve is the difference between the post- and the pre-Lorenz curves. A positive shaded area indicates a reduction in inequality and vice-versa.

V. CONCLUSION

Using a supply-side general equilibrium approach to assess the impact of fiscal and labor market policies in France, we find that fiscal expansions reduce the Gini coefficient in the long run, except for capital and labor income tax cuts (crossings of the Lorenz curve can alter the interpretation of this result). Given its positive impact on employment, a reduction of the minimum wage has an ambiguous impact on inequality: the Gini coefficient is worsened, but the first quintile improves its relative position in the income distribution because of the extra hiring. We also find scope for "win-win" policy packages that could improve overall efficiency, inequality, and fiscal outcomes, for instance if targeted labor tax reductions are offset by cuts in the public wage bill.

While our model is calibrated to France's economy, there are a number of simplifying assumptions that may affect the actual impact of policies, particularly for the long-term horizon. For instance, the positive impact of labor tax may be weaker if, for instance, social partners end up "using" the tax cut for raising gross wages. Another simplifying assumption is perfect capital mobility over the long term, which contributes to the finding that tax reductions are self-financing over the long term. In practice, capital market imperfections and competition restraining practices may considerably limit investment, even in the long run. If framework conditions are such that capital accumulation is hampered, capital and labor tax bases may barely grow in response to fiscal incentives and tax cuts will add to the government deficit. Notwithstanding these model limitations, the analysis provides an analytical starting point for comparing the output, employment, fiscal, and distributive effects of different policies.

Appendix A. Inequality Metrics

This appendix reviews conventional drivers of inequality and presents the notion of inequality used in this paper.

Inequality is a multifaceted concept. Measuring it necessitates defining two dimensions, income and metric. The most comprehensive income measure is based household disposable income adjusted for publicly-provided in-kind services (Stiglitz-Sen-Fitoussi Report, 2009). To get to it from a simple metric based on individual labor earnings, a broad set of drivers are typically used, including socioeconomic characteristics and fiscal policy (Figure 1). Individual labor earnings (ILEs) purely reflects market-driven wage dispersion; household labor earnings (HLEs) further capture the size and composition of families; household market income (HMI) adds capital income to labor revenues; household disposable income (HDI) covers all family income sources after taxes and transfers; and household adjusted disposable income (HADI) also takes into account in-kind transfers, such as education and health care spending.

For any one income concept, inequality can be measured in different ways. Starting from the Lorenz curve, which presents the distribution of income for the entire population, available metrics broadly fall into two categories, synthetic indicators and income shares and percentile ratios. Synthetic indicators, such as the Gini, Theil, or Atkinson index, measure the inequality throughout the whole income distribution. Income shares and percentile ratios inspect income inequality at specific points in the income distribution. Because inequality metrics differ in terms of their properties, it is widely recognized that relying on several of these allows overcoming weaknesses of any individual measure.

The simulation experiments conducted in this paper measure the impact of policy reforms on the Lorenz curve and Gini index computed on labor and capital income. While the Gini coefficient provides a simple snapshot of overall income dispersion, Lorenz curves allow us to inspect the income redistribution for the whole population. This is particularly relevant when pre- and post-policy Lorenz curves intersect. In such cases, different redistribution configurations may be associated with the same overall change in the Gini coefficient, making the Lorenz curve a more informative way to assess inequality, with "winners" and "losers" from the simulated policy measure.

For the purpose of the model simulations conducted in this paper, we construct Lorenz curves from labor market participants. The model also brings in the notion of disposable income as both labor market participants and firms pay taxes (flat income tax, capital income tax, and social security contributions) and households receive unemployment benefits and public goods (education and health) from the government.

Figure 1A. From individual labor earnings to adjusted household disposable income
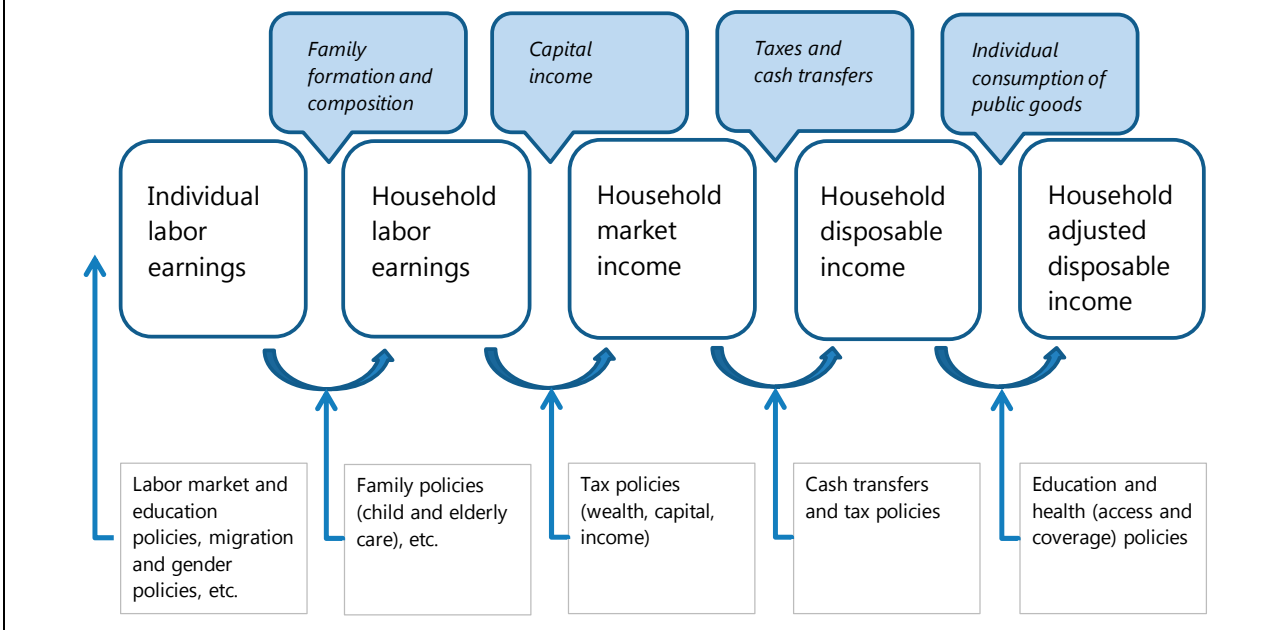
Appendix B. Model's Log-Linearized Equations

The 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_k, t_{pu}, t_{ps} and t_{pe}, which represent point changes, and the budget surplus, bs, which is expressed in percent of total GDP. The model is made of six endogenous variables, six exogenous variables and three accounting equations. It can be presented as follows.

The endogenous variables: the three production factors and their respective prices.
Six equations relate these variables:

- The labor demand curves for each qualification (skilled/unskilled): 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:

$$\frac{1}{\sigma_2}\ell_s = \gamma g(1-\frac{1}{\sigma_1})-lc_s+\frac{1}{\sigma_1}y+(\frac{1}{\sigma_2}-\frac{1}{\sigma_1})\ell$$

$$\frac{1}{\sigma_2}\ell_u = \gamma g(1-\frac{1}{\sigma_1})-lc_u+\frac{1}{\sigma_1}y+(\frac{1}{\sigma_2}-\frac{1}{\sigma_1})\ell$$

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

$$lc_u = w_u + \frac{t_{pu}}{1+T_{p,u}}$$

$$lc_s = w_s + \frac{t_{ps}}{1+T_{p,s}}$$

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- The labor supply curves for each qualification: In the short term, the assumptions for wage determination of skilled workers and of a constant minimum wage applicable to unskilled workers translate into the following expressions:

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

$$w_u = 0$$

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.

Similarly, in the long term, the labor supply curves are:

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

$$w_u = -\psi_u \frac{L_u}{U_u}\ell_u + \frac{t_n + t_{pe}}{1 - T_n - T_{pe}}$$

- The price and quantity determination equations for capital: In the short run, the quantity of capital is supposed to be fixed.

$$k = 0$$

The marginal product of capital r is such that capital income before tax $(r + k)$ corresponds to the part of output which is not paid out to other factors:

$$r = -k + \frac{y}{1 - \lambda_l} - (1 + T_{p,u})\frac{\lambda_l - \lambda_s}{1 - \lambda_l}(w_u + \ell_u) - t_{pu}\frac{\lambda_l - \lambda_s}{1 - \lambda_l}$$

$$- (1 + T_{p,s})\frac{\lambda_s}{1 - \lambda_l}(w_s + \ell_s) - t_{ps}\frac{\lambda_s}{1 - \lambda_l}$$

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

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

In the long run, the rate of return of capital, net of corporate taxes (t_k) and of the personal income tax (t_n), is back to a fraction ε_K of its initial deviation:

$$r - \frac{t_n}{1 - T_n} - \frac{t_k}{1 - T_k} = \varepsilon_K\left(r - \frac{t_n}{1 - T_n} - \frac{t_k}{1 - T_k}\right)_{t=0}$$

Note that if $\varepsilon_K = 0$, $t_n = 0$ and $t_k = 0$, the two previous equations imply:

$$0 = \frac{\gamma g - (\lambda_l - \lambda_s)lc_u - \lambda_s lc_s}{(1 - \lambda_l)}$$

The exogenous variables representing public policies:

- The employer's social security tax rates for skilled and unskilled workers $T_{p,u}$ and $T_{p,s}$.

- The employee social security tax rate $T_{p,e}$ which is fixed in our analysis.

- The income tax rate T_n which is also fixed in our analysis.

- Public spending M and labor L_g.

Three accounting equations:

- The production function that defines the private sector added value:

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

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

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 investment equation 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 government budget surplus (as a percent of GDP), bs.
Following Baxter and King (1993),Y refers to the whole country added value. We then express the fiscal surplus as a fraction of total GDP. $\frac{M}{Y}$ is defined as public spending excluding compensation of employees[24] over GDP.

In the short term, public sector wages and reference wages (that index unemployment benefits) are fixed. The budget surplus is given by the following components where it has been assumed that in the long run, all wages adjust. Unemployment benefits are then affected simultaneously by the employment and wage deviations. The unemployment benefits increase then impacts the budget surplus proportionally to the ratio of unemployment to employment, which is noted *UER*. The subscripts u (resp. sp) refers to the ratio for the unskilled workers (resp. the skilled workers in the private sector).

This 18 equation model is then solved for the 18 variables l_s, l_u, lc_s, lc_u, w_s, w_u, k, r, t_{pu}, t_{ps}, t_n, t_{pe}, m, l_g, bs, y, l, and i.

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[24]This number is calibrated to 8.2 percent using IMF (2013).

Table A1. Budget Deficit: Breakdown by Type of Automatic Stabilizers

$b_s = (1-\lambda_1)\left[t_n + t_k + (T_n + T_k)(r+k)\right]$	Rate and base effect for the capital and personal income taxes (in the short run, $k=0$)
$+\lambda_s \dfrac{t_{p,s} + t_n + t_{pe}}{1+T_{p,s}} + (\lambda_1 - \lambda_s)\dfrac{t_{p,u} + t_n + t_{pe}}{1+T_{p,u}}$ $+\lambda_s \dfrac{T_{p,s} + T_n + T_{pe}}{1+T_{p,s}}\left(w_s + \ell_s + \dfrac{L_g}{L_s}(w_s + \ell_g)\right)$	Rate effect for the labor taxes (skilled and unskilled)
$+(\lambda_1 - \lambda_s)\dfrac{T_{p,u} + T_n + T_{pe}}{1+T_{p,u}}(w_u + \ell_u)$ $+(\lambda_1 - \lambda_s)\dfrac{\theta_u}{1+T_{p,u}}(\ell_u - UER_u w_u)$	Base effect for the labor taxes (skilled and unskilled)
$+\lambda_s \dfrac{\theta_s}{1+T_{p,s}}\left(\ell_s + \dfrac{L_g}{L_s}\ell_g - UER_{sp}w_s\right)$	Changes in unemployment benefits (in the short run, the terms $UER_u w_u$ *and* $UER_{sp}\, w_s$ are absent)
$-\lambda_s \dfrac{L_g}{L_s}(w_s + \ell_g)$	Cuts in public employment, if any (calibrated *ex ante*)
$-\dfrac{M}{Y}m$	Cuts in public spending, if any (calibrated *ex ante*)

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.

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

$$w_{unet} = w_u - (t_n + t_{pe}) \cdot \frac{1}{1 - T_n - T_{pe}}$$

In the short run, since the public sector wages are fixed, the skilled labor income can be expressed as follows:

$$in_s = \frac{(1 - T_n - T_{pe}) \cdot EUR_s}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot \frac{L_s}{L_s + L_g} \cdot w_s$$

$$+ \frac{EUR_s}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot \left[(1 - T_n - T_{pe})(l_s + l_g) - \theta_s \left(\frac{L_s}{L_s + L_g} l_s + \frac{L_g}{L_s + L_g} l_g \right) \right]$$

$$in_u = \frac{EUR_u \cdot (1 - T_n - T_{pe} - \theta_s)}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot l_u$$

where EUR_s (resp. EUR_u) represents the ratio of employment to unemployment for the skilled (resp. unskilled) workers.

In the long run public sector wages are flexible:

$$in_s = \frac{(1 - T_n - T_{pe}) \cdot EUR_s}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot w_s$$

$$+ \frac{EUR_s}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot \left[(1 - T_n - T_{pe})(l_s + l_g) - \theta_s \left(\frac{L_s}{L_s + L_g} l_s + \frac{L_g}{L_s + L_g} l_g \right) \right]$$

$$in_u = \frac{(1 - T_n - T_{pe}) \cdot EUR_u}{(1 - T_n - T_{pe}) \cdot EUR_u + \theta_u} \cdot w_u + \frac{EUR_u \cdot (1 - T_n - T_{pe} - \theta_s)}{(1 - T_n - T_{pe}) \cdot EUR_s + \theta_s} \cdot l_u$$

Appendix C. Detailed Simulation Results

Figure A2. Social Security Contributions Cut
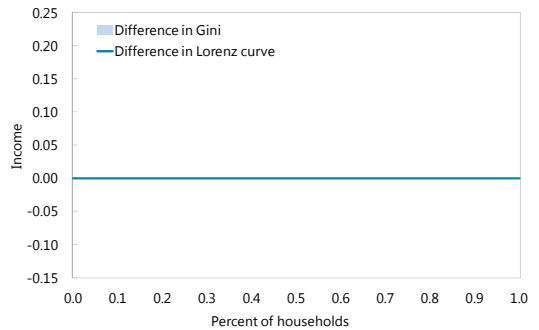(In percent difference from the baseline)

Untargeted

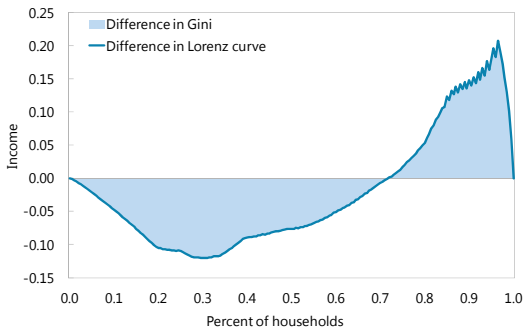**Short Run, Labor**
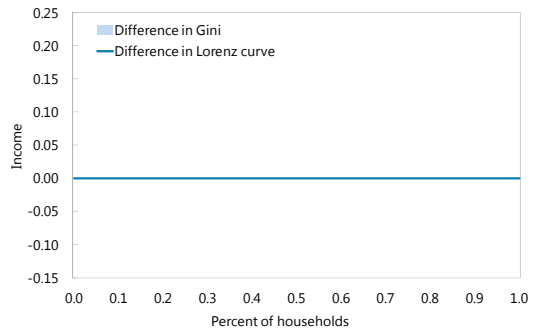Delta Gini (in pp) = 0.02
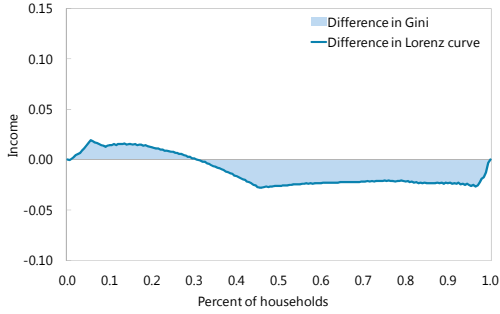
Long Run, Labor
Delta Gini (in pp) = -0.14
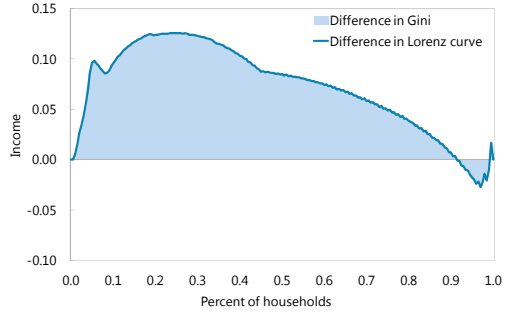
Short Run, Labor and Capital
Delta Gini (in pp) = 0.08
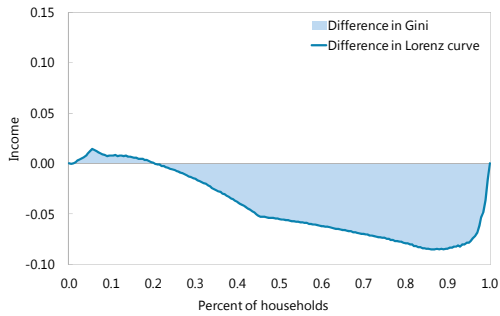
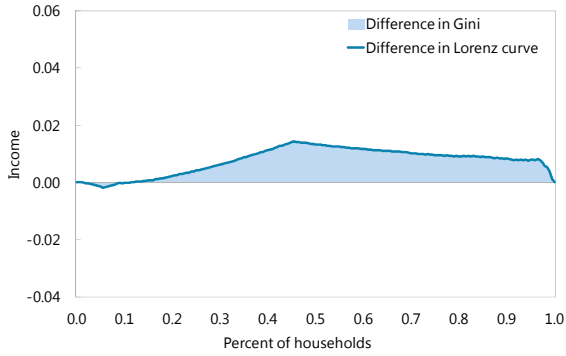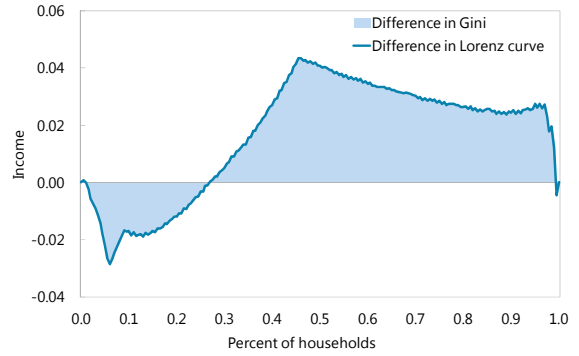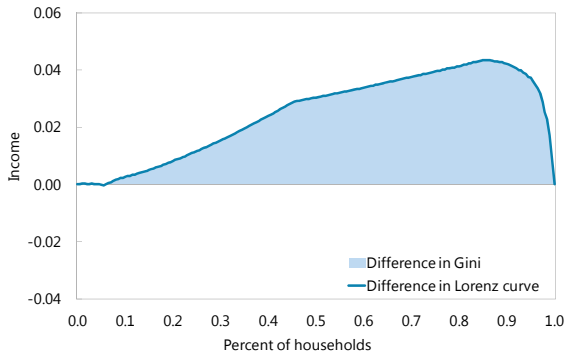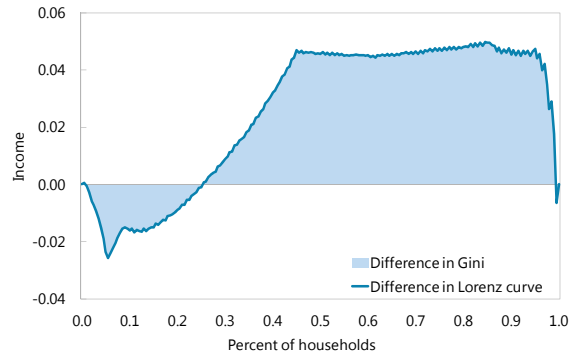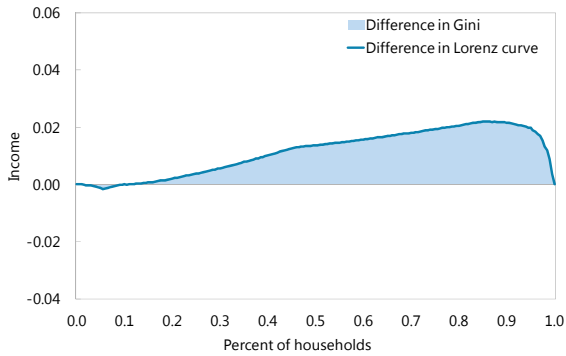

Long Run, Labor and Capital
Delta Gini (in pp) = -0.12
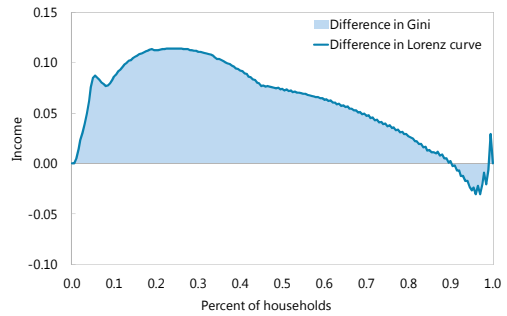
Targeted

Short Run, Labor
Delta Gini (in pp) = -0.14
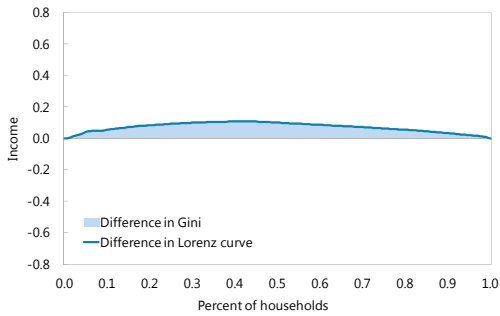
Long Run, Labor
Delta Gini (in pp) = -0.75
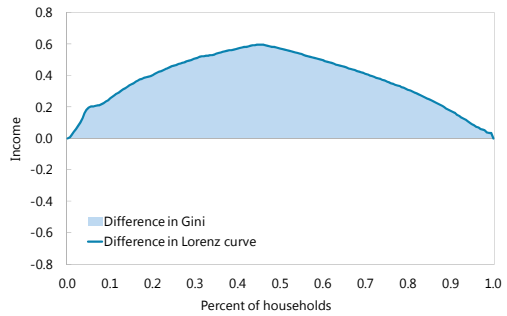
Short Run, Labor and Capital
Delta Gini (in pp) = -0.03
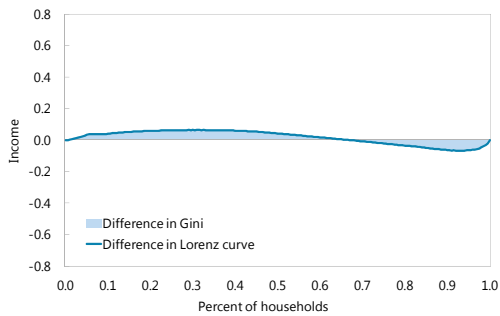
Long Run, Labor and Capital
Delta Gini (in pp) = -0.62

Source: IMF staff calculations.

Figure A4. Public Employment and Public Wages Cut
(In percent difference from the baseline)

Public Employment

Short Run, Labor
Delta Gini (in pp) = -0.46
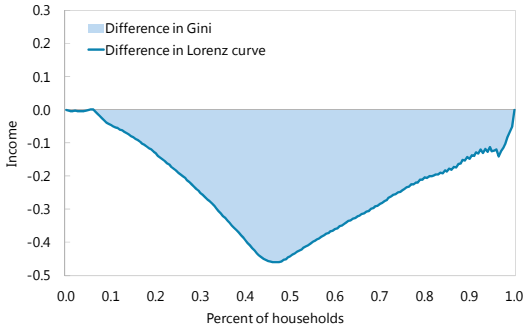
Long Run, Labor
Delta Gini (in pp) = -0.19
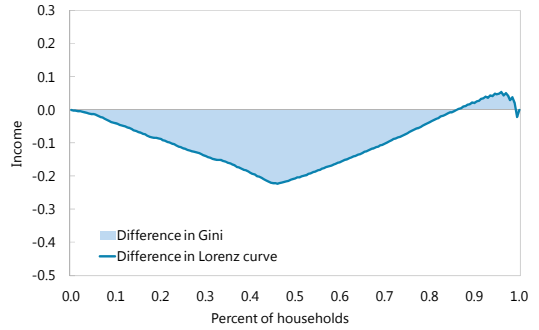
Short Run, Labor and Capital
Delta Gini (in pp) = 0.13
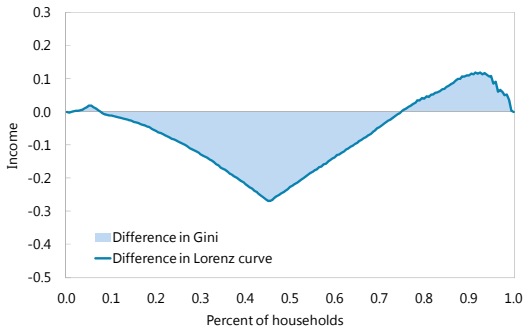
Long Run, Labor and Capital
Delta Gini (in pp) = -0.06
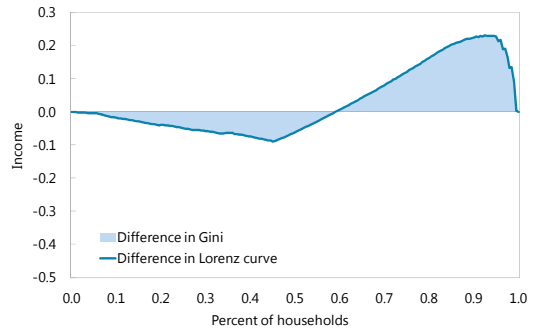
Public Wages

Short Run, Labor
Delta Gini (in pp) = -0.05
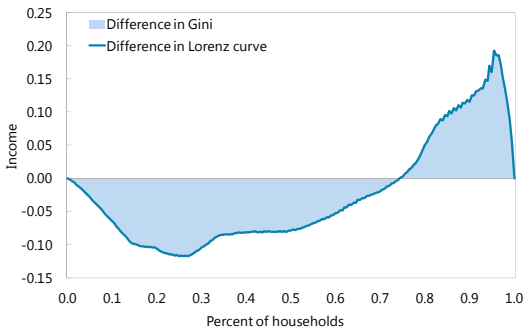
Long Run, Labor
Delta Gini (in pp) = 0.00

Short Run, Labor and Capital
Delta Gini (in pp) = 0.04

Long Run, Labor and Capital
Delta Gini (in pp) = 0.00

Source: IMF staff calculations.

Figure A5. Cut in Public Good
(In percent difference from the baseline)

Short Run, Labor
Delta Gini (in pp) = -0.01

Long Run, Labor
Delta Gini (in pp) = -0.03

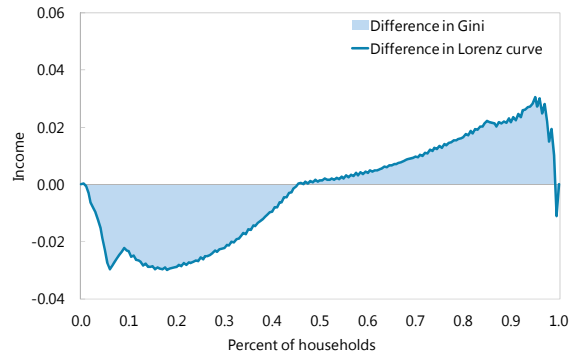**Short Run, Labor and Capital**
Delta Gini (in pp) = -0.05

Long Run, Labor and Capital
Delta Gini (in pp) = -0.05

Short Run, Labor, Capital and Public Goods
Delta Gini (in pp) = -0.02

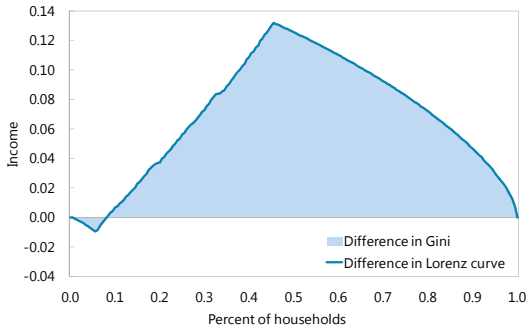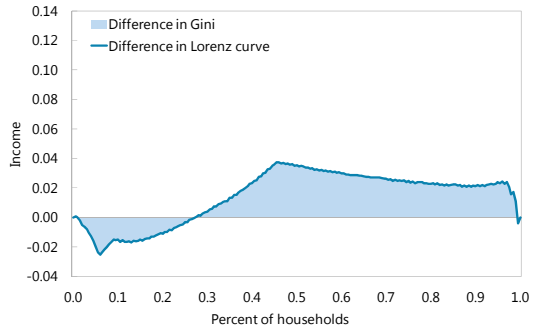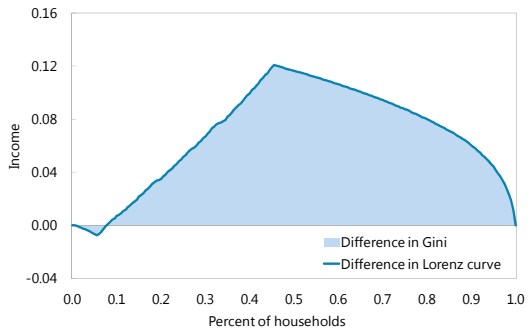**Long Run, Labor, Capital, and Public Goods**
Delta Gini (in pp) = 0.00

Source: IMF staff calculations.

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Figure A6. Minimum Wage and Unemployment Benefits
(In percent difference from the baseline)

Minimum Wage Increase

Short Run, Labor
Delta Gini (in pp) = -0.14

Long Run, Labor
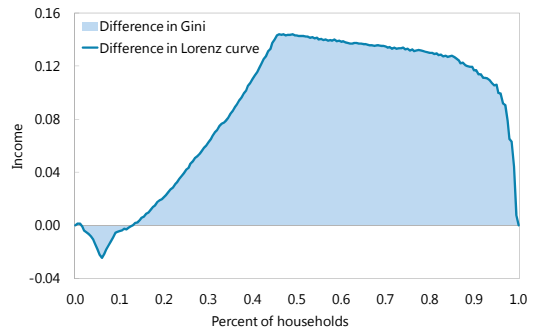Delta Gini (in pp) = -0.03

Short Run, Labor and Capital
Delta Gini (in pp) = -0.14

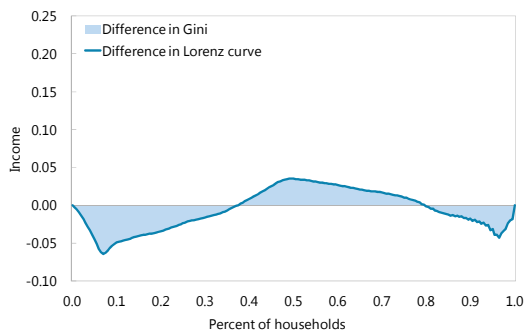**Long Run, Labor and Capital**
Delta Gini (in pp) = -0.18

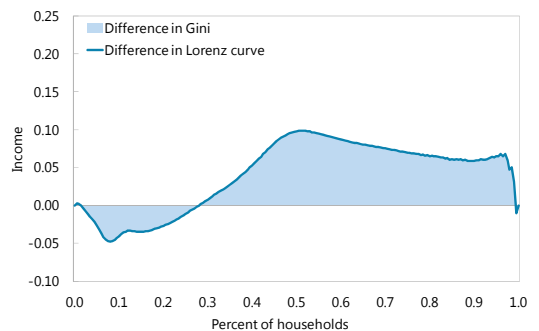

Unemployment Benefits

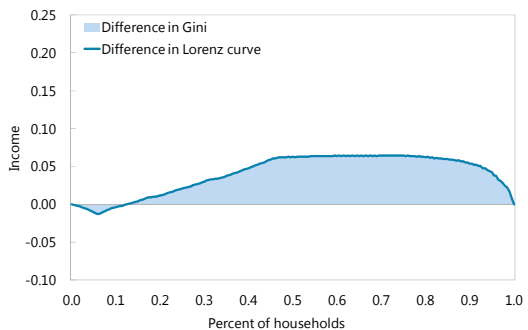**Short Run, Labor**
Delta Gini (in pp) = 0.01

Long Run, Labor
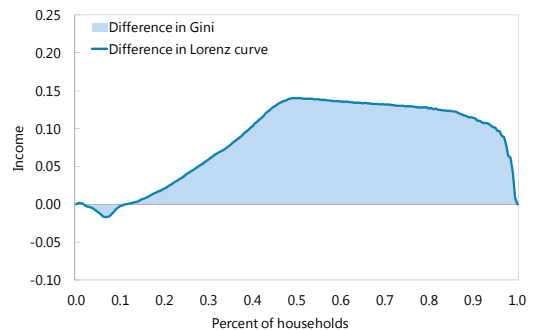Delta Gini (in pp) = -0.08

Short Run, Labor and Capital
Delta Gini (in pp) = -0.32

Long Run, Labor and Capital
Delta Gini (in pp) = -0.69

Source: IMF staff calculations.

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