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Labor Market Policies and European Crises

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Abstract

This paper studies theoretically and empirically why and how labor policies may reduce productivity and employment in order to stabilize labor incomes and redistribute resources. It proposes a specific stylized model where the tradeoffs facing labor policies are influenced by structural factors, inspects the empirical relevance of this mechanism in European data, and outlines the proposed theoretical perspective's implications for reform design in crisis-hit economies.

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Keywords: structural reforms, productivity, inequality.

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1 Introduction

Labor market reforms could significantly increase productivity and speed up growth in Europe, especially if accompanied by product market reforms (see e.g. Barkbu et al., 2012, and its references). The reasons why some European countries forsake opportunities to increase their citizens' average income by reforming their heavily regulated labor markets need to be understood. While some reforms may unambiguously benefit all members of society, increasing the size of the production "pie" without decreasing that of anybody's "slice," they would be obvious free lunches that are unlikely to remain undetected until discovered by economists.

Economic research can more plausibly help policy-makers by outlining how trade-offs between productivity and other objectives are shaped by the structural and political characteristics of different countries and periods. Such arguments are not often spelled out explicitly by advocates and adversaries of growth-oriented deregulation. Policy debates tend to fight a previous war, praising policy frameworks that performed well in specific previous instances (such as Danish flexicurity in times of growth and structural transformation, or German vocational education in the current crisis) without analyzing in detail the relationship between past policy choices and subsequent economic performance.

This paper explores the policy and empirical implications of a model where labor policies trade production efficiency off income randomness over individual lifetimes, and resource distribution across individuals. In the model, as in reality, no set of labor market institutions is optimal in all circumstances and from all points of view, because markets are not as perfect as economists would like them to be, policy-makers are not as powerful as they would like to be, and policies that trade production efficiency off labor income stability have different implications for the welfare of different individuals.

Section 2 sets up a model of uninsurable income shocks as a motivation for labor market policy. Section 3 outlines how this and more general models of policy choices and effects can help interpret labor policy patterns in terms of distributional tensions and international market pressure, as well as of uncertainty and other structural features that may be harder to detect. Section 4 examines

from that perspective European experiences and eurozone data. Section 5 discusses the possible role of labor policy's productivity implications in shaping the asymmetric developments underlying the current eurozone crisis, and outlines the implications of the proposed theoretical perspective for reforms meant to resolve that crisis. Section 6 concludes with some more general considerations.

2 A model

Consider an economy where labor earnings (gross of any tax or subsidy) amount to a marginal productivity function in the form

$$w_1 = \alpha_1 - \beta_1 l + \upsilon_1 \tag{1}$$

for the fraction l of labor units that pay a cost k before realization of a random shock $\upsilon_1 \sim N(0, \sigma_1^2)$, and to

$$w_2 = \alpha_2 - \beta_2 (1 - l) + \upsilon_2 \tag{2}$$

for those that do not, where $\upsilon_2 \sim N(0, \sigma_2^2)$ is an independent and possibly differently distributed shock. This represents in a stylized way some crucial aspects of the reality in which labor policies are implemented. In the model, as in reality, productivity differs across workers for two reasons. The first is that individual workers choose to perform effort or human capital investments that entail a cost and, in equilibrium, should be compensated by higher earnings. In this simple model, the mean level of earnings is linearly related to l, the fraction of the population that chooses the costly option of drawing earnings from (1). With parameters such that $\alpha_2 + k < \alpha_1$, $0 < \alpha_2 < \alpha_1$, $\beta_1 > 0$, $\beta_2 \geq 0$, as l increases above zero expected gross earnings weakly increase in (1) and fall in (2): marginal productivity declines in the employment opportunity that requires investment, making it possible to pin down the equilibrium level of l. The second reason why in reality individual earnings differ is luck. In this simple model, random shocks make individual earnings deviate ex post from those that could be expected at the time when the choice to pay k was made.

Figure 1 illustrates the model economy's structure. On the horizontal axis, the fraction l of labor employed in the set of jobs indexed by 1 increases from left to right, and the dashed downward

sloping line plots on the vertical axis the expected value of earnings from (1). That line meets its upward-sloping counterpart from (2) at the point where all of the economy's labor is employed at the same marginal productivity. The figure sets $\beta_1 = \beta_2 = \beta$ and chooses that parameter and the α_1 and α_2 intercepts so that all labor should be allocated to option 1 if doing so were costless, and would be paid its marginal productivity $(\alpha_1 + \alpha_2 - \beta)/2 = \alpha_1 - \beta$ at the level identified by horizontal dashes.

When financial markets are imperfect consumption cannot be completely sheltered from income shocks, and a risk-averse individual's welfare is increased by expected income but decreased by income variability. A tractable formalization of this general insight lets utility be a negative exponential function of consumption, $u(c) = -\exp(-\nu c)$, and simply supposes that $c = y + a$, where y is disposable labor income and a denotes other resources on which individual consumption can draw. Recalling that when $z \sim N(\mu, \sigma^2)$ then $-E\left[\exp\left(-\nu z\right)\right] = -\exp\left(-\nu\mu + \frac{1}{2}\nu^2\sigma^2\right)$, the expected utility afforded by normally distributed random resources $y + a$ is a monotonic increasing function of

$$V = E\left[y + a\right] - \frac{\nu}{2}\text{var}\left[y + a\right], \tag{3}$$

a linear expression that increases in expected income, and decreases in income variance.

Non-labor income a may differ across individuals, but does not influence labor allocation under the constant absolute risk aversion assumption underlying the mean-variance welfare criterion (3). In the economy's laissez faire equilibrium, y is a labor income draw from (1) or (2). Since every individual should be indifferent between paying k to earn w_1 from (1), or earning w_2 from (2), the equilibrium distribution of earnings differs across the two options in such a way as to offset the cost of allocating labor to employment opportunities that are more productive on average, and may entail a different amount of uncertainty. In Figure 1, the solid downward sloping line plots the marginal benefit in welfare terms $\alpha_1 - \beta l - k - \nu\sigma_1^2/2$ of paying k and allocating more labor to jobs that produce according to (1), and meets at $l < 1$ the upward-sloping marginal welfare benefit $\alpha_2 - \beta(1 - l) - \nu\sigma_2^2$ of not doing so. The dotted red lines subtract from earnings only the welfare cost $\nu\sigma_i^2/2$ of income uncertainty: for the parameters used in drawing the picture, uncertainty costs

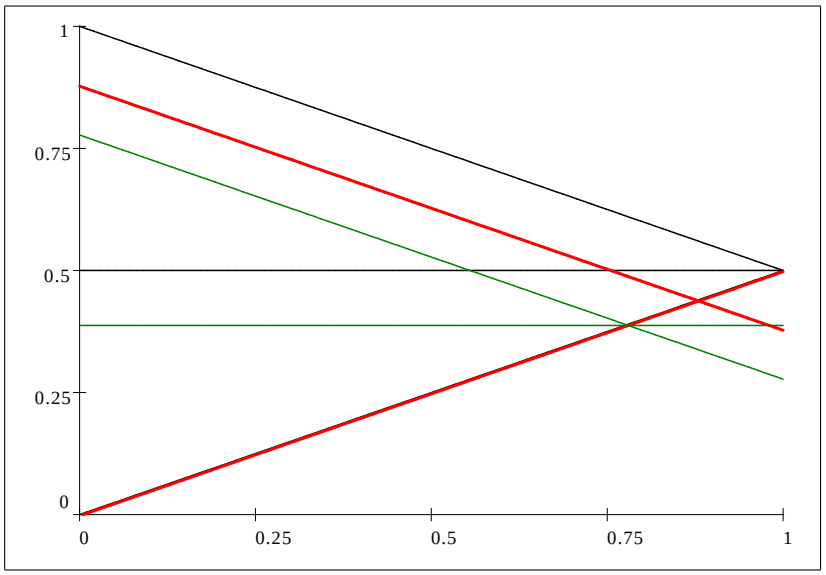

Figure 1: The model economy without policy. Parameters values $\alpha_1 = 1$, $\alpha_2 = 0.5$, $\beta = 0.5$, $k = 0.1$, $\sigma_1 = 0.35$, $\sigma_2 = 0.05$, $\nu = 2$.

are negligible when $i = 1$ but large, and comparable to the investment or effort cost represented by k, when $i = 2$.

In reality, it is not generally possible to disentangle the relevance of choices and luck in determining labor incomes. The model can represent this under the assumption that while labor income is observable, it is not possible to tell whether a specific individual draws it from the earnings distribution (1) or from (2). And the model can represent the motivation and implications of many labor market policies supposing that observed earnings are subject to a proportional tax τ, and that the revenues of that tax are used to pay a subsidy s to each individual. Intuitively, taxation and redistribution of the portion of earnings that is due to random shocks is beneficial for risk-averse individuals. If it is not possible to observe the individual costly actions that influence mean earnings as in (1) and (2), however, the scheme (which could also represent perhaps less easily enforceable private insurance contracts) unavoidably also taxes the earning differentials that reward such actions, and reduces incentives to perform them.[1]

[1] The assumption that it is impossible to tell whether earnings are drawn from (1) or (2) nearly follows from the more basic assumption that the costly action that determines the mean and variance of earnings is not observable, as is appropriate for e.g. effort. Income realizations can take any value when they are influenced by normally

Formally, the choice of paying k and earning $y_1 = (1-\tau)w_1 + s$ rather than $y_2 = (1-\tau)w_2 + s$ should be a matter of indifference in an equilibrium where that choice can be made by ex-ante identical individuals. Since s and a do not depend on that choice or on the shocks υ, indifference obtains when the welfare expression (3) evaluated at $E[y_1] = (1-\tau)(\alpha_1 - \beta_1 l)$ and $\text{var}[y_1] = (1-\tau)^2\sigma_1^2$, minus k, equals (3) evaluated at $E[y_2] = (1-\tau)(\alpha_2 - \beta_2(1-l))$ and $\text{var}[y_2] = (1-\tau)^2\sigma_2^2$. In a rational expectations equilibrium, therefore, it should the case that

$$(1-\tau)(\alpha_1 - \beta l) - (1-\tau)(\alpha_2 - \beta(1-l)) = k + \frac{\nu}{2}(1-\tau)^2\left(\sigma_1^2 - \sigma_2^2\right): \tag{4}$$

the net-of-tax expected earnings differentials should equal the cost of choice, in terms of risk as well as of investment or effort.

In the resulting equilibrium, each unit of labor receives a subsidy

$$s(\tau) = \left(l(\tau)w_1 + (1-l(\tau))w_2\right)\tau,$$

where

$$l(\tau) = \left(\frac{1}{2} + \frac{1}{2\beta}\left(\alpha_1 - \alpha_2 - \left(\frac{k}{1-\tau} + \frac{\nu}{2}(1-\tau)\left(\sigma_1^2 - \sigma_2^2\right)\right)\right)\right) \tag{5}$$

satisfies (4), and the welfare yield of disposable income from each individual's unit of labor is

$$\begin{aligned} & (1-\tau)w_1 + s - k - \frac{\nu}{2}(1-\tau)^2\sigma_1^2 \\ = \;& (1-\tau)w_2 + s - \frac{\nu}{2}(1-\tau)^2\sigma_2^2 \\ = \;& l(\tau)w_1 + (1-l(\tau))w_2 - kl(\tau) - \frac{\nu}{2}(1-\tau)^2\left(l(\tau)\sigma_1^2 + (1-l(\tau))\sigma_2^2\right). \end{aligned} \tag{6}$$

Since average production exceeds payments of marginal productivity to labor, the economy also produces non-labor income. These consumable resources are not random if financial income can be diversified, and need to be accounted for by a in (3), which is conveniently additive in labor and

distributed shocks, and while large realizations are more likely to be drawn from a higher-mean distribution, random shock largely obscure the signal provided by observed earnings. A better taxation scheme could take into account the signal provided by observed earnings for the mean of the distribution from which they are drawn, but this would not affect the qualitative character of the model: as long as luck plays a significant role in determining individual labor market outcomes, earnings provide a partial and noisy indication of individual choices.

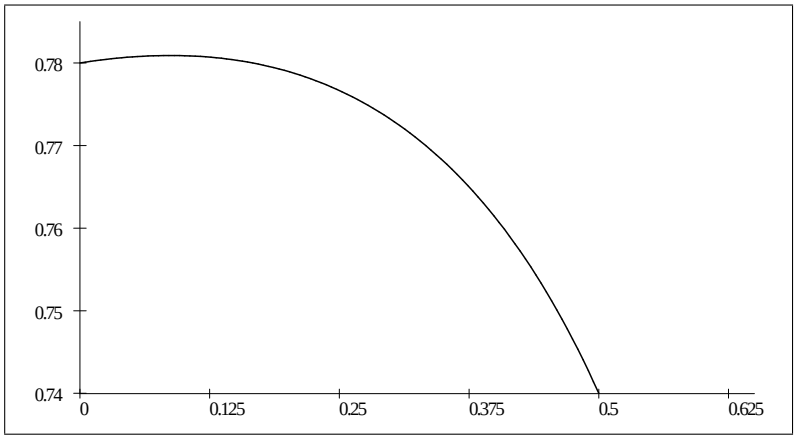

Figure 2: Equilibrium l on the vertical axis, as a function of τ on the horizontal axis. Other parameters as in Figure 1.

non-labor income. The per capita amount of non-labor rents,

$$a = \beta \left(\frac{1}{2} - l(\tau) \left(1 - l(\tau) \right) \right),$$

is increasing in $l(\tau)$ over the $0.5 < l(\tau) \leq 1$ range spanned by the labor allocation choices (5). Adding it to the expression in (6) yields an index of the welfare of the economy's typical individual,

$$\begin{aligned} V_{\text{rep}}(\tau) &= \alpha_1 l(\tau) - \frac{\beta}{2} l(\tau)^2 + \alpha_2 \left(1 - l(\tau) \right) - \frac{\beta}{2} \left(1 - l(\tau) \right)^2 \\ &\quad -kl(\tau) - \frac{\nu}{2} (1-\tau)^2 \left(l(\tau)\sigma_1^2 + (1 - l(\tau))\sigma_2^2 \right), \end{aligned} \tag{7}$$

which subtracts from the economy's output the investment cost as well as the risk–aversion-weighted variance of average income. It depends on τ directly, because redistribution supplies valuable income smoothing to uninsured risk-averse individuals, as well through labor allocation as in (5).

If human capital investment or effort implies higher risk as well as higher expected earnings, then redistribution may make it more attractive. In the model, the derivative of the expression in (5) is positive at $\tau = 0$ if $\nu \left(\sigma_1^2 - \sigma_2^2 \right) > 2k$, i.e., if the cost of allocating labor to more productive use is largely in terms of additional risk. If so, there is a range of τ values where more redistribution increases investment. The parameter set used in the figures to illustrate the model's implications does let the variance of earnings in jobs that require an investment be higher than that of other

jobs. In Figures 2 and 3, l and output (gross of the labor reallocation costs indexed by k) both increase through a range of small τ values: since the out-of-pocket cost k is only a little smaller than the risk cost of labor allocation, output peaks when only about 10 per cent of labor income is redistributed. This effect, which represents in the model the incentives to risk taking provided by a social safety net (Sinn, 1996; Andersen, 2010), makes it more likely that redistribution is socially beneficial. Of course, additional production comes with additional costs in terms of risk and investment: to maximize $l\left(\alpha_1 - \frac{\nu}{2}\sigma_1^2\right) + (1-l)\left(\alpha_2 - \frac{\nu}{2}\sigma_2^2\right) - \beta\left(\frac{1}{2} - l\left(1-l\right)\right) - kl$, which subtracts from output the kl investment cost as well as welfare cost of allocating more labor to riskier jobs, it would be optimal to set $\tau = 0$ in (4).

Welfare, however, depends on the riskiness as well as the total amount of production, and the policies represented by the model's redistribution scheme are beneficial because they reduce uninsurable uncertainty inframarginally. The pros and cons of redistribution in this type of model are rooted in the fact that luck and choice cannot be disentangled in observed labor incomes. While larger values of τ make the economy's labor market increasingly sclerotic and unproductive, they also bring it towards a configuration with lower investment effort, and lower observed inequality. As shown in Figure 4, the same increases of τ that reduce output in Figure 3 reduce the dispersion of observed net-of-tax labor incomes and, less strongly and perhaps less obviously, also the variance of gross labor incomes: while pre-tax expected earnings differentials must be larger when taxation reduces their ability to offset investment or effort costs, as l declines as in Figure 2 fewer units of labor have high marginal productivity, and the resulting distribution of wages is more skewed but not more dispersed.

Varying τ drives output and inequality in opposite directions, and implies a negative relationship between the average amount and the cross-sectional variance of income that is reminiscent of the classic "equity vs. efficiency" trade-off. Since inequality across ex ante homogeneous individuals correspond to ex-ante risk, however, different values of τ determine welfare-ranked outcomes. This makes it possible to identify policy preferences that, as discussed below, depends in interesting ways on the model's structural parameters, and on the identity of decisive individuals within an

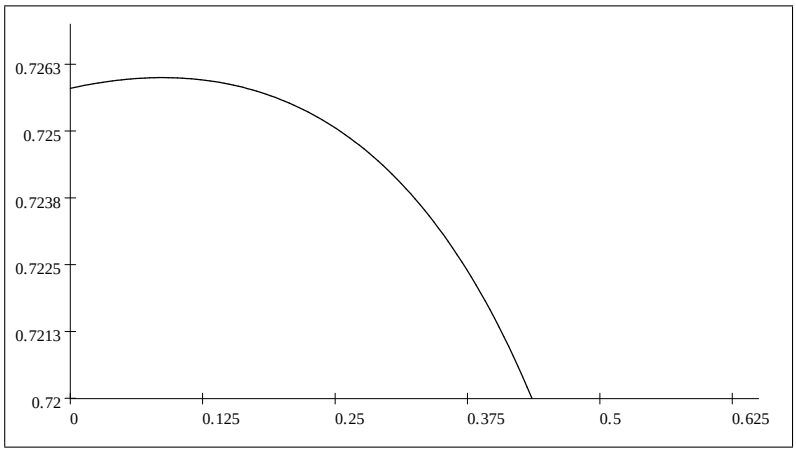

Figure 3: The solid line plots output $l(\tau)\alpha_1 + (1 - l(\tau))\,\alpha_2 - \beta\left(\frac{1}{2} - l(\tau)\,(1 - l(\tau))\right)$on the vertical axis as τ varies on the horizontal axis. Other parameters as in Figure 1.

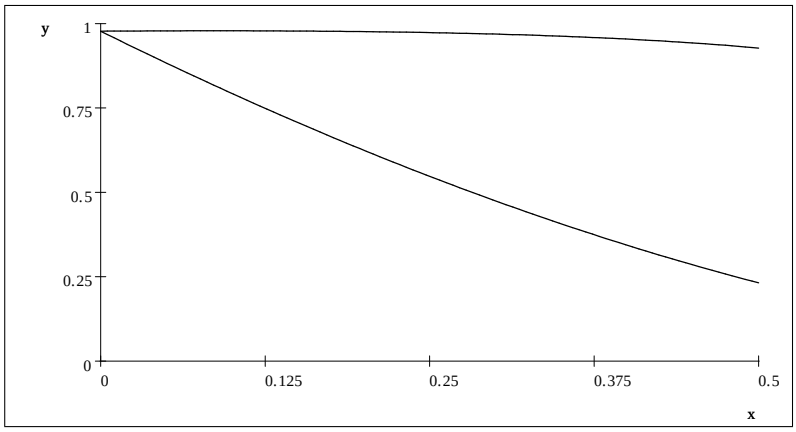

Figure 4: On the vertical axis the solid line plots the variance of net earnings $\left(l(\tau)\sigma_1^2 + (1 - l(\tau))\sigma_2^2 + l(\tau)(1 - l(\tau))\,(\alpha_1 - \alpha_2)^2\right)(1 - \tau)^2$ as τ varies on the horizontal axis; the variance of gross earnings is higher than the net by a factor $1/(1 - \tau)^2$ and is plotted as a dashed line. Other parameters as in Figure 1.

ex-ante unequal economy.

The appropriate measure of the typical individual welfare is (7), which accounts for the benefits arising from the reducing uninsurable income volatility at any given labor allocation l, and faces policy choices with a trade-off between those benefits and the output implications of changes in l. Labor income redistribution should optimally trade its production implications, through labor allocation, off its implications for consumption smoothing. For an individual who is entitled to the economy's per capita income (inclusive of the income of non-labor factors), Figure 5 shows that higher tax rates continue to increase welfare long after they have ceased to increase output: the parameter values used to illustrate the model's implications, which feature a large variance of uninsurable shocks and substantial risk aversion, imply that welfare only peaks when more than half of labor income is redistributed.

The first order condition for maximization of (7) yields a solution for the optimal tax rate which, while explicit, is too cumbersome to be shown, and is better characterized graphically and analytically. To understand why the baseline model calls for so much redistribution, it is for example interesting to see in Figure 6 that the τ level that maximizes the typical individual's welfare increases towards the level identified by the peak in Figure 5 as the variance of uninsurable income shocks becomes as large as it is supposed to be in the model economy, and that no redistribution would be optimal in the absence of uncertainty.

The implications for the optimal policy choices of the slope β of earnings with respect to labor allocation represent features of reality that are argued below to play an important role in reality, and deserve to be shown in full generality by standard comparative statics methods. Totally differentiating the first order condition $\partial V(\tau,\beta)/\partial\tau = 0$ for maximization of the typical individual's welfare,

$$\frac{d\tau^*}{d\beta} = \frac{\partial V(\tau,\beta)}{\partial\beta\partial\tau} \Big/ \left(-\frac{\partial^2 V(\tau^*,\beta)}{\partial\tau^2}\right). \tag{8}$$

The denominator is positive as the first order condition identifies a maximum of $V(\tau,.)$, and

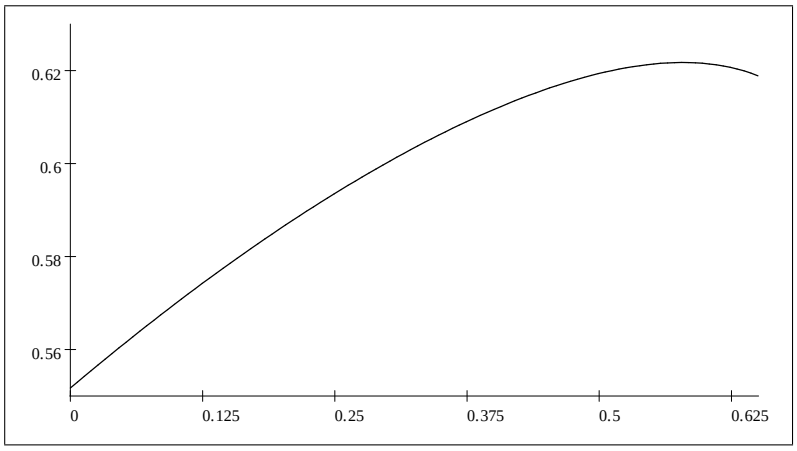

Figure 5: Welfare of an individual entitled to the economy's per capita income as a function of τ. Other parameters as in Figure 1.

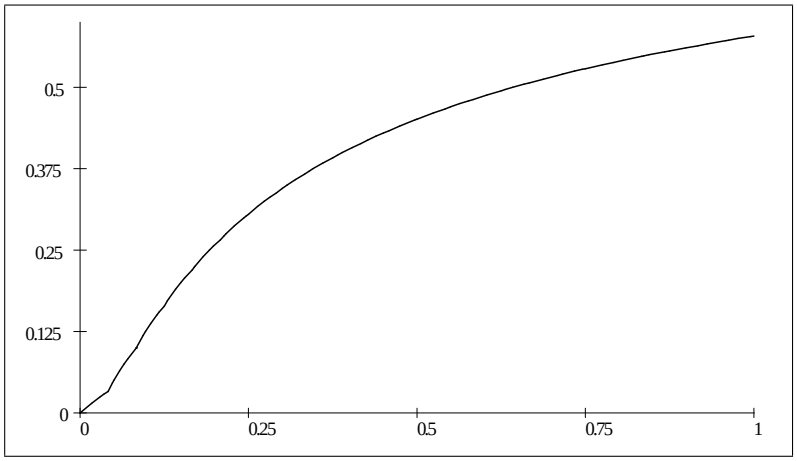

Figure 6: Representative welfare-maximizing τ^* as uncertainty varies: $\sigma_1 = 0.35x$ and $\sigma_2 = 0.05x$, for x the value reported on the horizontal axis. Other parameters as in Figure 1.

differentiating (7) yields

$$\begin{aligned}\frac{\partial V(\tau,\beta)}{\partial \beta} &= -\frac{1}{2}l^2 - \frac{1}{2}(1-l)^2 \\ &= -\frac{1}{2} + l(1-l) :\end{aligned}$$

hence, the expression in (8) has the same sign as

$$\frac{d}{d\tau} l(\tau)\,(1-l(\tau)) = (1-2l(\tau^*))\,l'(\tau^*),$$

which is negative for $l(\tau^*) > 0.5$ and $l'(\tau^*) < 0$. When productivity and earnings depend more strongly on labor allocation (in the model, when β is larger), then the optimal intensity of redistribution is lower (in the model, τ^* is smaller). Intuitively, redistribution remains appealing for the economy's typical individual because it smooths uninsurable income shocks, but its collateral damage in terms of average production, through smaller incentives to perform investments or effort, is larger when production depends more strongly on labor allocation.

3 Models and reality

In the model outlined above, labor income redistribution shapes workers' choices to undertake activities that require ex ante effort or investment, and entail ex post risk. This can help interpret productivity and inequality data along the lines illustrated in Figures 3 and 4, and simple modeling variations have qualitatively similar implications for the employment and unemployment effects of unemployment insurance, minimum wages or binding collective wage agreements, and other policies that are meant to isolate the welfare of workers from uninsurable shocks, and generate effort and efficiency side effects. To see this, consider a reinterpretation of the model's structure where allocation of labor units to employment opportunities that do not require investment of k corresponds to non-employment rather than to occupations with lower total productivity. It would then be appropriate to set $\beta_2 = 0$, so that returns are constant in terms of production-equivalent leisure or informal employment, or to suppose that any rents generated by such informal activities accrue

to labor and are neither taxed nor redistributed. The resulting model could accommodate policies that impose lower bounds on the marginal productivity of formal employment (such as minimum wages, or payroll taxes that fund subsidy payments to unemployed or retired workers), would have similar implications for observed labor income inequality and productivity, and would represent the implications of such policies for market output and employment. Employment protection legislation, while somewhat harder to model formally, is shown in e.g. Bertola (2004) to have similar motivation and effects.

All such model variations represents "labor" policies (rather than, say, general income taxation) because redistribution occurs within labor income, and influences incentives to perform costly actions that affect individual earnings as well as the economy's overall productivity. The model and its redistribution policy treat all workers equally, and abstract from distributional conflicts across ex-ante heterogeneous workers, which may if present influence the politico-economic appeal of the policies represented by the model's τ. If individuals who expect to earn differently receive the same per capita subsidy, then those who expect to earn more should be less inclined to favor redistribution. As in Agell (2002), the equilibrium intensity of distortions and redistribution would then depend on the political power of individuals who face different trade-offs between expected income losses and better income smoothness. Allowing for such heterogeneity would also open the way to more direct "rent seeking" tensions, such as struggles over the size of the individual lump-sum transfers that in the model are as homogeneous across individuals as their ex ante characteristics.

Features of the model economy bear on the optimal intensity of redistribution in intuitive ways. The effect of uncertainty, illustrated in 6, represent in the model a mechanism familiar from Mulligan's (2012) and other models of incentive-compatible social insurance.[2] Risk aversion, and the size of the ex ante cost k, have similarly intuitive qualitative implications for the optimal intensity of redistribution, which in turn determines productivity and inequality as in Figures 3 and 4. To interpret the real-life form and evolution of labor market policy, however, it is helpful to

[2] A related mechanism is at work when policies fail to react to changes in the amount of uncertainty: as in Bertola and Ichino (1995) and Sargent and Ljungqvist (1998), the effects of higher volatility on an economy's performance depend on its institutional structure.

focus on two features that may be easier to pin down at least suggestively, and that both happen to be represented in the model by the slope effects characterized analytically above.

Consider first the implications for policy preferences of wealth inequality,, which is not only realistic but a natural theoretical implication of any model where consumption-smoothing individuals are subject to uninsurable labor income shocks: if the static model outlined here were extended to allow each individual to save rather than consume some of the windfall represented by the shocks v to their earnings, then it would be optimal to spread the consumption implications of labor income over multiple periods, and wealth and consumption inequality would increase over time (more widely when redistribution is mild, and without bounds when constant absolute risk aversion makes consumption levels irrelevant to consumption smoothing incentives as well as to labor allocation choices). Even when all individuals are similarly endowed with labor and treated similarly by redistribution of ex post income, the labor allocation and risk reduction effects of redistribution are differently relevant for individuals who are entitled to different amounts of non-labor income. For an individual who is entitled to income of a unit of labor (indifferently allocated to either sector) and to ω_i times the per capita amount of the other factors that produce the economy's output, welfare in the model is given by (7) plus $\omega_i - 1$ times the amount $\beta\left(\frac{1}{2} - l\left(1-l\right)\right)$ of the economy's per capita non-labor income. The resulting expression

$$\begin{aligned} V_{\mathrm{i}}(\tau) &= \alpha_1 l(\tau) - \frac{\beta(2-\omega_i)}{2} l(\tau)^2 + \alpha_2 \left(1 - l(\tau)\right) \\ &\quad - \frac{\beta(2-\omega_i)}{2} \left(1 - l(\tau)\right)^2 - k l(\tau) - \frac{\nu}{2}(1-\tau)^2 \left(l(\tau)\sigma_1^2 + (1-l(\tau))\sigma_2^2\right) \end{aligned} \tag{9}$$

has the same form as (7), with $\beta(2-\omega_i)$ replacing β. The policy choice problem of an individual entitled to a smaller-than-average $\omega_i < 1$ portion of the economy's non-labor income effectively features a smaller β. As shown above when establishing the sign of expression (8), and illustrated in Figure 7, this leads such an individual to prefer more intense redistribution.

Intuitively, while all owners of labor units benefit equally from a reduction in labor income risk, individuals entitled to different amounts of the economy's non-labor income are differently affected by redistribution's collateral damage in terms of production efficiency: in the model economy's

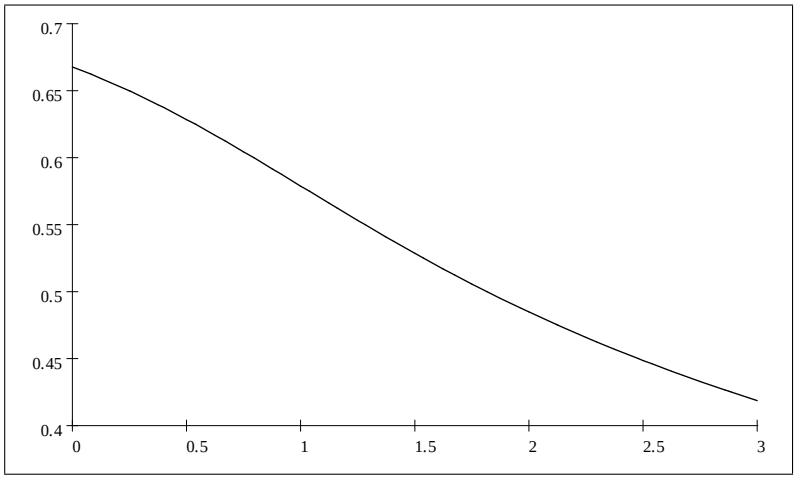

Figure 7: Optimal tax τ^* on the vertical axis from the perspective of an individual who owns ω (plotted on the horizontal axis) times the economy's per capita non-labor income. Other parameters as in the previous Figures.

equilibrium, the returns to the work investment or effort represented by k are competed away in wage differentials, but do partly accrue to the surplus earned by the economy's non-labor factors of production.

The rationale of redistribution policy in this model is related to, but subtler than, the rent seeking motives familiar from models where wage floors or non-employment subsidies funded by payroll taxes increase the wage bill at the same time as they decrease employment and profits. In either setting, the production side effects of labor policy are disregarded by workers who are not entitled to rents. From this perspective, the many policies and institutions that do trade production efficiency off other objectives are neither intrinsically right nor intrinsically wrong everywhere and for everybody. Policy-makers need to strike a balance between conflicting interests, and while support for production efficiency might in principle be enhanced by compensatory transfers of resources other than labor income, this is very difficult in practice. In the context of the simple imperfect information model outlined above, redistribution of wealth resulting from past good luck would have exactly the same incentive implications as labor income redistribution if it were expected ex ante.

Consider next the implications for the policy-choice problem of allowing non-labor income to include not only rents (paid to exogenously given factors, such as land) but also payments to a factor (such as financial capital) that is competitively supplied. If the units of labor that choose to pay k work with an amount K_1 of the latter factor, the model's linear-quadratic production function can be written $(\alpha_1 + \delta_1 K_1)l - (\beta_1/2)\, l^2 - (\gamma_1/2)\, K_1^2$, and $\delta l - \gamma K_1 = \rho$ ensures that the marginal productivity of K_1 equals a given ρ. In this extended model, the expected marginal productivity component of the earnings (1) is $w_1 = \alpha_1 - \left(\beta_1 - \delta_1^2/\gamma\right) l$, and the earnings represented in (2) can be similarly modified. If, as in the Figures above, only the intercepts differ across the two employment (or non-employment) alternatives, then $\delta_2 = \delta_1 = \delta$ as well as $\beta_1 = \beta_2 = \beta$. Welfare as a function of policy choice has the same form as (7), with a different intercept and, more interestingly, $\beta - \delta^2/\gamma$ in place of β, to imply that a smaller τ maximizes welfare. Intuitively, the beneficial uninsurable income smoothing effect of the tax is traded off an output reduction effect that, with

$$l'(\tau) = -\frac{1}{2\left(\beta - \frac{\delta^2}{\gamma}\right)}\left(\frac{k}{(1-\tau)^2} - \frac{\nu}{2}\left(\sigma_1^2 - \sigma_2^2\right)\right),$$

is magnified at each τ by $\delta > 0$. The larger is δ, i.e. the more complementary to labor is the elastically supplied factor K, the smaller is the τ^* that maximizes the welfare of an individual who is entitled to the income of a unit of labor, to a portion of the per capita rents that decreasing returns allow after K and labor are paid their marginal productivity, and to the unit income ρ earned, regardless of redistribution, by the units of K he or she may own.

4 Motives and effects of European labor market policies

The model's insights into the role of wealth inequality in shaping policy-makers' labor policy choices can explain why European labor markets became more rigid in the 1970s, when the Golden Age of post-war growth had accumulated a large stock of unavoidably unequally distributed wealth. A political majority may then have been inclined to trade better income security for lower production efficiency, and for a productivity slowdown that, since the parameters of the model are not as clear

in reality as in the mathematical expressions above, may have been more pronounced than expected and contributed to public debt accumulation.

And the role of in the model of elastic supply of factors other than labor can illustrate the implications of a more recent phase of European policy evolution. Market integration across areas subject to independently chosen policies, and the resulting capital mobility and competition among systems, should in theory shift choices towards less redistribution, higher inequality, and stronger productivity; in practice, European and global economic integration may therefore explain labor market deregulation trends observed in the 1990s.[3] It is possible to detect in some interesting cases the stronger deregulation incentives of countries experiencing more elastic market responses to relative policy differences. When the Netherlands found itself the smaller partner of an essentially complete economic and monetary union with Germany, it was logical for it to adopt the wage moderation and deregulation policies implemented by the 1982 Wassenaar agreement. The German "Agenda 2010" reform framework only took a similar path in the first half of the 2000s (Rinne and Zimmermann, 2012), after the country's reunification, euro adoption, and Eastern enlargement had changed the trade-off between high wages and idle labor on the one hand, and better competitiveness on the other.

For the more recent period where comparable cross-country panel data are readily available, it is possible to assess the relevance of such structural phenomena beyond these and other case studies. Ideally, regression specifications should let policy indicators, driven by exogenous factors, explain labor market outcomes. In practice, it is difficult to measure accurately the wide variety of institutional features that can in reality have the effects represented by the model, and available data are neither as accurate nor as plentiful as to allow estimation of the long and likely variable lags with which expected and actual policies affect observable outcomes. A less direct indication of

[3] There is empirical evidence that adoption of the single currency was associated with an increase in inequality and a tendency to deregulate labor markets. Comparing countries that did and did not join the euro area, and the 1995-99 and 2000-04 periods, Bertola (2010a,b) finds that the tighter economic integration implied by the 'One Market, One Money' paradigm was indeed associated with substantially faster deregulation of their product markets, some deregulation of their labor markets, and lower social policy expenditure. As a result, disposable income inequality grew faster in countries adopting the single currency, and these differences were completely accounted for by differences in social policy and other policy indicators, rather than by economic integration directly.

Table 1: Accounting for total factor productivity developments with inequality and emploument variation.

TFP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inequality	0.69	0.72	0.77	0.88	0.63	0.53	0.65	0.64
	(2.87)	(3.27)	(3.30)	(3.98)	(2.75)	(2.42)	(3.33)	(3.10)
Employment		0.79		1.00			1.06	0.91
		(5.53)		(4.42)			(8.12)	(4.38)
Institutional quality					0.13	0.20	0.20	0.19
					(4.17)	(5.41)	(7.10)	(5.37)
Country effects	yes	yes	yes	yes	yes	yes	yes	yes
Year effects	no	no	yes	yes	no	yes	no	yes

Robust t statistics in parentheses.

EA12 except Luxembourg, annual 1996-2011 sample (172 observations; inequality and institutional quality data are available for roughly half of the years, somewhat unevenly across countries, and are interpolated when missing). Inequality is the Gini coefficient (fraction) of equivalized household income; source: Eurostat. Employment rate (fraction) and Total Factor Productivity (1990=1 index); source: The Conference Board. Institutional quality: average of the six World Bank Governance Indicator (sample mean=1.31, std.dev.=0.39); source: The World Bank.

the theoretical mechanism's empirical relevance can however be obtained by inspection of outcome covariation patterns in data where they are at least partly driven by past labor policy variation.

The descriptive regressions in Table 1 inspect the relationship between total factor productivity and various other variables of interest in the original group of euro area countries.[4] Since productivity is measured as an index with a common basis in 1990, all specifications include country fixed effects and only convey information on within-country dynamic developments. In columns 1 and 2, inequality is significantly and positively related to productivity, both when country effects highlight within country dynamics, and when year effects additionally control for common developments. As discussed above, employment rates are also plausibly influenced by labor market policy (as well as by demographic factors, and by labor supply reactions to exogenous productivity variation). In columns 2 and 3, the coefficient of inequality is barely affected when employment rates are in-

[4]The regressions are limited to EU countries by inequality data availability. The relationship is much stronger across the original members of EMU where inequality changes are much more pronounced than across the euro outs. Comparable inequality indicators are not available for most of the more recent EU members.

cluded in the regression, with a coefficient indicating a positive association between employment and total productivity that is sensible, and may be generated by labor policy variation. To the extent that country fixed effects capture the implications of relatively slow-moving factors (such as demographics, ethnic composition, and size), and time effects those of trade and technological developments, the relationship between productivity, inequality, and employment traced by these regressors suggests that movements along the trade-off illustrated by the model may have been at work in recent European experience. Productivity growth is stronger where inequality and/or employment increase, and these empirical relationships may be driven by past changes in labor market policies and institutions.

In columns 5-8, the regressions include as an explanatory variable of within-country total factor productivity variation a general indicator of institutional quality.[5] Its strong significance indicates that each economy's productivity is determined by more general features than labor market policies.[6] Inequality and employment indicators do help interpret productivity developments even when institutional quality developments are accounted for, and evidence of an inequality-efficiency trade-off is remarkably stable across the specifications estimated in Table 1. Institutional quality is in fact only loosely related to inequality and employment in the data's within-country dimension. In Table 2, inequality is very significantly lower and employment higher in countries with better institutions, confirming that groups of countries differing in these (and probably many other) respects display widely different labor market performances (Sapir, 2006). These relationships, however, are weaker or absent when controlling for fixed effects, indicating that in order to change their group membership countries would need to change in drastic, permanent, and perhaps not uniformly pleasurable (if at all possible) ways.

[5] This is the average across six subject areas of the World Governance Indicators, http://www.govindicators.org, which aggregate and normalize by cross-sectional standard deviations a large number of variables drawn from individual opinion surveys and reports by private and public information providers.

[6] The standard errors used to compute the statistics in the table are robust to heteroskedasticity, and similar to those obtained assuming homoskedasticity. When the estimates allow for country-level error clustering, significance levels drop markedly, but institutional quality remains highly significant.

Table 2: Relationships between the inequality, unemployment, and institutional factors related to productivity in Table 1.

Inequality	(1)	(2)	(3)	(4)	(5)	(6)
Institutional quality	-0.06	0.01	0.04	-0.07	0.01	0.04
	(-11.29)	(0.78)	(2.52)	(-10.98)	(0.72)	(2.62)
Employment				0.13	-0.01	-0.13
				(2.12)	(-0.11)	(-1.54)
Country effects	no	yes	yes	no	yes	yes
Year effects	no	no	yes	no	no	yes

Robust t statistics in parentheses.

5 Reforms and crises

The empirical associations documented above, while remarkably robust, offer only suggestive evidence of the policy effects of interest, because in available the theoretical mechanism modeled above is influenced or confounded by a variety of structural factors and channels. Disposable income inequality is decreased by labor income redistribution, but increased by wealth concentration, which implies more redistribution in a democratic society. Pre-tax income inequality is influenced by a host of factors, including international economic integration and ethnic differentiation, that are also relevant to policy-making processes. Besides tighter economic integration without policy coordination, other factors may explain lower social policy expenditure, labor market deregulation, and stronger labor income instability. The appeal of redistribution is lower when other margins of adjustment and financial market development reduce the need for protection from labor market risk, and labor reallocation can have a more beneficial effect on productivity when shocks hitting labor markets are more likely to be region- or industry-specific than country-specific.

All such phenomena arguably did play a role in the period before the Great Recession across all of Europe. To the extent that the model's perspective is empirically relevant, however, it can help interpret another crucial European development during that period, namely the large accumulation of negative international imbalances by peripheral eurozone countries that was largely mirrored by positive imbalances in Germany and other core countries. Only part of these imbalances reflected

investment patterns driven by equalization of capital intensity (which influences pre-tax inequality directly if wealth is more unequally distributed than labor income). A large portion was accounted for by public and private consumption booms (and in particular to housing expenditures) that, as discussed in Bertola (2013), were financed on the basis of productivity convergence expectations that were not realized ex post, resulting in the euro debt crisis.

Labor market reforms that influence future productivity and risk prospects are a theoretically and empirically plausible driver of current account imbalances (Bertola and Lo Prete, 2012), and may well have contributed to eurozone imbalances. In the aftermath of euro adoption, it might have been sensible to trade efficiency for security in the periphery: the current account and asset imbalance implications of such reform's productivity effects could have been affordable if relative efficiency was expected to improve in the periphery, consistently with the idea that joining the Single Market and adopting the *aquis communataire* should lead to more civilized institutions and better organized production. Between 2000 and 2007, total factor productivity did increase in the core and decline in the periphery in ways that are related to inequality developments, and possibly to underlying labor policy changes. Inspection of specific country trajectories along the regression lines estimated above suggest that movements along the model's trade off between productivity and inequality (or employment) may have played a role in determining expected and actual growth trajectories before and after the European crisis. Scatter plots of the relationships between economic productivity and inequality (in Figure 8) or employment (in Figure 9) tell intriguing country-specific stories: only some of the data points are labeled to preserve legibility, and it is possible to see that the extreme boundaries of that data cloud are populated by peripheral and core countries that traded places along a fairly stable relationship before, during, and after the imbalances build up period. However, a stronger explanatory role for productivity is played by institutional quality (illustrated in Figure 10), and this suggests that it would be misleading to focus too narrowly on labor market policy (disregarding its distributional benefits) as the driver of productivity dynamics in general, and in particular of those experienced in the euro area before the crisis.

Consider next the implications of this paper's theoretical perspective for labor reform choices.

Figure 8: Partial association between total factor productivity and inequality, controlling for employment rate, institutional quality, country and year effects (as in column 8 of Table 1).

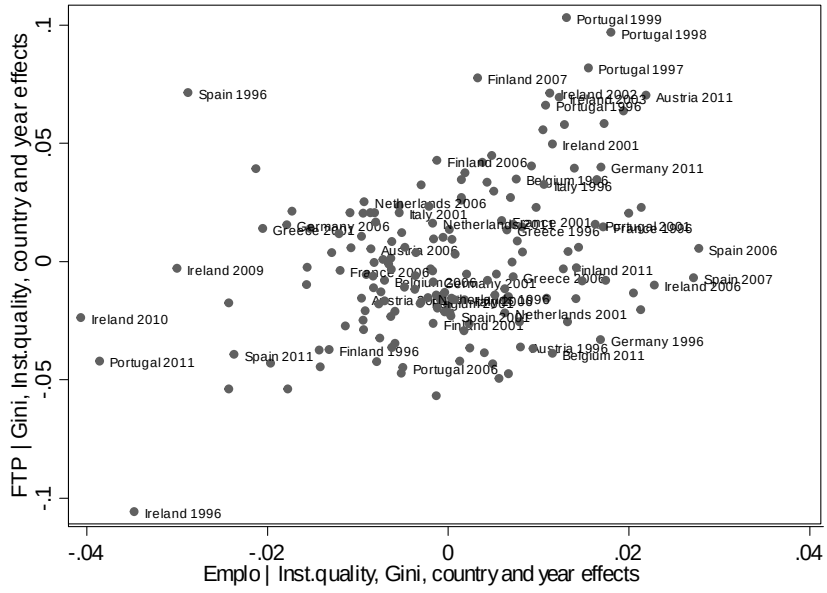

Figure 9: Partial association between total factor productivity and employment rate, controlling for inequality, institutional quality, country and year effects (as in column 8 of Table 1).

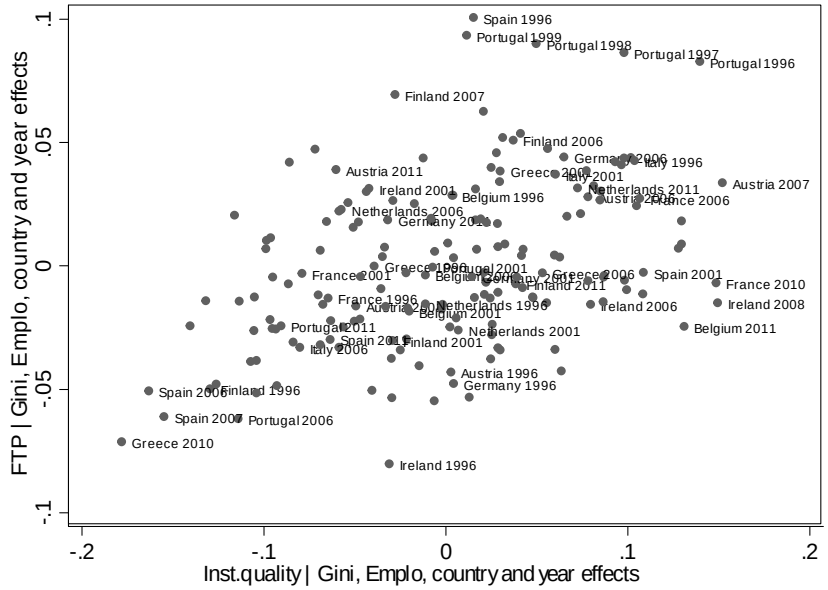

Figure 10: Partial association between total factor productivity and institutional quality, controlling for employment rate, inequality, country and year effects (as in column 8 of Table 1).

In the simple model economy of Section 2, looser labor market regulation can increase production at the expense of labor income smoothing. While this can be the optimal policy response to politico-economic developments, the effects of reforms in the model depend on previous labor allocation choices. In reality, the lag between policy causes and effects can be long, and just like falsified expectations of productivity growth may have contributed to the onset of the current European crisis, the uncertainty surrounding reform processes can hinder suitable adjustment in the aftermath of the crisis.

When changes in structural conditions and crisis shocks call for reforms, two difficult issues arise in the model and in reality. On the one hand, deregulation increases productivity only if workers perform costly actions that are not optimal when the reform announcement is not credible. On the other hand, policy uncertainty reduces the welfare of risk averse workers with imperfect access to financial markets, diminishes their incentives to make choices that increase the economy's overall productivity, and introduces potentially undiversifiable risk in the model's rental income.

Expectations and perceptions play a crucial role in both respects. In the model, what matters for labor allocation and productivity is the policy configuration expected to shape incomes at the time when investment choices are made, and the pros and cons of labor market policies are unavoidably heterogeneous across individuals who at a point in time happen to be differently entitled to the economy's non-labor income. In such an environment, reform processes can be strengthened by virtuous expectation feedbacks, but can just as easily be derailed by negative feedbacks: deregulation is unpopular if it is perceived to magnify individual income risk without suitable payoffs in terms of income growth expectations; lack of popular support damages the credibility and effectiveness of reforms; and the resulting policy uncertainty riddles the reform path with macroeconomic pitfalls, as reluctance to spend in the presence of large downside risks reduces economic activity and growth expectations.

Reform processes should aim to credibly link current adjustment problems to future gains, and to address distributional issues in politically sustainable ways. In principle, and in the long run, all markets and policies should be reformed in complementary ways, addressing the issues arising from changing circumstances as discussed above, and aiming to remove barriers to change and competition rooted in a culture that myopically privileges defense of one's own existing resources, and prevents market exchanges from benefitting all parties. In practice, reforms are necessarily gradual and need to be credible, because their effects are far from instantaneous and depend crucially on expectations of future developments. Changes of life- and career-shaping institutions (in education, labor market, and pensions) cannot quickly influence behavior, and they modify the conditions in which choices made a long time ago have effects. Credibility is as necessary for labor reforms as for monetary or fiscal policies, and similarly elusive at times of political and economic turmoil. It is obviously not so useful to increase supply when demand is lacking, so efficiency-enhancing reforms have a negative impact on the output gaps resulting from price rigidities and expectations-based expenditure restraint. But while it would be wishful to suppose that product and labor market reforms could, like an ideal problem-free devaluation, quickly restore macroeconomic equilibrium, a credible reform path can encourage export- and import-substitution investments, at the same time

as it reduces domestic consumption demand through expectations of decreasing prices, provided that such investments are not restrained by downside risks surrounding the reform process's future path.

Reforms steps should be sequenced so as to ensure dynamic stability, because a tentative reform that is widely believed to be reversed soon can very well be worse than no reform at all. To be fruitful, a reform package needs to be aware of the problems addressed by collective policies, and to address them coherently in the face of changing circumstances. Support for social protection and labor market regulation may well be rooted in the myopic defensive culture that prevents positive growth feedbacks. But it is also motivated by the impact of product and financial market imperfections on the level and volatility of labor income, which for a very large majority of households accounts for a major portion of lifetime resources. It may be inappropriate for reform processes to introduce labor market flexibility in the midst of crisis: not only do easier dismissals tend to multiply the effects of weak labor demand without automatically encouraging job creation (which depends on expected future policies) but, since the risk aversion that the model takes to be constant is in reality decreasing, in times of crisis deregulation has more negative welfare implications, and provides weaker incentives to the effort or investment choices that, as in the illustrations above, entail higher risk at the same time as they contribute to the economy's productivity. To the extent that productivity growth appears in the regression above to reflect more general institutional features, it may be advisable not to give priority to labor market deregulation. Transparent, well regulated, corruption-free product markets and financial markets increase the purchasing power of households and make it easier to undertake more technically and politically difficult reforms of labor and social policies. In many European countries, including those that are doing well in the current crisis, retail, business, and financial services are sheltered from international as well as domestic competition; and while self-employment is common in countries where both labor and product markets are heavily regulated, it is not as attractive and easily accessible there as in less regulated economies where it is neither unusual nor particularly unpleasant for redundant white collar employees to open their own business.

6 Conclusions

As long as insurance markets and policies remain imperfect, it is moot to blame low production efficiency on labor market policies that mean to stabilize labor incomes. While reforms of such policies should be considered when structural change alters the trade-off between their pros and cons, they redistribute resources across different individuals and groups, and are unavoidably triggered or constrained by political feasibility considerations. In general, demographic trends, migration flows, and changes of family structure can influence support for pay-as-you-go pension scheme, or for labor market rigidities that make it difficult for youth to find employment at the same time as they protect their parents' income. In Europe, labor market reform pressure has come from international economic integration and other technological and organizational innovations, from financial development that made it appear less necessary to interfere with laissez faire labor market outcomes in order to smooth temporary income fluctuations, and by crisis shocks to both the desirability of labor income support, and the affordability of production efficiency losses: expectations of fast growth may lead public expenditures and policies to be upgraded to a level that appears within reach, but is no longer affordable in the crisis aftermath.

This general perspective can help understand the sources and consequences of structural reforms of the 1980s (in the United Kingdom and in the Netherlands), of the 1990s (in Sweden's post-financial crisis experience), of the pre-crisis 2000s (in Germany's reforms, and in other countries' similar introduction of flexibility at the margin). Such past experiences and the simple model and evidence outlined in this paper, however, also help understand why reform experiences are difficult and infrequent. It may be true that radical reforms can only be passed in the face of extreme crisis situations, not least because their consequences are typically very difficult to predict. But while "there is no need" objections easily stunt reforms when things are going well, political processes do not always channel crises into reforms. The reforms that we do observe in reality always result from a combination of structural factors and shocks that alter the pros and cons of status quo policies, and of specific political factors, such as Mrs. Thatcher's stubborn personality, or the willingness of Mr. Schroeder's left-of-center government to sacrifice its own popularity.

A fruitful reform process has to follow a narrow path between complacency and defeatism. The design and sustainability of reform processes depend on the one hand on proper consideration of changing external circumstances, as may be provided to National policy-making processed by the EU market integration and supranational policy framework; on the other, on political aspects that reflect internal social shifts, which may be violent and unpredictable in crisis situations. A sense of crisis can trigger reforms if a "there is no alternative" perspective supports an economically sensible, politically sustainable, and suitably credible reform path. But it can lead to destructive unraveling of the existing policy framework if "all is lost anyway" attitudes prevail: crises may be aggravated when they produce political paralysis, and poor growth experiences and prospects can only too easily foster "real deflation" feelings, that things could be worse and change is too risky, which make it difficult for a society to adapt and reform.

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