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Reforms, Finance, and Current Accounts

Giuseppe Bertola and *Anna Lo Prete

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ABSTRACT: We study theoretical and empirical relationships between countries' current accounts and reforms of institutions that shape labor's productivity and labor income risk. In theory, both consumption smoothing and precautionary motives shape saving behavior when deregulation speeds up income growth and amplifies idiosyncratic income risk, and the relative importance of these two channels depends on workers' access to credit. Empirically, nonlinear regressions on a standard sample of OECD countries indicate that the association between deregulation trends and current accounts surpluses is statistically significant, robust to a variety of specification details, and stronger where financial markets are less developed. The relevant labor market regulation and financial indicators are empirically associated not only with lower consumption, faster production growth, and more investment, but also with higher wage dispersion.

1. Introduction

Since the early 1990s, structural labor market reforms along the OECD (1994) guidelines have been accompanied by financial market development within countries, and by growing current account and net foreign asset imbalances across countries. In this paper, we characterize how these broad trends may be linked to each other in theory, and assess the extent to which the relevant mechanisms fit the uneven pace of reforms, financial development, and current account imbalances across a panel of OECD countries.

In theory, financial markets play a crucial role in funding human capital investment, allowing consumption to respond to the expected growth of future income, and smoothing out its variability's consumption impact. But financial markets do not in practice make it possible to diversify labor income risk, and redistribution policies and other institutional features of labor markets also shape the dynamics of production and its distribution across individuals. Labor market regulation generally decreases production efficiency at the same time as it smoothes uninsurable labor income flows. The efficiency effects of regulation may be detected in growth, investment, and total factor productivity country-level data, to the extent that is it possible to control for other relevant factors. Income and consumption volatility are not as easy to measure in comparable fashion across countries and periods, however. Hence, we study how changes in institutions meant to smooth consumption risk are related, through savings and growth effects mediated by financial market channels, to countries' current accounts.

Our approach connects elements from various strands of literature. Productivity growth is straightforwardly related to savings and investment and to current accounts (Ventura, 2003, and references therein), and is in turn influenced by structural reforms (Nicoletti and Scarpetta, 2003). To the best of our knowledge only Kennedy and Slok (2005) have inspected the resulting relationship between reforms and current accounts, using empirical specifications that are difficult to interpret from an inter-temporal optimization perspective and yield mixed and inconclusive results. We specifically focus on the role of financial market development in allowing reforms to improve the economy's efficiency, and expected income growth to affect current consumption and welfare through the channels analyzed by Buti et al. (2008) in a politico-economic context. But we also model the implications of reforms' impact on labor income risk. As argued by Carlin and Soskice (2007), flexibility-oriented reforms may lower the propensity to consume of workers faced by more volatile income processes, and recent literature has explored the international implications of such within-country income distribution aspects. Kocherlakota and Pistaferri (2007), for example, show that within-country risk influences equilibrium exchange rates when individual consumption can be insured against observable country-specific shocks, while the need to elicit

unobservable effort prevents complete insurance against individual idiosyncratic income fluctuations.[1]

In the context of this literature, we highlight the role of redistribution and labor market regulation in shaping not only productivity developments, but also the intensity of labor income risk. To model the relationship between financial market development and allocative and distributional mechanisms, we choose to employ a standard liquidity-constrained self-insurance framework of analysis, which we find more natural than settings with more or less complete formal insurance mechanisms. Empirically, we focus on the association between institutional change and balance of payment dynamics, rather than on the role of institutional configurations in shaping the international impact of shocks (Lo Prete, 2008, finds that the configuration of internal risk-sharing institutions matters for the relationship between aggregate consumption and aggregate production at the country level).

In Section 2 we outline in some detail the relevant theoretical insights, modeling a simple economy where redistribution policies influence choices by worker-consumers to invest so as to increase their future jobs' productivity. Since redistribution diminishes individual incentives to undertake such investments, aggregate incomes are expected to increase when labor markets are deregulated. The extent to which this is reflected in current consumption (and in the aggregate current account balance of investment and savings) depends on the implications of less generous redistribution and labor market deregulation for individual consumption risk. We characterize the relevant effects adopting functional forms that neatly separate the effects of interest, and we discuss how borrowing constraints may further shape the impact of reforms on output, consumption, and current accounts.

The resulting theoretical perspective implies interesting interactions between financial structure and current accounts. If financial markets allow households to anticipate and smooth consumption, then the representative individual saves less when regulatory reforms increase expected future income relative to current income. But consumption growth may be prevented by borrowing constraints and, to the extent that labor market regulation is meant to reduce uncertainty for workers, the same reforms that increase average production also increase idiosyncratic uncertainty and induce precautionary savings. Through this channel, reforms should be associated with smaller current account deficits, or larger surpluses. In Section 3 we specify an empirical model aimed at detecting

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[1] This implication can in principle be tested empirically, and the paper claims some success in doing so on UK and US data, but Kollman (2009) shows that the same data offer little or no support to the theory. Broer (2008) proposes a different channel of interaction between risk and savings, based on the Kruger and Perri (2007) endogenous enforcement mechanism whereby more uncertain future income prospects relax borrowing constraints; Mendoza, Quadrini, and Ríos-Rull (2007) show that international financial integration across countries with different internal borrowing constraints have distributional implications, as it implies that rates of return increase – to the detriment of borrowers – in financially repressed countries.

such effects. In a standard cross-country panel data set, relationships between indicators of labor market rigidity (drawn from standard OECD sources) and indicators of financial development can be interpreted in terms of reforms' impact not only on aggregate income and investment dynamics, but also on households' consumption, which is expected to increase when financial markets allow households to borrow, with a negative impact on current account balances. Many other cyclical and trend factors also shape current accounts, of course. In contrast to recent empirical studies of macroeconomic current account imbalances, which analyze the effects of a comprehensive set of variables on short, medium, and long term dynamics, relying on a wide range of theoretical models but without testing a particular one (see Debelle and Faruqee, 1996, Calderon et al., 2002, Chinn and Prasad, 2003), our perspective combines theoretical insights from models of labor market institutions' motivation and effects, and from models of consumption-smoothing channels of interaction between financial markets and other markets' structure.

The results offer intriguingly significant and robust support to the empirical relevance of such theoretical insights. In our basic specification, deregulation is associated with smaller current account deficits, and the size of this effect is larger where financial markets are less developed. This can be explained by precautionary saving behavior in response to stronger labor income risk. While it is of course impossible to account for all possible channels of interaction, we find that the estimated effects of institutional change is robust to controlling for arguably exogenous variables (such as dependency ratios, real effective exchange rates, and the terms of trade), to 5-year averaging of the data (to reduce the importance of cyclical fluctuations), and other specification variants. Section 4 explores the relationship to income and consumption, to investment, and to earnings inequality of the institutional interactions detected to be relevant to current account developments by our estimation procedure, and documents empirical associations consistent with our theoretical perspective: deregulation is associated with lower consumption, faster production growth, more investment, and higher earnings inequality.

Section 5 concludes summarizing the results and discussing their implications for the interpretation of past trends and possible developments after the 2008 crisis at the end of a long phase of financial deepening and labor market deregulation, when countries following trajectories of labor market deregulation and financial development accumulated foreign financial assets relative to those that already featured loosely regulated labor markets and easy access by households to borrowing and stock ownership.

2. A theoretical framework

We illustrate with a simple model the interaction of labor market and international phenomena when labor incomes are determined by individual choices as well as by uninsurably random events, and both are shaped by public policies. The relevant mechanisms may be applicable to other income flows, such as those resulting from business investments, and to any redistributive taxation that reduces incentives to seek higher expected income at the same time as it smoothes the consumption impact of income shocks. Consistently with our empirical application, we focus on a labor market interpretation of the model.

As in Bertola (2004), the economy's risk-averse workers may relocate their labor to firms, sectors, or occupations where labor income is expected to be higher. In equilibrium, the payoff to such mobility is endogenous, because employment in better jobs encounters decreasing returns.

Formally, let π_0 denote the marginal and average productivity of employment opportunities available by default to all workers. Normalizing total labor to unity, and denoting with l the proportion of employment in jobs where marginal productivity is a decreasing function $\pi_1(l)$ of employment, the economy's aggregate output

$$Y(l) = \int_0^l \pi_1(x)dx + (1 - l)\,\pi_0 \qquad (1)$$

is increasing in l over the range where $\pi_1(l) > \pi_0$.

In order to allocate labor to the type of jobs indexed by 1, it is necessary to pay a per-unit cost k in terms of the previous period's output. Denoting with r the opportunity cost of funds for the economy, discounted output is maximized when labor productivity differentials offset the relocation cost at the margin:

$$\pi_1(l) = \pi_0 + (1 + r)k. \qquad (2)$$

This corresponds to the competitive outcome when individual workers' investments are funded at rate r and rewarded on the basis of labor's marginal productivity; under decreasing returns, part of the infra-marginal production is paid to a factor in fixed supply that, like labor, we take to be owned by the country's resident.

The economy does not necessarily deliver the socially efficient allocation of labor when individual gross wages are subject to random uninsurable shocks and net income is influenced by a tax-and-subsidy scheme. Gross earnings are observable and may taxed, but payment of k is private information, and we suppose that the component of earnings that reflects the mean marginal productivity (implied by aggregate labor's allocation) cannot be disentangled from that which results from mean-zero shocks, denoted ε, that are idiosyncratic to individuals. When random

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shocks are realized on a common support that prevents labor income from revealing whether k has been paid, they are uninsurable: taxes and subsidies can be a function of realized labor income, but cannot be contingent on whether k has been paid by the worker.

We model formally a simple linear redistribution policy, denoting with τ a proportional labor income tax rate and with s the per capita subsidy implied by a static balanced-budget constraint. Thus, net earnings of a unit of labor are given by

$$w = (1 - \tau)(\pi_1(l) + \varepsilon_1) + s \text{ in sector 1,}$$

$$= (1 - \tau)(\pi_0 + \varepsilon_0) + s \text{ in sector 0,} \tag{3}$$

$$\text{for } s = [l\pi_1(l) + (1 - l)\pi_0]\tau,$$

where the idiosyncratic mean-zero income shocks ε are indexed by 0 and 1 to allow their distribution to differ across jobs that do and do not require investment. When solving the model explicitly we will suppose that $\varepsilon_0 \sim N(0, \sigma_0^2)$ and $\varepsilon_1 \sim N(0, \sigma_1^2)$; the normal distribution's infinite support ensures that one-shot wage realizations do not provide information about their mean.

In the model, this policy has both efficiency and insurance effects (Varian, 1980). Collective bargaining and wage compression could be similarly modeled in this framework along the lines of Agell (2002), and employment protection provisions could also be represented in this setting by job-specific wage taxes and subsidies (Bertola, 2004).

2.1. Individual optimization

All individuals are indefinitely lived, and homogeneous in all respects except the resources available to them at the beginning of each period. These include the asset level a_t, resulting from the previous period's financial savings choice and accrual of interest, and the wage w_t paid by their job, which results from the previous period's human capital investment and from a random shock. In every period, individuals choose consumption c_t and decide whether to spend k in order to increase their expected labor income in the next period. The remainder of their savings is invested in a financial asset that yields the rate r in equation (2). A constraint may be binding on the amount borrowed at that rate.

Individuals choose c and the investment indicator $m_t \in \{0,1\}$ to solve the problem

$$V(w_t + a_t) = \max_{c,m} u(c) + \beta E_m[V(w_{t+1} + (w_t + a_t - c - km)(1 + r))]$$

$$\text{s.t.} \quad w_t + a_t - c - km > -\bar{b}, \tag{4}$$

where β is the discount factor, $u(\ )$ is an increasing and concave differentiable function, V( ) is the value function resulting from the problem's solution in a stationary environment, $E_m[\cdot]$ denotes the expectation operator conditional on the investment choice, and $\overline{b}$ denotes a borrowing limit.

Since all workers have an option to choose $m = 1$, investment in human capital must be a matter of indifference at the margin. Hence,

$$u(x) + \beta E_0[V(w_{t+1} + (w_t + a_t - x)(1 + r))] = u(z) + E_1[V(w_{t+1} + (w_t + a_t - z - k)(1 + r))]$$

where expectations are taken with respect to the wage distributions relevant to the two possible investment choices, and the consumption levels x and z satisfy the possibly slack Euler conditions implied by the intertemporal budget constraint,

$$u'(x) \geq (1 + r)\beta E_0[V'(w_{t+1} + (w_t + a_t - x)(1 + r))], \tag{5}$$

$$u'(z) \geq (1 + r)\beta E_1[V'(w_{t+1} + (w_t + a_t - z - k)(1 + r))].$$

2.2. Investment and savings

Postponing discussion of binding liquidity constraints to Section 2.4, we proceed to characterize the individual choice and equilibrium implications of uninsurable uncertainty and redistribution when human capital investment can be funded at rate r, focusing in particular on functional specifications that allow explicit closed-form characterization of the relevant effects.

If borrowing is unconstrained, human capital investment is funded by a single capital market, and the indifference condition requires equalization of both current consumption and expected utility: at the indifference margin, some workers can look forward to worse earning opportunities but larger accumulated wealth; others pay k but offset the resulting lower wealth with the expectation of higher earnings. In equilibrium, $x = z = c$ is independent of investment if borrowing is unconstrained and the Euler equations (5) hold with equality. In the neighborhood of the resource level that implies indifference, then, wage distributions and the level of consumption satisfy

$$E_0[V(w_{t+1} + (w_t + a_t - c)(1 + r))] = E_1[V(w_{t+1} + (w_t + a_t - c - k)(1 + r))] \tag{6}$$

and

$$E_0[V'(w_{t+1} + (w_t + a_t - c)(1 + r))] = E_1[V'(w_{t+1} + (w_t + a_t - c - k)(1 + r))].$$

In the absence of uncertainty, the expectation would be redundant, and $\pi_1(l) = \pi_0 + (1 + r)k$ would immediately follow by monotonicity of the value and marginal value functions. When there is uninsurable uncertainty, conversely, its extent and character interact with the value function's nonlinearity, and these conditions determine the level both of consumption and of expected wages.

Uncertainty's implications for consumption levels and for wage differentials can be separated neatly when the period utility function has negative exponential (CARA) functional form,

$$u(c) = -\frac{1}{\eta} e^{-\eta c},$$

which implies that wealth and consumption do not influence individual attitudes towards risk and intertemporal substitution, and makes it is possible to obtain a closed-form solution and characterize the implications of interest sharply, if at the cost of neglecting the higher-order and compositional effects that would be implied by variable risk aversion.

When period utility has CARA form with parameter η, the value function of an unconstrained savings problem with stationary returns r also has negative exponential form, with parameter $\eta r/(1 + r)$ (see for example Bertola, Foellmi, and Zweimueller, 2006, section 9.2). Writing

$$V(x) = -X \frac{1+r}{\eta r} e^{-\frac{\eta r}{1+r} x},$$

where X is a constant to be determined as a function of the model's parameters, the $w_t + a_t - c$ savings terms can be simplified out of (6) to yield

$$E_0 \left[e^{-\frac{\eta r}{1+r} w_{t+1}} \right] = E_1 \left[e^{-\frac{\eta r}{1+r}(w_{t+1} - (1+r)k)} \right]: \tag{7}$$

for human capital investment to be a matter of indifference, its cost k must exactly offset the discounted gain it affords in terms of the expected marginal utility of labor income. This condition ensures that the uninsurable returns of the model's human capital investment do not offer (risky) arbitrage opportunities in utility terms. It may be of interest to note, and is discussed further below, that if better jobs not only require an ex-ante investment but also imply higher risk, then risk aversion has the same implications as a larger investment cost.

The constant X and the $x = z = c$ consumption corresponding to each resource level can be solved using (4) and either Euler condition in (5), with equality. The resulting consumption and value functions are

$$c(w_t + a_t) = \frac{r}{1+r}(w_t + a_t) - \frac{1}{\eta r}\ln((1+r)\beta) - \frac{1}{\eta r}\ln E_0\left[e^{-\frac{\eta r}{1+r} w_{t+1}}\right], \tag{8}$$

$$V(w_t + a_t) = -\frac{1}{\eta}\frac{1+r}{r}\left((1+r)\beta\right)^{\frac{1}{r}} e^{-\frac{\eta r}{1+r}(w_t + a_t)} E_0\left[e^{-\frac{\eta r}{1+r} w_{t+1}}\right], \tag{9}$$

where the last term may in each expression be replaced by the right-hand side expression in (7).

If the idiosyncratic ε shocks are normally distributed, which ensures that the mean of labor income cannot be inferred from its realization, then

$$\ln E_0\left[e^{-\frac{\eta r}{1+r} w}\right] = -\frac{\eta r}{1+r} E_0[w] + \frac{1}{2}\left(\frac{\eta r}{1+r}\right)^2 \text{var}_0[w] \tag{10}$$

(the same expression holds as a second order approximation for more general distributions). In equation (8), then, a larger variance of future uninsurable shocks implies lower consumption levels

if $\eta > 0$ in the CARA specification of utility and, more generally, when marginal utility is convex. Uncertainty decreases consumption and, noting that $V(w_t + a_t) = -\frac{1+r}{r} e^{-\eta c(w_t + a_t)}$ in the CARA specification, also implies a lower level of welfare in (9).

Redistribution schemes like that in (3) smooth out the random component of labor incomes, and are beneficial through that channel. To assess their implications fully, however, it is necessary to account for their impact on the wage and asset levels that also appear in (9). We next proceed to do so, in the context of a characterization of the economy's dynamic equilibrium.

2.3. Equilibrium

Even though the identity of individuals who undertake human capital investments is not observable, under rational expectations their total number l is common knowledge, like taxes and subsidies, at the time when such investments are decided. In equilibrium, taxation implies that a smaller proportion l of the economy's labor will be employed in high-productivity jobs: since human capital investments are decided on the basis of net wage gains, their gross marginal productivity yields have to be larger when redistribution is more intense.

To see this, and to inspect additional effects arising from uninsurability of investment returns, consider that the allocation of labor must in equilibrium be such as to ensure that (7) is satisfied together with the definition (3) of wages. The resulting equilibrium condition, using (10), may be written

$$\pi_1(l) - \pi_0 = \frac{(1+r)k}{1-\tau} + \frac{1}{2}(1-\tau)(\sigma_1^2 - \sigma_0^2)\frac{\eta r}{1+r}$$

where σ_1^2 and σ_0^2 are the variances of the idiosyncratic shock distributions surrounding the expected labor income of workers who do and do not invest. Denoting with $l(\tau)$ the high-productivity employment fraction implied by this condition, we have

$$l'(\tau) = \frac{1}{\pi_1'(l)}\left(\frac{(1+r)k}{(1-\tau)^2} - \frac{1}{2}(\sigma_1^2 - \sigma_0^2)\frac{\eta r}{1+r}\right). \tag{11}$$

Recalling that $\frac{1}{\pi_1'(l)} < 0$, redistribution reduces high-productivity employment through the first term in parenthesis: a larger tax rate discourages costly investment, because individual investment choices are based on net-of-tax wages (and the subsidy, which is independent of investment, cancels out in the CARA indifference condition).

Less intuitively, the second term in parenthesis indicates that taxation may foster human capital investment and improve labor productivity if $\sigma_1^2 > \sigma_0^2$, i.e., if uninsurable risk is higher in the jobs or occupations that require previous investment. In theory, even the very blunt redistribution tools available to the economy's government may, by providing a safety net, address the insurability

problems that prevent labor allocation from maximizing total production flows. In reality, human capital investments may or may not entail additional risk: while labor income is presumably more volatile for individuals who undertake mobility towards new occupations or entrepreneurial activities, individuals with more years of education are empirically less likely to have volatile incomes (Jensen and Shore, 2008). Whether redistribution encourages individuals to take socially beneficial risks, and whether that effect is large enough to offset smaller expected net returns from investment and increase productive efficiency, are essentially empirical questions.

Consider next the implications of redistribution for the intertemporal dimension of individual optimization problems, and for the aggregate saving rate and current account in the economy's equilibrium. Recognizing that l_{t+1} among the economy's unitary population choose to invest, the linear consumption functions (8) can be aggregated to

$$C_t = \frac{r}{1+r}(W_t + A_t) - \frac{1}{\eta r}\ln\big((1+r)\beta\big)$$

$$- \frac{1-l_{t+1}}{\eta r}\ln E_0\left[e^{-\frac{\eta r}{1+r}w_{t+1}}\right] - \frac{l_{t+1}}{\eta r}\ln E_1\left[e^{-\frac{\eta r}{1+r}(w_{t+1}-(1+r)k)}\right] \qquad (12)$$

where W_t denotes aggregate wages and A_t denotes aggregate assets. In equilibrium, aggregate wages are $W_t = (1 - l_t)\pi_0 + l_t\pi_1(l_t)$ in both gross and net terms (since the redistribution policy equates the two at the aggregate level). At the time when production is realized and consumption is chosen along with the next period's labor allocation, aggregate wealth includes net foreign assets with interest, $(1 + r)F_t$ at time t, as well as claims to the flow of production that the economy's decreasing returns technology yields over and above labor income.

The amount of such "profits" or rents, earned by fixed factors other than the "labor" we model explicitly in terms of marginal choices and marginal rewards, is related to total factor productivity measures obtained subtracting from output factor changes weighted by (marginal) rewards. Like wages and output, profits are a function of labor allocation and, through that, of the redistribution policy's tax rate: recalling the expression (1) for the economy's total production and subtracting wages,

$$Y(l_t) - (1 - l_t)\pi_0 - l_t\pi_1(l_t) = \int_0^{l(\tau)} \pi_1(x)dx - l(\tau)\,\pi_1(l(\tau_t)) = P(l(\tau_t)).$$

When the tax rate τ and all parameters are constant, inserting $l_t = l_{t+1} = l$, $W_t = E_0[w_{t+1}](1 - l_{t+1}) + E_1[w_{t+1}]l_{t+1}$, and $A_t = \frac{1+r}{r}P\big(l(\tau)\big) + (1 + r)F_t$ in equation (12) yields a compact and insightful relationship between aggregate consumption, output, and labor income risk expressed in the form of equation (10):

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$$C_t = Y\big(l(\tau)\big) - kl(\tau) + rF_t - \frac{1}{\eta r}\ln\big((1+r)\beta\big) - \eta r \frac{1}{2}\left(\frac{1-\tau}{1+r}\right)^2 \big(\sigma_0^2 + l(\tau)(\sigma_1^2 - \sigma_0^2)\big). \quad (13)$$

The effect of τ on this expression (and on the typical individual's welfare function) is ambiguous, for two reasons. First, redistribution may or may not imply a smaller l and a lower aggregate output flow: by (1) and (11),

$$\frac{dY\big(l(\tau)\big)}{d\tau} = \left(\frac{\pi_1\big(l(\tau)\big) - \pi_0}{\pi'_1\big(l(\tau)\big)}\right)\left(\frac{(1+r)k}{(1-\tau)^2} - \frac{1}{2}(\sigma_1^2 - \sigma_0^2)\frac{\eta r}{1+r}\right)$$

is negative if the second parenthesis is positive, but may be positive if human capital investment is so risky, and individuals so risk averse, as to let insurance effects dominate those of a smaller expected return to human capital investment. Second, and more importantly, redistribution smoothes out uninsurable risk and has a positive effect on the welfare and consumption of risk-averse individuals with precautionary motives: even when $l'(\tau) < 0$, consumption and welfare can increase in τ if the positive effect of τ on the last term of (13) dominates its negative effect on its first term.

2.4. Borrowing constraints

In the model, as in Varian (1980) and in reality, redistribution is appealing because its smoothing effect on income uncertainty, against which financial markets cannot provide insurance, can offset the negative welfare implications of smaller incentives to invest so as to increase expected individual income, and aggregate output.

These effects were illustrated above under the assumption that investment could be financed at the social rate of return, r. In reality, however, it need not be so easy to access the financial market for human capital investment purposes, and individuals may face binding borrowing constraints, which interact with technology and redistributive policies in determining equilibrium wages and labor allocation.

To see this, consider the implications of allowing the liquidity constraint to be binding for individuals who pay the cost k of obtaining a higher expected labor income in the next period. Supposing for simplicity that the borrowing constraint would not be binding if that cost was not paid, the indifference margin is characterized by the condition

$$u(x) + \beta E_0[V(w_{t+1} + (w_t + a_t - x)(1+r))] = u\big(w_t + a_t - k + \bar{b}\big) + E_1[V(w_{t+1} - b(1+r))] \quad (14)$$

for a consumption level x that satisfies

$$u'(x) = (1+r)\beta E_0[V'(w_{t+1} + (w_t + a_t - x)(1+r))], \quad (15)$$

while the Euler condition is slack at the constrained consumption level:

$$u'\left(w_t + a_t - k + \bar{b}\right) > (1+r)\beta E_1[V'(w_{t+1} - b(1+r))]. \tag{16}$$

Inserting the wage expressions (3) in (14), differentiating totally with respect to the high-wage labor fraction l and the borrowing limit $\bar{b}$, and noting that dx terms cancel out by (15), yields

$$\frac{dl}{d\bar{b}} = \frac{u'(w_t + a_t - k + \bar{b}) - (1+r)\beta E_1[V'(w_{t+1} - b(1+r))]}{(E_0[V'(\cdot)] - E_1[V'(\cdot)])(\pi'_1(l)l + \pi_1(l) - \pi_0)\tau - E_1[V'(\cdot)]\pi'_1(l)(1-\tau)}. \tag{17}$$

The numerator is positive by (16) when liquidity constraints bind investment. Since $E_0[V'(\cdot)] - E_1[V'(\cdot)] > 0$ follows from differentiation of (14) with respect to a_t and in consideration of the Euler conditions, the denominator, can also be shown to be positive as long as τ is not so large as to imply that tax revenues are declining in it, i.e., as long as the economy is not on the declining portion of the Laffer curve implied by the functional form of $\pi_1(l)$.

Thus, looser borrowing constraints imply that more labor is allocated to high-productivity employment opportunities. It is also possible to show, neglecting higher-order effects through changes in marginal value functions, that the denominator of (17) is an increasing function of τ. Hence, the effect on labor allocation of looser liquidity constraints becomes less positive when more intense redistribution reduces incentives to invest. Conversely, tighter borrowing constraints reduce high-productivity employment, and imply that the effects of redistribution on labor allocation are less pronounced.

A full characterization of individual value and policy functions, and of the economy's liquidity-constrained equilibrium, would be very cumbersome because while a condition in the form (14) holds in the neighborhood of a critical resource level in every period, different individuals are at the investment margin at different times. The dynamics of the wealth distribution, which in the absence of liquidity constraints becomes increasingly unequal but does not prevent a stationary representation of the aggregate equilibrium, have intractable implications when liquidity constraints are binding: as inframarginal investors enjoy surplus wage differentials, the value of individual wealth needs to account for expectations of endogenously binding liquidity constraints, and the equilibrium of the economy is not stationary.

Intuitively, however, the steep consumption path implied by liquidity-constrained investment reduces welfare. Regardless of uncertainty, the welfare loss imposed on individuals who choose to invest acts like an additional investment cost. For human capital investment to be attractive when it requires workers to compress consumption, it must be rewarded by larger expected wage increases, as implied in equilibrium by lower employment in decreasing-returns "good jobs". Thus, future production is lower and less strongly influenced by redistribution in a liquidity-constrained

equilibrium than it would be, by the no-risky-arbitrage condition (12), if savings and investment met on a financial market where r is the intertemporal rate of transformation.

2.5. Reforms and the current account

For given and constant parameters, the current account of the model economy is

$$Y\big(l(\tau)\big) - kl(\tau) + rF_t - C_t \; = \frac{1}{\eta r}\ln\big((1+r)\beta\big) + \eta r \frac{1}{2}\left(\frac{1-\tau}{1+r}\right)^2 \big(\sigma_0^2 + l(\tau)(\sigma_1^2 - \sigma_0^2)\big): \quad (18)$$

domestic residents accumulate or decumulate net foreign assets so as to ensure that consumption may sustainably grow at the rate dictated by any difference between the rates of return and of utility discount, and by precautionary motives.

Changes of redistribution policy (or "reforms") affect current consumption and future output through their implications for the riskiness of labor income and for human capital investment incentives. It would be conceptually straightforward and analytically feasible to let reforms be less than completely unexpected. Specifying and testing on scarce data an empirically realistic stochastic process for institutional parameters would be hard if not impossible, however, and allowing reforms to be sources of country-specific risk would beg the obvious questions of whether and how domestic residents diversify internationally their wealth portfolios, so that reform would impact a global investor's consumption. To sidestep this issue, which would in turn call for a discussion of whether and how reforms may reflect the politico-economic interests of specific groups of workers and investors, we suppose that while internationally traded assets yield the noncontingent rate r, all claims to domestic output are owned by domestic residents. While preventing the model from interpreting empirical patterns of foreign direct investment and international financial integration, this assumption usefully establishes a clear link between country-specific institutions and current accounts.

To illustrate more general implications in the context of the model proposed and solved above, suppose that τ changes unexpectedly and permanently. This redistributes income across workers, but has no impact on aggregate wages and on current output, which in the model depend only on past investment decisions. The model could be extended to let redistribution affect current output, for example through labor supply incentives. Since such effects would be similar on current and on future output, however, they would not matter for the growth, savings, and investment reactions that shape the economy's external asset position.

When a reform changes the tax rate from τ to τ', future wages and profits will depend on the new policy regime: inserting $W_{t+1} = (1 - l(\tau'))\pi_0 + l(\tau')\pi_1(l(\tau'))$ and $A_t = P(\tau) + \frac{1}{r}P(\tau') + (1+r)F_t$ in (12), and recognizing that $(1 - l(\tau))\pi_0 + l(\tau)\pi_1(l(\tau)) + P(\tau) = Y(\tau)$, yields

$$C_t = \frac{r}{1+r}Y\big(l(\tau)\big) + \frac{1}{1+r}Y\big(l(\tau')\big) - kl(\tau') + rF_t$$

$$- \frac{1}{\eta r}\ln\big((1+r)\beta\big) - \eta r \frac{1}{2}\left(\frac{1-\tau}{1+r}\right)^2 \big(\sigma_0^2 + l(\tau')(\sigma_1^2 - \sigma_0^2)\big).$$

The economy's aggregate consumption level depends on both the past and the new value of the policy indicator. The impact on it of a reform is overall ambiguous, because the intensity of redistribution affects the speed of consumption growth, through precautionary savings behavior, as well as its long-run mean, through the budget constraint. When less intense redistribution implies more uninsurable risk as well as more efficient labor allocation, the consumption path is steeper and centered around a higher permanent income level, and its initial level may be higher or lower.

This has interesting implications for the economy's current account. As it is possible for its residents to access an international financial market where funds yield r, the economy accumulates net foreign assets according to

$$Y\big(l(\tau)\big) - kl(\tau') + rF_t - C_t = \frac{1}{1+r}\Big(Y\big(l(\tau)\big) - Y\big(l(\tau')\big)\Big)$$

$$+ \frac{1}{\eta r}\ln\big((1+r)\beta\big) + \eta r \frac{1}{2}\left(\frac{1-\tau'}{1+r}\right)^2 \big(\sigma_0^2 + l(\tau')(\sigma_1^2 - \sigma_0^2)\big).$$

Linearizing this expression around τ, and supposing for simplicity that $\sigma_1^2 = \sigma_0^2$, we obtain:

$$CA(\tau, \tau') = \frac{1}{\eta r}\ln\big((1+r)\beta\big) + \eta r \frac{1}{2}\left(\frac{1-\tau}{1+r}\right)^2 \sigma_0^2$$

$$+ \left[\frac{1}{1+r}Y'\big(l(\tau)\big)l'(\tau) + \eta r \left(\frac{1}{1+r}\right)^2 (1-\tau)\sigma_0^2\right](\tau - \tau'). \tag{19}$$

If more intense redistribution reduces $l(\tau)$, as it certainly does when σ_1^2 is smaller than or equal to σ_0^2, then the first term in square brackets is negative, and so is the current account impact of a reform that decreases the intensity of redistribution: if $\tau - \tau' > 0$, the country's residents increase consumption as they look forward to higher future output. The second term in square brackets, however, is positive, and reflects the precautionary savings effects of higher uninsurable risk, through which less intense redistribution tends to steepen the consumption path and bring the current account into surplus.

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Which of the two effects dominates is an empirical question, the answer to which depends in theory not only on the level of τ and of other parameters determining the terms in square brackets in (19), but also on the stringency of liquidity constraints. On the basis of the derivations in Section 2.4, tighter borrowing constraints decrease the impact of reforms on future production and incomes, and require a larger share of investment to be funded by lower consumption. As financial constraints increase the effective discount rate applied to individual investments above the economy's intertemporal rate of transformation, the future output and current consumption effects of a reform that increases incentives to invest are less positive: when borrowing is constrained, the response of investment to a reduction in taxes is weaker, and the response of current consumption to that smaller productivity increase is smaller still. The empirical specifications of the next section aim at detecting, in country-level data, such interactions between the effects of reforms and financial market access.

3. Empirical relationships between current accounts and reforms

Less pervasive redistribution increases uncertainty about future net wage, to imply lower consumption through precautionary effects. But it also tends to encourage investment, to an extent that depends on its uninsurable riskiness and on ease of access to financial markets by workers: this increases future expected output, and boosts current consumption to an extent that, again, depends on accessibility of the country's financial market.

These insights are more general than the specific model proposed and solved in Section 1. They are qualitatively valid for more general preferences that display precautionary motives, and are applicable not only to the explicit tax-and-subsidy policy we model, but also to labor market institutions that smooth out uninsurable shocks and reduce incentives to seek higher expected income. An economy's current account depends on the level and, especially, on the change of such institutions. A market-oriented reform always fosters precautionary savings, and increases future productivity and current consumption to the extent that it encourages efficient labor market mobility and that higher future aggregate income can be anticipated by accessing the financial market.

3.1. Main results

To assess the significance and relative importance of the various channels of interaction, we estimate nonlinear specifications relating changes in institutions and indicators of financial development to current account patterns. Our basic specification implements the theoretical relationship (19), allowing the coefficients of institutional changes to depend on financial development as suggested by the derivations in Section (2.4):

$$CA/GDP_{jt} = f(FinDev)\left(\varphi + \sum_{i=1}^{I} \beta_i \Delta Institution_{ijt} \right) + Controls_{jt} + \varepsilon_{jt} . \qquad (20)$$

Across countries indexed by j and over periods indexed by t, we estimate nonlinear least squares regressions of the current account to GDP ratio on a linear combination of institutional changes interacted with financial development, which also affects the dependent variable directly if φ differs from zero. The control variables, discussed below, will be meant to capture how the time-preference, risk aversion, and risk terms in the first line of (19) may differ across countries and periods.

We measure financial development in terms of deviations from period-specific means of a Loan-to-Value (LTV) ratios time series, constructed from the data collected by Jappelli and Pagano (1996), Catte et al. (2004), and other sources (see Data Appendix), and we model its interaction with reform indicators

$$f(FinDev) = 1 + \gamma FinDev, \ \text{ for } FinDev_{jt} = LTV_{jt} - \frac{1}{J}\sum_{j=1}^{J} LTV_{jt}. \qquad (21)$$

As to reform, a variety of institutional features in reality have effects similar to those illustrated by redistribution in Section 2's model. The interacted term of equation (20) includes changes of several indicators, weighted by coefficients β_i, drawn from the standard CEP-OECD Institutions Data Set compiled at the LSE. Since it appears very hard to assess the extent to which changes in institutions are unexpected 'shocks,' we do not attempt to time and measure discrete 'reforms' (as in Duval, 2008). Our reform variables are based on annual changes of the indicators, interpolated when necessary, and are meant to capture the broad trends that are relevant to consumption and investment processed characterized by lagged and anticipation effects.

We consider three dimensions of relevant regulation: strictness of employment protection legislation, trade union density, and marginal tax rate. These institutions, like the simple redistribution scheme of our theoretical model, interfere with labor markets for purposes of income stabilization and redistribution, presumably at the expense of productive efficiency, in ways that we discuss briefly when commenting the results below. Of course, these and other institutions have a variety of other roles in reality, but it is interesting to assess empirically their association with current accounts, through growth and risk effects, controlling for other potentially relevant factors. The basic specification includes the government budget balance to GDP ratio, to control for the cyclical effects of fiscal policy.[2] We also assess the robustness of the estimates of interest to inclusion of country effects and of time effects, capturing permanent country-specific imbalances

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[2] The theoretical model can be extended to account for the effects of government debt, which can help relax financing constraints. The empirical model could be similarly extended to disentangle government budget balance changes due to cyclical movements, from those reflecting discretionary factors linked to structural reforms.

within the sample period and the impact on the current accounts of OECD countries common external factors.

We expect the main effect of financial development on current accounts to be negative, as relatively easier borrowing tends to worsen the current account even in the absence of other institutional evolution. We define institutional indicators so that larger values are associated with more efficiency and more individual income risk. Our theoretical perspective suggests that β_i coefficients may be positive or negative, depending on whether institutional change has larger effects on the future level or variability of incomes, and that financial development is a crucial determinant of the strength of the relevant effects. Easier access to financial markets for purposes of consumption smoothing and mobility investments should enhance the negative impact of institutional change on current accounts (because easier access to financial markets makes it possible to consume in anticipation of future income growth), and dampen its positive impact (because easier access to financial markets reduces precautionary savings).

We assess the fit of our theoretical perspective on annual data for 19 OECD countries over the period 1980-2003 (see the Data Appendix for definitions and sources; the panel dataset is unbalanced, notably because LTV information for Australia and New Zealand is only available for the very early portion of the time-series dimension).

Table 1 reports the results of estimation by nonlinear least squares of equations (20) and (21). In all columns, which differ according to whether country and time effects are included or not, the estimated coefficients β of the Structural Reform Variables are positive, indicating that deregulation is associated to larger current account surpluses (or smaller deficits), and the interaction with financial development is significant. Time effects absorb much of the variation in Employment Protection indicator, indicating that OECD countries have broadly followed similar reform paths along that dimension.

The results are consistent with theoretical insights regarding the role of the institutions we include in the specification. Less stringent employment protection and lower union density are associated with larger current account surpluses: in theory, employment protection and collective wage setting (proxied by union density) do stabilize labor incomes, and labor market deregulation may well increase the riskiness of labor income streams in ways that are not diversifiable in private financial markets. The marginal tax rate reflects the progressivity of the tax system, which automatically stabilizes incomes, and is also positively associated with current accounts. Financial market development implies that all these relationships between deregulation and current accounts should be less positive, and possibly negative, consistently with the interaction effects estimated in Table 1.

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Thus, the evidence is consistent with a preeminent role, for these countries and periods, of income smoothing rather than income growth as the most important channel of interaction between internal institutions and CA dynamics. The negative estimate of the interaction coefficient γ with Relative LTV sensibly indicates that precautionary behavior is less relevant in better-developed financial markets. Since the maximum positive deviation of Relative LTV from the cross sectional mean is 24 in the sample, the point estimates of γ indicates that the association between flexibility-oriented reforms and the current account is negative for the most financially developed countries and periods.

3.2. Additional controls and specification robustness

Of course, the mechanisms we want to focus on do not capture all determinants of current account dynamics in reality. In Table 1, the coefficient of the government balance to GDP ratio is always positive, capturing cyclical variation in the denominator and/or the effects of fiscal policy shocks. In the empirical literature a number of other mechanisms are brought to bear on the data through the inclusion of various indicators.

The effects of institutional changes on which we focus are arguably more interpretable and structural than the statistically more significant role played, as explanatory variables of current accounts, by income growth and other variables which may themselves be driven by institutional change. Recent analyses characterized empirically the effect of short and long term macroeconomic determinants of external balances in cross-section and panel data for industrial countries (Debelle and Faruqee, 1996) and developing countries (Calderon et al., 2002), as well as the effect of medium term determinants (Chinn and Prasad, 2003). Of course, cyclical indicators, current accounts, and reforms are jointly endogenous, as the likelihood of reforms may be also related to the cycle (Duval, 2008, analyzes relevant empirical regularities). The direction of the relationship is ambiguous, however, as serious crises may trigger reforms but labor market regulation is likely more popular at times of high unemployment.

We refrain from including in our regressions income-related determinants of current account imbalances, such as the domestic output gap and country-specific output growth, which in our framework of analysis are at least partly driven by institutional developments. In the first three columns of Table 2, we do assess the robustness of results from specification (20) to inclusion of demographic and macroeconomic indicators, drawn from the IMF World Economic Outlook and from the World Bank's World Development Indicators online database, that are arguably unrelated to institutional change: external determinants of current account positions, such as changes of terms of trade and real effective exchange rates, and "structural" determinants such as demographics.

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Estimates of the coefficients of institutional development and financial market development indicators are largely unaffected by these additional controls, some of which are significant (also depending on the presence or absence of country and period effects in the three specifications) and yield theoretically sensible point estimates. The annual change in the terms of trade has a positive effect on current account balances, consistently with the Harberger-Laursen-Meltzler effect whereby temporary positive shock to the relative price of exports increase current income more than permanent income, thus improving the current account position (see, for instance, Obstfeld, 1982). The impact of changes in the real effective exchange rate is not significant, as predicted by the intertemporal approach to the current account (see Razin, 1995). Demographics, measured by relative (with respect to the sample) dependency ratios, enter with the expected negative sign unless we include both time and period effects, which in our sample appear to capture most of the variation in relative demographic profiles.

In the remaining columns of Table 2 we further extend the empirical model to assess the relevance of increasing international financial market integration for capital mobility, and hence income convergence (Abiad et al., 2008). Columns 4-6 include the deviation from the cross-sectional mean of gross stocks of foreign portfolio assets plus liability ratio to GDP (data from Lane and Milesi-Ferretti, 2006). This indicator of relative financial openness is not significant and leaves unaffected the point estimate and significance of main and interaction effects of the LTV-based indicator of internal financial development on which our theoretical perspective focuses. As regards the role of convergence dynamics, columns 7-9 extend the specification to test for the "stage of development" hypothesis that growing countries typically import capital, and thus run current account deficits. In the literature (see, Chinn and Prasad, 2003, and their references), this effect is captured by the level of PPP-adjusted GDP per capita in relative terms with respect to the average in the sample. In our sample of fairly uniformly developed OECD countries the size of that variable's coefficient is very close to zero and significant only when country and time effects are not included. Once again, the results of interest are broadly unaffected.

We proceed in Table 3 to assess the robustness of our main estimates along two further dimensions. Columns 1-3 address the issue of whether our reform variables may spuriously capture other unobservable country characteristics. The specifications reported so far are robust to unobservable time invariant heterogeneity when fixed effects are included linearly, so that deviations from country means of the left-hand-side variable are related to deviations from country means of the whole multiplicative expression. To the extent that trends towards deregulation are not uniform across countries and across policy instruments, however, time-invariant unobservable heterogeneity

may still bias estimates of interaction effects (Bassanini and Duval, 2009). We check for the impact of country specific characteristics on deregulation patterns by including country effects α_j in the interaction term in (21), so that $f(FinDev) = 1 + \tilde{\alpha}_j + \gamma \widetilde{LTV}_{jt}$ where $\tilde{\alpha}_j = \alpha_j - \frac{1}{J}\sum_{j=1}^{J} \alpha_j$. Allowing the relationship between institutional changes and current accounts to differ systematically across countries reduces the significance of the estimates of interest, not surprisingly in light of the rather short time span available for each country. The very imprecisely estimated coefficients, however, have the same signs as in Table 1 when both country and time effects are included.

To check for the results' robustness to cyclical factors, in columns 4-6 we report results from regressions on non-overlapping time averages of annual observations over five sub-periods including five years each (four in the last one, 2000-2003). While the coefficients are again less precisely estimated for obvious reasons, institutional reform variables and their interaction with financial market development indicators have the same sign as in Table 1.

4. Consumption, productivity, inequality, and reforms

Our results so far document that, in the data, the current accounts of initially highly regulated countries tended to move towards surplus as they tended to relax regulation over the sample period, while countries with initially looser regulation and better financial market access tended to move towards deficit positions. The former countries are prevalently Continental European, the latter Anglo-Saxon, and since these groups of countries differ in many other respects, it is impossible to tell in general whether current account and institutional developments might be jointly and spuriously caused by some observed or unobserved underlying phenomenon. To the extent that institutional variation may be viewed as exogenous, however, it is interesting to assess whether more detailed patterns of consumption, production, and inequality changes across countries are consistent with our theoretical framework.

In this section we explore the empirical relationship between the current account effect of structural reforms and other variables. Our theoretical framework suggests that deregulation should accelerate production growth, and that consumption-to-GDP ratios should be related to the resulting trends by consumption-smoothing channels (mediated by ease of access to internal and external borrowing) and by precautionary savings behavior (mediated by instability of individual labor income streams). It is also an implication of our theory that deregulation, in interaction with financial development, should encourage investment and increase wage dispersion.

To assess the relevance of these theoretical relationships in the available data, we regress the relevant indicators on the summary reforms indicator constructed from the estimates of Table 1:

$$Ref_{jt} = \left(\hat{\varphi} + \sum_{i=1}^{I} \hat{\beta}_i \, \Delta Institution_{ijt}\right)\left(1 + \hat{\gamma}\widetilde{LTV}_{jt}\right).$$

Since consumption, production, investment, and inequality development may depend on time and country characteristics, we include in the regressions the same controls considered in Table 1, and in each case construct the summary reforms indicator using the estimated coefficients $\hat{\varphi}$, $\hat{\beta}_i$, and $\hat{\gamma}$ from the regressions that in Table 1 include the same controls. The resulting slow-moving variable represents the institutions-related component of our countries' current account observations. Imposing that institutional changes' relative weight is determined by estimating specification (20) on highly variable current account data sharpens the message of the data; allowing institutions to enter the specification individually typically yields coefficients that either have the same sign as those reported below, or are insignificant.

As regards consumption, our empirical exercise is related to that performed by Loayza, Schmidt-Hebbel, and Servén (2000), where growth and inflation (as a proxy for uncertainty) are included among the weakly exogenous explanatory variables of private saving rates. Both their and our specifications also control for government savings. We also view growth and uncertainty as key determinants of savings behavior, however we focus on developed countries and, crucially, suppose that income processes are in turn determined by institutional changes which, in our specifications, are directly related to consumption/output ratios. Our reform indicator is constructed so as to become more positive when deregulation increases labor market risk, to an extent that depends on financial market development. Thus, we expect it to be negatively associated with consumption in a sample where reforms tend to bring current accounts towards surplus positions. To see whether this is the case, we run

$$C/GDP_{jt} = \gamma_C Ref_{jt} + \mu_C C/GDP_{j,t-1} + Controls_{jt} + \varepsilon_{jt}$$

In these and the following regressions, the primary government balance is included for consistency with Table 1's regressions (and always enters with the expected sign when it is significant), and lagged dependent variables control for slow and persistent effects of reforms on the phenomena of interest. In light of evidence of rather high persistence, the dynamic biased-corrected panel data specifications may or may not offer a fully reliable assessment of statistical significance. The reforms indicator is also persistent, and we plan to investigate stationarity issues formally in further work. The first three columns of Table 4 confirm that structural reforms, as summarized by the composite institutional trends indicator that by construction maximizes correlation with current

account balances, co-vary negatively (and significantly when country fixed effects are included) with consumption, as implied by precautionary savings motives.

Next, we use per capita production as the dependent variable, and run

$$GDPpc_{jt} = \gamma_Y Ref_{jt} + \mu_Y GDPpc_{j,t-1} + Controls_{jt} + \varepsilon_{jt},$$

aiming to assess the effects of institutional developments on relative production dynamics. Columns 4-6 show that the coefficient of our aggregate reform variable is significantly positive and robust to the inclusion of fixed effects.[3]

In the data, GDP per capita reflects capital accumulation as well as the productivity effects modeled in Section 2 in terms of labor mobility incentives. Multifactor productivity growth rates (MFP) are available since 1985. When we regress them on the summary reforms indicator,

$$MFP_{jt} = \gamma_Y Ref_{jt} + Controls_{jt} + \varepsilon_{jt},$$

the results (in columns 7-9 of Table 4) indicate that, even though in theory regulation might offset market incompleteness and foster productivity, the negative effects of regulation on expected rewards from factor reallocation are empirically dominant.

The remaining element of current account dynamics (besides the government balance, controlled for in all regressions) is the country's investment rate. Our model only features worker mobility investments, but it would be straightforward to extend it to physical investments: since future income of non-labor factors in the model is higher in less regulated labor markets, endogenous supply of such factors would increase upon deregulation. To assess whether capital is indeed attracted to less regulated economies, we regress national income account measures of investment, available only for a subset of our panel's countries on our reforms indicators. Results from the specification

$$I/GDP_{jt} = \gamma_I Ref_{jt} + \mu_I I/GDP_{j,t-1} + Controls_{jt} + \varepsilon_{jt},$$

are reported in columns 10-12 of the Table. The coefficient of the summary reforms indicator is positive, indicating that deregulation is associated with more investment, but insignificant or negative when country and time effects are included. Finding that our reform-trend indicator is more robustly related to country-level GDP growth than to physical investment corroborates our

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[3] GDP per capita is deflated by the Consumer Price Index, to stress the impact of structural reforms on domestic variables; using the GDP per capita measure based on PPP would slightly decrease the significant of the coefficient in the specification with no fixed effect only.

modeling framework's focus on labor mobility choices and is in line with Nicoletti and Scarpetta's (2003) results on the productivity effects of structural reforms.

The results of Table 4 confirm that all components of the current account balance respond to reforms in ways consistent with our theoretical framework. Next, we seek more direct evidence of the risk-based mechanism that links reforms, especially when financial market access is limited, to lower rather than higher consumption.

In columns 1-3 of Table 5 we run regression specifications similar to those of Table 4 for a measure of within-country earnings inequality: the ratio of the 90th percentile of earnings to the median,[4] available at yearly frequency for the 1980-2000 period. If deregulation depresses aggregate consumption because it increases idiosyncratic risk, at least part of its effects on income instability should be detectable in the dispersion of ex-post income levels. We run regressions in the form

$$Ineq_{jt} = \gamma_Q Ref_{jt} + \mu_Q Ineq_{j,t-1} + Controls_{jt} + \varepsilon_{jt}$$

Consistently with the results of Koeniger, Leonardi, and Nunziata (2007), and with our theoretical perspective, there is a significantly positive relationship between our current-account-based measure of deregulation trends and changes of country-specific earnings inequality. The unitary coefficient of lagged inequality in the pooled OLS regression of column 1 gives evidence of very high persistence; the dynamic panel data specifications of columns 2 and 3 offer a more reliable estimates. In columns 4 and 5 we explore the relationship between earnings inequality levels (controlling for country effects) and an indicator of institutional configuration levels obtained by cumulating country-specific reforms indicators: the regression, specified as

$$Ineq_{jt} = \gamma_Q \sum_{y=1980}^{t} Ref_{yj} + Controls_{jt} + \varepsilon_{jt}$$

confirms that our indicator is positively related to earnings inequality, although the imprecisely estimated coefficient is significant only in the specifications of columns 3 and 4.

Finally, we assess whether the savings impact of reforms may work through variability of aggregate (rather than idiosyncratic) income. While theoretically possible, this is not empirically plausible: the theory and evidence in Kent et al. (2005) and their references suggest that flexibility-oriented reforms, including financial liberalization and indirect measures of labor market deregulation, have

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[4] The definition of earnings may be different across countries, in ways that may or may not be appropriately controlled by fixed effects. The regression needs to be run on net earnings, because taxes have different implications for gross and net wage inequality in Section 2's model. The source does not specify whether net or gross earnings are used in computing the indicator.

contributed to the "great moderation" of country-level output fluctuations over our sample period. In Table 5, columns 6-10 assess whether the same finding holds in our data, justifying our focus on within-country income distribution and idiosyncratic risk, rather than on responses to country-level shocks, as the channel through which deregulation influences precautionary motives.

As a standard measure of output instability we compute 5-year standard deviations of output growth, computed on the same non-overlapping windows as in Table 3. In columns 6-8 of Table 5 we document its relationship to reforms using the same specification as in Table 4, regressing the output instability measure on 5-year averaged observations of our summary indicator of reforms, computed on the basis of the estimates in the relevant columns of Table 3. Dynamic panel estimation does not detect any evidence of a significantly positive relationship between reforms and output instability, controlling for the latter's lagged level. In columns 9 and 10, using the same specification as in columns 4 and 5, we find that the relationship between output instability and cumulative reform processes is negative, or insignificantly positive when period effects are included. This weak evidence of a negative relationship between reforms and aggregate output stability is consistent with the findings of Kent et al. (2005), and with our theoretical framework: since deregulation seems to have fostered income stability at the aggregate level, precautionary savings by each country's representative agent (under perfect within-country risk-sharing) could not rationalize the positive relationship between current accounts and labor market flexibility.

5. Conclusion

Our regression results on a sample of 19 OECD countries observed over the 1980-2003 period offer an interesting gauge of the contrasting policy-relevant effects of institutional change on the overall level and distribution of income. In theory, institutions meant to reduce risk and even out earnings inequality also reduce production efficiency. In the data, efficiency-oriented reforms that improve expectations of productivity growth tend to bring current accounts into surplus, through the precautionary-savings effects of higher uninsurable risk, to an extent that depends on financial development.

The one we propose is not the only possible and plausible interpretation of the empirical relationships we detect. As regards theoretical channels, for example, increasingly flexible market relationships may shift purchasing power towards individuals with higher saving propensities. As regards empirical evidence, a causal interpretation of regression results is admittedly difficult, because institutional and structural dynamics are not independent of each other. In the data, reforms appear to be associated with lower consumption ratios, driven by stronger precautionary motives, and faster production growth. In theory, taking at face value the model with negative exponential

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preferences, reforms reduce the representative agent's welfare when their consumption effect, all else equal, is negative. Of course, however, the exogenous changes that trigger reforms may also influence risk and productivity for given policies. Further work could explore the exogenous component of international openness as a plausible shifter of the environment in which policy is made, along the lines of Bertola and Lo Prete (2009).

While it does not appear possible reliably to detect and disentangle such high-order mechanisms in the data, the relationships we uncover between imperfectly synchronized reforms, net income inequality, and aggregate investment and growth rates may have contributed to the development of global imbalances. The recent financial crisis has undoubtedly reduced ease of borrowing, and may well trigger some re-regulation of labor and product markets. Extrapolating our results, countries engaged in such institutional restructuring should experience larger *ceteris paribus* current account deficits and slower growth. This could, in combination with possibly restricted international economic integration, help interpret the evolution of the global economy in coming years.

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DATA APPENDIX

The dataset compiled for this paper includes structural reform indicators and macroeconomic variables for 19 OECD countries, from 1981 to 2003. The countries in the sample are: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal , Spain, Sweden , United Kingdom, United States.

Structural Reform Variables. Information on the evolution of labour market institutions and tax rates is drawn from the CEP-OECD Institutions Data Set, compiled by LSE (issue: September 2006). Reform variables are computed as the annual change in the institutional indicators of interest, and measured so that an increase in the rate of change is associated with more efficiency and more individual income risk.

Employment Protection Legislation ("epl" in the CEP-OECD database). The EPL indicator indexes the strictness of mandatory measures that regulate hiring and firing. Its time series is built on the basis of data from the OECD labour market statistics database and from Blanchard and Wolfers (2000), interpolated and readjusted in mean.

Trade Union Density ("udnet_vis" in the CEP-OECD database). Union density is computed as the percentage of wage-earners who are members of trade unions. Values refer to administrative and survey information available in the OECD labour market statistics database, where administrative information for the EU countries refers to the so-called Visser's version.

Marginal Tax Rates ("sing1a" "sing2a" "sing3a" sing4a" in the CEP-OECD database). Data on taxation are from the OECD Taxing Wage Statistics and from the series computed by Faggio and Bentil. The marginal tax rate series in this dataset is computed as the un-weighted average of tax rates paid by a single person on the basis of "total tax payment less cash transfers" rates over four family types.

Financial Development Indicators. Financial development indicators, in level, are computed as deviations from the sample average.

Loan-to-Value ratios. Data refer to the maximum LTV ratios, reported by the OECD Economic Study by Catte et al. (2004), Jappelli and Pagano (1994), and various sources adding information on countries not accounted for by the OECD, namely: Canada (Canada Mortgage and Housing Corporation), Japan (Standard & Poor's Reports), and the USA (Millennial Housing Commission). The time series is built on authors' calculation according to the following compilation strategy: when yearly observations were missing, data have been interpolated; when data referred to a 5 (or more) sub-period average, the average value has been assigned to the mid year in the sub-period, and then interpolated; for years before (after) the first (last) observation available no change has been assumed, thus assigning the value recorded in the first (last) year of observation back (up) to all years since the starting (ending) point in the dataset.

Financial Openness. This indicator corresponds to the gross stocks of foreign portfolio assets plus liability ratio to GDP, based on data by Lane and Milesi-Ferretti (2006).

Macroeconomic Variables. Macroeconomic variables used in Tables 1 to 3 are drawn by the IMF World Economic Outlook (IMF-WEO), April 2008 issue, and by the World Bank's World Development Indicators online database (WB-WDI), April 2009 issue.

Current Account/GDP. Current account balance as a percentage of GDP (IMF-WEO database).
Government Balance/GDP. General government balance as a percentage of GDP (IMF-WEO database).
Terms of Trade. Annual change in the Net barter terms of trade index (WB-WDI database).
Real Effective Exchange Rate. Annual change in real effective exchange rate index (WB-WDI database).
Demographics. Dependency ratios are computed as deviations from the sample average, on the basis of the percentage of total population that ages between 0 and 14 and that ages 65 or more (WB-WDI database).
Relative GDP per capita. Data are computed in relative terms with respect to the sample average, on the basis of the Gross domestic product based on PPP per capita GDP (IMF-WEO database).

Macroeconomic variables in Table 4 and Table 5 are drawn from several data sources.

Consumption share of GDP. Household final consumption expenditure, in current local currency units (WB-WDI database), divided by Population (WB-WDI database), as a share of Gross domestic product per capita, in current prices (WB-WDI database).

GDP per capita, based on CPI. Gross domestic product per capita, in current prices (WB-WDI database), deflated by CPI, data for inflation being averages for the year, based on 2000=100 (WB-WDI database).

Multifactor productivity growth (MFP). Multifactor productivity growth rate (OECD Factbook, 2008).

Investment share of GDP. Investment, percent of GDP (WB-WDI database).

Inequality. Earnings dispersion measured as the ratio of the 90th percentile of earnings to the median ("ed90/50" in the CEP-OECD database, based on data from the OECD labour market statistics database, available for 1980-2000).

Table 1. Structural Reforms and the Current Account

Dependent variable: Current Account/GDP	1	2	3
Structural Reform Variables			
Employment Protection	0.0690	0.0693	0.0118
	2.33	*2.78*	*0.81*
Trade Union Density	0.0533	0.1360	0.1413
	1.15	*2.54*	*2.96*
Marginal Tax Rate	0.0425	0.0302	0.0341
	2.22	*1.62*	*2.73*
Main effect of Financial Development	0.0082	0.0415	0.0109
	3.07	*6.19*	*3.28*
Financial Development interaction			
Relative LTV (linear functional form)	-0.0587	-0.0420	-0.1435
	-2.85	*-5.56*	*-3.73*
Control Variables			
Government Balance/GDP	0.3117	0.2364	0.1952
	5.91	*4.65*	*3.76*
Country effects	no	yes	yes
Period effects	no	no	yes
Number of observations	393	393	393
R2	0.1757	0.5239	0.6251

Notes: Robust t-statistic in italics.

Table 2. Extended specification

Dependent variable: Current Account/GDP	External and demographics controls			Financial Openness			Relative income level		
	1	2	3	4	5	6	7	8	9
Structural Reform Variables									
Employment Protection	0.0313	0.0403	0.0122	0.0391	0.0388	0.0084	0.0224	0.0443	0.0144
	1.39	*2.42*	*0.61*	*2.20*	*2.26*	*0.43*	*1.17*	*2.44*	*0.69*
Trade Union Density	0.0171	0.0738	0.0896	-0.0074	0.0753	0.0912	0.0403	0.0778	0.0908
	0.40	*1.98*	*1.98*	*-0.17*	*1.98*	*1.96*	*1.06*	*2.14*	*2.02*
Marginal Tax Rate	0.0131	-0.0085	0.0051	0.0010	-0.0088	0.0046	0.0137	-0.0081	0.0054
	0.56	*-0.40*	*0.24*	*0.04*	*-0.41*	*0.20*	*0.67*	*-0.37*	*0.25*
Main effect of Financial Development	0.0115	0.0664	0.0449	0.0116	0.0670	0.0456	0.0081	0.0648	0.0447
	3.99	*13.51*	*5.10*	*4.08*	*13.22*	*5.14*	*2.85*	*12.83*	*5.02*
Financial Development interaction									
Relative LTV	-0.0522	-0.0271	-0.0393	-0.0554	-0.0272	-0.0395	-0.0765	-0.0264	-0.0388
	-2.98	*-7.61*	*-4.69*	*-3.01*	*-7.70*	*-4.74*	*-2.62*	*-7.60*	*-4.89*
Relative financial openness				0.3824	-0.0677	-0.1014			
				0.76	*-0.94*	*-1.03*			
Control Variables									
Government Balance/GDP	0.3539	0.1768	0.2139	0.3515	0.1770	0.2141	0.2719	0.1676	0.2118
	6.58	*3.49*	*3.26*	*6.40*	*3.51*	*3.29*	*5.25*	*3.43*	*3.24*
Terms of Trade	0.1148	0.0981	0.1090	0.1167	0.0984	0.1092	0.1122	0.0943	0.1075
	3.34	*2.75*	*2.88*	*3.36*	*2.80*	*2.92*	*3.42*	*2.70*	*2.82*
Real Effective Exchange Rate	-0.0490	-0.0196	-0.0134	-0.0501	-0.0185	-0.0123	-0.0453	-0.0199	-0.0137
	-1.56	*-0.68*	*-0.48*	*-1.57*	*-0.64*	*-0.44*	*-1.41*	*-0.70*	*-0.49*
Demographics	-0.0006	-0.0002	0.0005	-0.0006	-0.0006	0.0000	-0.0004	0.0001	0.0006
	-1.26	*-0.30*	*0.69*	*-1.27*	*-0.73*	*0.02*	*-0.79*	*0.14*	*0.69*
Relative GDP level per capita							0.0000	0.0000	0.0000
							2.69	*1.07*	*0.41*
Country effects	no	yes	yes	no	yes	yes	no	yes	yes
Period effects	no	no	yes	no	no	yes	no	no	yes
Number of observations	309	309	309	309	309	309	309	309	309
R2	0.2440	0.6130	0.6765	0.2455	0.6142	0.6779	0.2730	0.6165	0.6770

Notes: Robust t-statistic in italics.

Table 3. Robustness checks

Dependent variable: Current Account/GDP	Country-specific reform patterns			5-year sub-periods		
	1	2	3	4	5	6
Structural Reform Variables						
Employment Protection	0.0361	0.0737	0.0472	0.2524	0.2009	0.0987
	0.68	*1.32*	*0.99*	*1.85*	*1.90*	*0.91*
Trade Union Density	-0.3648	0.1135	0.0955	0.1085	0.2431	0.3160
	-3.74	*1.33*	*1.06*	*1.11*	*1.61*	*1.92*
Marginal Tax Rate	0.0999	0.0414	0.0291	0.2200	0.1122	0.0735
	2.02	*1.32*	*1.04*	*1.88*	*1.41*	*0.91*
Main effect of Financial Development	0.0476	0.0448	0.0293	0.0112	0.0505	0.0365
	7.52	*6.63*	*3.70*	*2.02*	*4.60*	*2.74*
Financial Development interaction						
Relative LTV	-0.0431	-0.0387	-0.0595	-0.0301	-0.0345	-0.0469
	-6.01	*-5.74*	*-3.61*	*-1.19*	*-4.04*	*-2.94*
Country effects	yes	yes	yes	no	no	no
Control Variables						
Government Balance/GDP	0.2558	0.2463	0.2471	0.3864	0.3546	0.2884
	5.59	*4.65*	*4.48*	*3.11*	*2.97*	*2.27*
Country effects	no	yes	yes	no	yes	yes
Period effects	no	no	yes	no	no	yes
Number of observations	393	393	393	85	85	85
R2	0.5310	0.5926	0.6797	0.2835	0.6960	0.7281

Notes: Robust t-statistic in italics.

Table 4. Relationship of reforms to consumption, growth, and investment

Dependent variable:	Consumption/GDP			GDP per capita, based on CPI			MFP growth			Investment/GDP		
	1	2	3	4	5	6	7	8	9	10	11	12
Summary Reforms indicator from CA/GDP regressions	-0.0568	-0.0899	-0.0912	33.8006	20.3232	21.3711	17.1798	18.7723	24.2905	20.8195	19.6827	-7.3491
	-0.83	*-2.49*	*-2.46*	*3.12*	*2.68*	*2.73*	*1.47*	*2.62*	*3.17*	*1.65*	*1.48*	*-0.67*
Lagged values of dep. variable												
Consumption/GDP, lagged	0.9865	0.9122	0.9306									
	92.86	*47.94*	*49.21*									
GDP per capita, lagged				1.0123	0.9387	0.9434						
				221.26	*76.24*	*74.56*						
Investment/GDP, lagged										0.9093	0.7817	0.7377
										38.44	*16.32*	*12.55*
Control Variables												
Gvt. Balance/GDP	-0.0104	-0.0407	-0.0182	7.3039	10.5815	14.7326	6.0143	3.4588	4.8728	9.0235	11.4629	15.0636
	-0.56	*-3.68*	*-1.38*	*3.53*	*4.67*	*5.22*	*2.32*	*1.00*	*1.21*	*3.43*	*4.01*	*5.07*
Country effects	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Period effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Number of observations	375	375	375	375	375	375	265	265	265	150	150	150

Notes: T-statistic, in italics, are computed on the basis of robust standard errors when using the pooled-OLS estimator (in columns 1,4,7,10) and the fixed-effect estimator (in columns 8, 9), and bootstrap standard errors when using the bias corrected LSDV dynamic panel data estimator (in the remaining columns).
The "Summary reforms indicator" is computed on the basis of the estimates of: Table 1 column (1) in columns (1), (4), and (10); Table 1 column (2) in the specifications including country effects; Table 1 column (4) in the specifications including country and period effects.

Table 5. Relationship between reforms, earnings inequality, and output stability

Dependent variable:	Earnings inequality					5-year standard deviation of output growth				
	1	2	3	4	5	6	7	8	9	10
Summary Reforms indicator from CA/GDP regressions	0.8221 *1.46*	0.3180 *1.58*	0.4023 *1.74*			-0.1884 *-1.56*	-0.0271 *-0.27*	0.0052 *0.06*		
Summary Reforms indicator, cumulated				0.1527 *8.14*	0.0161 *0.30*				-0.0253 *-2.37*	0.0132 *0.81*
Inequality , lagged	1.0152 *47.43*	0.8030 *13.65*	0.6935 *9.20*							
Output instability, lagged						0.1531 *1.24*	0.0472 *0.31*	0.1981 *1.19*		
Control Variables										
Government Balance/GDP	-0.0399 *-0.63*	0.0858 *1.17*	0.0561 *0.63*	0.4117 *4.33*	0.3611 *3.03*	0.0911 *1.31*	-0.0094 *-0.22*	0.0363 *0.70*	0.0342 *0.58*	0.1004 *1.76*
Country effects	no	yes	yes	yes	yes	no	yes	yes	yes	yes
Period effects	no	no	yes	no	yes	no	no	yes	no	yes
Number of observations	163	163	163	194	194	66	66	66	85	85

Notes: T-statistic, in italics, are computed on the basis of robust standard errors when using the pooled-OLS estimator (in columns 1 and 6) and FE estimator (in columns 4, 5, 9 and 10), bootstrap standard errors when using the bias corrected LSDV dynamic panel data estimator (in columns 2, 3, 7 and 8).
The "Summary reforms indicator" is computed on the basis of the estimates of: Table 1 column (1) in columns (1) and (6); Table 1 column (2) in the specifications including country effects; Table 1 column (4) in the specifications including country and period effects.