News from the frontline: An economic diary

By Gilles Saint-Paul

We have considerable incentives to develop economic analysis for the sole purpose of publication in referreed journals. This implies a number of limitations: Focusing on a small set of topics, on which one knows the literature well, follows it, and is acquainted with other economists active on the topic. Choosing a topic which is "hot" and yet leaves room for substantial innovation. Eliminating conjectures, value judgements, and speculation, which eventually reduces the role of economic intuition and creativity. Spending considerable time polishing results and models even though there is no true gain in terms of economic knowledge. Coming up with new tools and models rather than applying existing ones to new problems.

This scientific diary hopes to show that we can also use the existic apparatus to understand a variety of issues and shed light on many current policy debates, without having to go all the way to writing a true scientific contribution for a jounal. Given that there is no obvious outlet for such an "Unidentified Scientific Object" – although Fisher Black wrote a book of casual reading notes, which bears some similarities to my attempt – I leave it on the Internet for now. It allows for regular updating and adding of new features.

02.08.02

Does working time reduction boost measured French total factor productivity growth? In recent data, the U.S. outstrips continental Europe in terms of TFP, but France comes close, with 1.1 % yearly vs. 1.3 % in the US (my source is a recent OECD paper by Scarpetta and others). Now, if the labor input is measured in terms of total employment, clearly reduction in working time reduce measured TFP. As this is not a technical regression, it makes sense to adjust for hours worked, which is what was done in that paper.

So one typically considers total hours worked as the appropriate labor input, i.e. $L = hN$, where h is hours per employed and N the number of employed. If the production function is $Y_t = A_t K_t^{\beta}(h_t N_t)^{1-\beta}$, then TFP growth is measured as

$$TFP = \dot{Y}_t/Y_t - \beta\dot{K}_t/K_t - (1-\beta)\dot{N}_t/N_t - (1-\beta)\dot{h}_t/h_t = \dot{A}_t/A_t,$$

so we do capture the true contribution of technical progress.

But do we get it right? We all know that inframarginal hours worked are more productive than marginal ones. This means slack periods for retail

trade, coffee breaks and useless phone calls for office workers, board meetings for managers, and so on. These are the periods being cut when under pressure. So it is more reasonable to assume that the total labor input is not proportional to individual hours, but rather that thered are decreasing returns to individual hours. We can formalize that by assuming that $L = Nh^{\alpha}$, with $0 < \alpha < 1$. Measured TFP growth then becomes equal to

$$TFP = \dot{A}_t/A_t - (1-\beta)(1-\alpha)\dot{h}_t/h_t,$$

so that in periods where h falls, we tend to overestimate TFP. By how much? Assume h falls by 1 % per year, which is more or less what has been going on in France in the last 5 years, then with $\beta = 0.3$ and $\alpha = 0.5$ we get that 0.35 points of TFP ¨growth are spurious and due to curtailing the least productive hours. French TFP figures would then have to be revised down to 0.75 % a year, which puts it on par or even slightly below its European partners. With a more optimistic $\alpha = 0.7$, the bias is still 0.21 points, putting French TFP at 0.9 % a year.

03.02.02

Will water become more expensive in France? The recent disaster at Vivendi suggests that it could. Most of the debt which was borrowed by Messier from fellow Inspecteurs des Finances at BNP and Société Générale in order to buy overvalued US media and telecom companies was transferred to the water company Vivendi Environnement (VE), the original Compagnie Générale des Eaux. Why? To ensure that the communications giant Vivendi Universal (VU) would be as viable as possible in case of a split with VE. Because VE has huge rents from selling a natural resource in a highly concentrated market, so that bankers who made these dubious loans would feel more secure if it is the debt of VE rather than that of VU. However, many naïve observers say that this debt is actually going to be financed by hikes in the price of water. That is, out of the pocket of French taxpayers, who pay for it in the form of local taxes (and also directly on their water bill). If this view is correct, it makes quite a big difference whether this is the debt of VE or that of VU. In either case, we run the risk of a new Crédit Lyonnais scandal. But having VE bear a large chunk of the debt means that the government bailout will occur more discretely, through a more expensive water.

However, does the view that the price of water will go up make any economic sense? It would not if it were determined on a perfectly competitive market, since a simple portfolio swap between VE and VU has no effect on the structure of costs nor on the demand for water. Nor would it if water were simply priced at a monopoly level: this is determined by a markup on marginal cost. The latter depends on technology and demand. The former depends on the elasticity of demand. None are affected by the firm's financial structure.

Nevertheless, under more complex market structures, VE's debt will indeed mean dearer water. The price of water is probably *negotiated* between Vivendi and local administrations, and the risk of bankruptcy affects the utility's outside option in that bargaining game.

Consider the following simple model: Total gross surplus from the match is M. The local government pays P to Vivendi for water, and gets $M - P$. If the bargain fails, the local government gets zero. Vivendi gets P, but starts from a situation with a negative wealth $W < 0$. If $P + W > 0$, it gets $P + W$. But, if $P + W < 0$, it goes bankrupt and gets zero. Finally, if the match does not operate, it also gets bankrupt and gets zero.

If one had $W > 0$, Vivendi would get $P + W$ always, and its outside option would always be W. The net surplus from the match would always be M, and if Vivendi gets a fraction φ of it, then we have $P = \varphi M$. Clearly, it is unaffected by Vivendi's financial wealth.

However, if $W < 0$, then Vivendi gets zero from participating in the match as long as $P < -W$. If $P > -W$, it gets $P+W$, and its outside option remains equal to zero. The net surplus from the match is thus $M + W$, and Nash bargaining implies that we have $P+W = \varphi(M+W)$,i.e. $P = \varphi M-(1-\varphi)W$. If $M + W < 0$, then the match fails and Vivendi goes bankrupt. If not, then the match continues and the price is higher than if W were positive, and it is higher the more deeply Vivendi is in debt. Finally, the effect of debt on the price is higher, the *lower* Vivendi's bargaining power.

So this bargaining game implies some form of bailout from local communities in the form of higher water prices. Bankruptcy puts a floor on Vivendi's outside option, which helps it to get higher prices.

17.07.02

Should the gasoline tax be floating?

In september 2001, following violent protests from truck drivers against hikes in the price of gasoline, the government bowed to them. Officially, this was presented as a transition from a "fixed" gasoline tax where the consumers pays x euros per liter, to a "floating" system where the tax falls to compensate for increases in the world price of oil.

Of course, no economic consideration prevailed when this decision was made. But, from an economic viewpoint, the question is relevant: should the gasoline tax be fixed or floating? Generically, it has no a priori reason to be fixed, and can be adjusted upwards or downwards in response to the price of oil. To say more, consider the following simple model:

Utility is $u(x)+c-v(\bar{x})$, where x is gasoline consumption, c consumption of other goods, $\bar{x}$ average gasoline consumption in the economy. $v(.)$ is the externality imposed by gasoline consumption on people, in the form of road congestion or pollution. u is concave and v convex.

Let q be the world price of gasoline, 1 the world price of other goods, and $\bar{q}$ be the internal price of gasoline. Let R be income per capita. We assume the gasoline sector is small enough so that q and $\bar{q}$ do not affect R. Finally assume that tax proceeds from gasoline are worth λ to the consumer, with $\lambda \geq 1$. λ is the shadow value of public funds.

Then the policymakes maximizes

$$\lambda x(q-\bar{q}) + u(x) + R - \bar{q}x - v(x),$$

subject to $u'(x) = \bar{q}$, the consumer's first order condition for gasoline consumption.

Optimization implies that the gasoline tax must satisfy

$$\bar{q} - q = -\frac{\lambda - 1}{\lambda} x u''(x) + \frac{1}{\lambda} v'(x)$$

If λ is close to one, then the main motive for taxation is Pigovian, and this formula implies a positive relationship between $\bar{q} - q$ and x. So the system should be "floating" to some extent: the tax should be increased (less than 1 for 1) when the world price falls, and vice-versa. If λ is substantially above one, things are more complicated, but if u'' does not fall with x in absolute value by too much, then the conclusion remains that the system should be floating.

By how much? Assume everything is linear-quadratic, that is:

$u(x) = ax - bx^2/2$,

$v(x) = cx^2/2$

Then the above formula boils down to

$$\bar{q} - q = b\frac{\lambda - 1}{\lambda}x + \frac{1}{\lambda}cx$$

Substituting in the demand curve for gasoline, $x = (a - \bar{q})/b$, we get

$$\bar{q} = \frac{a\left((\lambda - 1) + c/b\right) + q\lambda}{(2\lambda - 1 + c/b)}$$

Thus $\bar{q}$ varies less than one for one with q. The greater λ, and the greater c/b, the lower the coefficient of q, and the more the system should be floating.

Let us briefly calibrate the model, keeping in mind that it is quite unlikely that the huge gasoline taxes prevailing in France are optimal.

Normalizing the world price of gasoline to 1, we get an interior price roughly equal to $\bar{q} = 5$ (yes, about 80 % of your gasoline bill goes to the government). In the case of French gasoline, this roughly means that x is counted in liters and that its price per liter is in units of 0.2 Euros.

The elasticity of demand for gasoline is $\bar{q}/x \cdot dx/d\bar{q} = -\bar{q}/(a - \bar{q})$. In order to maximize our chances that the actual level is about optimal, assume a low elasticity of -0.2, implying $a = 30$. Next, assume the marginal congestion/carbon cost is 20 % of the marginal utility gain, which sounds reasonable. This means that $v'(x)/u'(x) = c/b.(a - \bar{q})/\bar{q} = 5c/b = 0.2$, implying $c/b = 0.2/5 = 0.04$.

For all this to be optimal, λ must be such that the above equation holds, i.e.

$5.(2\lambda - 1 + 0.04) = 30(\lambda - 1 + 0.04) + \lambda$.

This gives $\lambda = 8/7$, which is reasonable after all!

Then the formula for the optimal internal price of gasoline boils down to:

$$\bar{q} = 0.86q + 4.14$$

If q increases by 0.1, i.e. 10 %, i.e. roughly 0.02 Euros, then $\bar{q}$ must increase by only 0.086, implying the tax must fall by 0.014, i.e. 0.0028 Euros. So for each Euro-cent of an increase, the tax must fall by 0.14 Euro-cents, which is quite minute.

The fixed system is not too far from optimality, after all.

25.07.02

Should we stop recycling paper?

A very common view is that paper should be recycled. The argument is simple: if we recycle paper, we cut less trees. Therefore, if we recycle more, we should have more trees. And trees are good, because they fix carbon which otherwise would be in the atmosphere.

The argument is so simple that economists should be suspicious. In fact, a very similar argument is used by non-economists to justify policies that economists find dubious. Consider employment protection legislation. It is often justified on the grounds that if we fire less people, there will be more employment. Clearly, this argument forgets that people will also *hire* fewer people, so that employment need not increase. Similarly, recycling reduces the incentives to *plant* trees for the purpose of producing paper. This has a negative impact on the stock of trees and therefore may have adverse effects on global warming. In fact, the analogy with employment protection goes further in practice than one may think. France has a legal provision called *Plans sociaux* which compels conglomerates considering an employment reduction in some branch to do everything possible to *recycle* its workers in another branch. Just like environmentalists in the case of paper recycling, the employment-conscious policymaker only sees the direct effects of his policies, ignoring its equilibrium effects.

Hence we should be a priori critical of policies imposing or subsidizing paper recycling. Is their general equilibrium really to increase the stock of trees, or could it be that they reduce it? Clearly, in the case of cattle, for example, few people would argue that substitution of fish or vegetable for cattle or any policy which reduces the demand for cattle would increase the stock of cattle. Yet what's the difference between that and paper recycling, which reduces the demand for non recycled paper?

Consider the following simple model. At each point in time the price of paper is equal to p_t,and the flow demand for paper is $x(p_t), x' < 0$. The stock of trees (measured in terms of carbon for simplicity) is given by Q_t, and a fraction μ of them per unit of time becomes mature and can be cut and used for paper, yielding φ units of paper per tree. A fraction θ of paper used is recycled and immediately available.

Consequently, at each point in time, equilibrium in the market for paper implies

$$x(p_t) = \mu\varphi Q_t + \theta x(p_t).$$

At each point in time paper producers plant z_t trees, incurring a cost $c(z_t), c', c'' > 0$. The evolution of Q_t is consequently given by:

$$\dot{Q}_t = z_t - \mu Q_t. \tag{1}$$

Assume paper is produced by a competitive industry, that the total stock of land is H (assumed large enough), that one tree uses one unit of land, and that the alternative use of land is valued at a annuity price equal to ω. Then the equilibrium path of z_t must satisfy the following problem:

$$\max \int_0^{+\infty} e^{-rt} \left[p_t \varphi \mu Q_t - c(z_t) + \omega(H - Q_t) \right] dt,$$

subject to (1).

The Hamiltonian is given by $\mathcal{H} = e^{-rt} \left[p_t \varphi \mu Q_t - c(z_t) + \omega(H - Q_t) \right] + \lambda_t e^{-rt}(z_t - \mu Q_t)$, and the first-order conditions boil down to, using the law of demand

$$\varphi \mu x^{-1} \left[\frac{\varphi \mu Q_t}{1 - \theta} \right] - \omega = -c''(z_t)\dot{z}_t + (r + \mu)c'(z_t)$$

This defines a $\dot{z}_t = 0$ locus which is clearly downward sloping. The economy moves upwards in the (Q, z) plane if it is located above or on the right of this locus (Figure 1). The other equation is the law of motion (1), which defines a linear, upward sloping relationship.

Clearly, an increase in the recycling rate θ shifts the $\dot{z} = 0$ locus downwards. Hence, the equilibrium stock of trees must go down. Competition from recycled paper reduces the current and future price of paper, which reduces the value of planting trees. In equilibrium there must be fewer trees. Indeed, given that there exists a positive steady state relationship $z = \mu Q$, any reduction in z must be matched by a reduction in μ. Consequently, recycling unambiguously increases the stock of carbon in the atmosphere, and reduces the stock of carbon in trees.

Now, an environmentalist would say that the model is biased toward this conclusion, because the total number of trees being cut is equal to μQ_t. Could investors decide to cut less trees than μQ_t? Under the preceding set of assumptions, this would be an economic waste. Provided trees cannot be cut before maturity and provided they become useless after maturity, then for price-takers it is optimal to cut all the available trees at t, unless the price of trees has dropped to zero. In this model, mature trees cannot be stored, contrary to what happens for natural resources.

Would making it more like a natural resource improve the case for recycling? At least in the extreme case where one cannot plant any tree, this would be true, in the sense that a reduction in the price of paper (due to

enhanced recycling) would reduce the cutting rate and thus reduce the rate at which this natural resource is depleted. However, this is a pretty extreme case. And, even in this extreme case, in the long-run the resource is exhausted anyway; recycling therefore has no long-run effect on the stock of carbon in the atmosphere.

Consider a more realistic case where the paper industry can cut less than μQ_t trees, without a loss. Then the evolution equation for Q_t is now given by

$$\dot{Q}_t = z_t - y_t, \tag{2}$$

where $y_t \leq \mu Q_t$ is the cutting rate. The representative paper firm's problem becomes

$$\max \int_0^{+\infty} e^{-rt} \left[p_t \varphi y_t - c(z_t) + \omega(H - Q_t) \right] dt,$$

subject to (2) and to $0 \leq y_t \leq \mu Q_t$.

There are two regimes of interest.

The Hamiltonian is given by $\mathcal{H} = \quad e^{-rt} \left[p_t \varphi y_t - c(z_t) + \omega(H - Q_t) \right] + \lambda_t e^{-rt}(z_t - y_t)$ and there are two relevant regimes.

In regime I, we have $\lambda_t < p_t \varphi$. In this case the shadow value of planted trees is lower than their current paper value, and we cut trees up to the limit: $y_t = \mu Q_t$. The analysis is the same as above.

In regime II, we have $\lambda_t = p_t \varphi$. We are indifferent between cutting a tree and leaving it, and we have $y_t \leq \mu Q_t$. Furthermore, planting is determined by $c'(z_t) = \lambda_t$. Given that $p_t = x^{-1}(\varphi y_t/(1-\theta))$, this regime prevails in the zone where $Q_t \geq \frac{1-\theta}{\varphi \mu} x(\frac{\lambda_t}{\varphi})$. The evolution equation for Q is given by

$$\dot{Q}_t = c'^{-1}(\lambda_t) - \frac{1-\theta}{\varphi} x(\frac{\lambda_t}{\varphi}) \tag{3}$$

The evolution equation for λ is given by

$$-\dot{\lambda}_t + r\lambda_t = -\omega,$$

implying $\dot{\lambda}_t > 0$. In this regime, the price of paper must be appreciating in order to compensate for the opportunity cost ω of leaving a tree uncut. In other words the motive for not cutting all the trees is speculative. Consequently, the steady state cannot be in regime II, meaning that the expected

capital gains which induce people not to cut all available trees must eventually be realized. The phase diagram in the (Q, λ) plane is represented on Figure 2. The saddle path may be in regime II for a while, although this is by no means guaranteed. It will eventually leave it and converge towards a steady state where all available trees are cut. Therefore, it is still true that an increase in θ reduces the long-run stock of trees. However, more recycling may *transitorily* reduce the rate at which the stock of trees falls if the economy is in regime II. *Controlling for* λ, (3) implies that a greater θ increases $\dot{Q}$ (note that $\dot{Q}$ must be negative if the economy is in regime II). If one is not in steady state, but on a convergence path where the stock of trees is currently falling, and if the shadow value of planted trees does not fall too much in response to a boost in θ, then the stock of trees may transitorily be eroded at a lower rate in response to an increase in recycling.

The error made by environmentalists is to treat wood (or virtually everything) as a precious nonrenewable resource. This leads to imposing conservationist policies, often at the cost of economic efficiency and/or individual freedom (for example when it comes to compelling people to sort their garbage). When one recognizes that trees are a form of capital which can be accumulated, then these policies appear as counterproductive.

The same can probably be said about other liberticide policies such as banning ivory trade. The real issue is enforcement of property rights on elephants. Once these property rights are enforced, ivory trade should be encouraged, which will boost the development of elephant farms, and contribute to saving the species. None of the domestic cattle species are endangered in Europe, although some specific breeds are endangered because they are less efficient from an economic viewpoint.

23.09.02

Back from the airport.

I resume this diary, having surfed across a bunch of academic congresses for a few weeks. In Venice I met Jacques Mélitz, who having been put into compulsory retirement at the age of 65, is now teaching in *Scotland.*

A relative of mine, has taught for years in high schools. Her husband let her down ten years ago and she leaves alone. Having devoted some years to take care of her children, and started her professional life a bit late, she has not enough years of contributions to be entitled to a full pension. There was a possibility of working an extra year, which they denied to her at the last minute, after having claimed it could be possible. She could do some part-time work in private schools, but then she would lose her pension.

A private labor contract, which would make it compulsory to work in some states of nature, would be considered as illegal, even if willingfully signed by both parties. People would call it slavery (although footballers have such contracts, with provisions that typically violate their privacy; but if this sort of things occurred to regular people, there would be an outcry).

Similarly, a private insurance contract, which would condition some payments on not working at all, *despite being in need,* would be considered inhuman and made illegal–a reverse form of slavery, equally shocking.

Yet the "Etat de droit" *imposes* such contracts to millions of citizens. I take your money and I will pay it back to you if you fulfill my own conditions.

If there was competition in the provision of pension plans, very few people would accept such conditions; presumably the market would be dominated by plans such that you get the money regardless of whether you continue to work or not. This after all, is none of the provider's business. Their business is to put your money into appropriate assets that yield a sufficient long-term return. How long you work is *your* business.

We know from previous work by Lazear that some firms want to offer a labor contract with compulsory retirement, because for incentive reasons the wage profile's slope exceeds that of productivity; implying that your wage eventually exceeds your marginal product. This leads me to two comments:

–This argument has nothing to do with the conditions under which you get your pension. Furthermore, not all sectors have such incentive problems, and presumably workers in such firms could work elsewhere, or accept jobs with lower monitoring problems in the same firm.

–Second, the argument is weaker if the worker accumulates firm-specific experience; he can then get an upward sloping profile while being paid his marginal product, which makes it unnecessary to impose a compulsory retirement clause.

To conclude, let me quote this masterpiece of overinflated paranoid political correctness, the "Universal declaration of human rights"

"Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment."

Apparently human rights, just like yoghurts or credit cards, have an expiration date. At around 65.

Revealed Preferences.

The abstract of a paper presented at the IEA congress in Lisbon, runs as follows:

ISLAMIC POLITICAL ECONOMY

The budding field of Islamic Political Economy as premised on the epistemological roots of Divine Oneness as explained by the *Qur'an* and the *Sunnah* (guidance of the prophet Mohammed) is explained. Several mainstream economic ideas are thus critically examined and their alternative treatment under Islamic Political Economy is thus expounded. The *process*-oriented process termed in this paper as the *Shuratic* process or the interactive, integrative and evolutionary process (IIE-process) is shown to be central to the methodology of circular causation and continuity model of unified reality in Islamic Political Economy.

Welcome to PC-Land, the Land of Those Who Shall Not be Criticized.

But what hurts most is the next paragraph on the abstract book:

This paper has been refereed and accepted for presentation in the forthcoming World Congress of the International Economic Association in Lisbon, Portugal, September 9-13, 2002, being organized under the chairmanship of Professor Robert Solow, Department of Economics, MIT.

21/01/03

Some clarifications on real interest rates and the cost of capital

A French official pointed out to me recently that economists get it wrong when they look at real interest rates to get an idea of the cost of capital faced by investors. He pointed out that different sectors have different producer prices and argued that, consequently, for the same nominal interest rate, the real interest was higher in the industry, where prices are falling, than in services, where they are rising.

That claim is not correct, but it is equally incorrect to use the general price level to deflate the nominal interest rate, as we all tend to do.

It is perfectly correct to say that if a sector has declining prices it will invest less, but this is not because it faces a higher cost of capital; rather, it is because it faces a lower expected profitability.

So by which inflation rate should the cost of capital be deflated? Economic theory tells us that the cost of capital, which is the right hand side of the equation determining the optimal value of the marginal product of capital is equal to

$$p_K(r + \delta - \dot{p}_K/p_K), \tag{4}$$

where r is the interest rate, δ the depreciation rate, and p_K is the price of capital goods used by the sector or firm we are considering. Thus the appropriate deflator is neither the inflation rate of the general price level nor that of the goods produced by the firm, but that of the capital goods it has to buy in order to install capital.

Note that I did not specify whether this price and r were nominal or real. It can be both, provided it is done in a consistent way. If r is nominal, then $\dot{p}_K$ has to be nominal. If r is real, so has to be $\dot{p}_K$.

So does the industry face a higher cost of capital than services? That would be true if the price of its investment goods fell more rapidly than for the service sector's investment goods. However, if you believe that the service sector uses mostly computers and the industry uses mostly machines, then you probably think that the sector which faces the highest cost of capital is services, because the price of computers is falling very rapidly.

Is the French official plainly wrong, then? Well... I have only discussed the *basic* economic theory. Under this theory's assumption, if I expect my prices to go down in the future, this will not affect my investment today, because I will be able to de-invest at no cost the day my prices have fallen. This does not sound too realistic. In other words, what's missing from the picture are installation costs of capital. These installation costs are taken into account by the so-called "$q-$theory" of investment.

Roughly sepaking, this theory states that the firm maximizes the present discounted value of its profits,

$$\int_0^{+\infty} (p_t F(K_t) - p_{Kt} I_t) e^{-\int_0^t r_u du},$$

where p_t is the price of the good, r_u the instantaneous interest rate, and p_{Kt} the price of capital goods, subject to

$$\dot{K}_t = I_t - \delta K_t - I_t c(I_t/K_t),$$

where the last term represents installation costs. The Hamiltonian is

$$H = (p_t F(K_t) - p_{Kt} I_t) e^{-\int_0^t r_u du} + \lambda_t e^{-\int_0^t r_u du} \left[I_t - \delta K_t - I_t c(I_t/K_t) \right],$$

implying the following first-order conditions:

$$\frac{1}{1 - c(I_t/K_t) - I_t/K_t \cdot c'(I_t/K_t)} = h(\frac{I_t}{K_t}) = q_t = \frac{\lambda_t}{p_{Kt}} \tag{5}$$

and

$$p_t F'(K_t) = \lambda_t (r_t + \delta - \frac{\dot{\lambda}_t}{\lambda_t} - \frac{I_t^2}{K_t^2} c'(\frac{I_t}{K_t}))$$

The left hand side is the marginal value product of capital, so the right-hand side is the cost of capital. It differs from (4) in two main respects. First, and most importantly, instead of p_K, the price of investment goods, we have λ, the *shadow price of installed capital.* These two things differ precisely because there are installation costs of capital. In fact, it worth investing only to the extent that installed capital is worth more than its resale value p_K. This is what equation (5) is telling us: we invest only if $\lambda > p_K$, and more so, the more the gap between the two, as measured by their ratio q, (usually called Tobin's (or Hayashi's) marginal q), is large. Second, the cost of capital must be deflated by a term equal to $\frac{I_t^2}{K_t^2} c'(\frac{I_t}{K_t})$, which captures the fact that with our specification, a larger capital stock reduces installation costs for a given investment rate. This term is unimportant (under some other specifications it would deflate the marginal value product of capital rather than its cost) and can be neglected if I/K is small.

So things now look far more complicated than they used to. Now the proper deflator for the cost of capital is no longer an observable price, but the co-state variable of an optimization problem. However, λ being the marginal

effect of capital on the firm's value, could be proxied by the firm's stock value (this was Tobin's original argument about how the incentive to invest is related to the firm's stock value divided by the replacement cost of its capital). In this case a sector with a falling *stock* value can be said to face a higher cost of capital than a sector with a rising stock value. However all that remains esoterical, in the sense that (5) does not tell us much about how much the firm is currently investing, rather the investment level is determined by (4), where the level of λ intervenes but not its rate of change. Thus, the $q-$theory does not predict that investment depends on a simple, well-defined user cost of capital.

That falling producers prices reduce investment is necessarily true in a long-run sense. Assuming that $F'(K) = AK^{-\beta}$, we can look for a steady state where all variables grow at a constant rate, assuming a constant r, a constant δ, and that p and p_K grow at π_p and π_K respectively. We get that K must grow at

$$g_K = \frac{\pi_p - \pi_K}{\beta},$$

which pins down the investment/capital ratio $z = I/K$ since we must have

$$g_K = (z - \delta - zc(z)).$$

These two equations would also hold absent installation costs: in a balanced growth path, a faster growth rate of producer prices imply a faster growth rate of capital, hence more investment.

It is also true in a dynamic sense, in the context of the $q-$theory just exposed: if p_t is expected to be lower in the future, the current value of q will be lower, and one will invest less. This is because in equilibrium, q must be equal to the net present value of expected future marginal returns to capital.

Nevertheless, these two arguments have nothing to do with the cost of capital, they have to do with profitability.

To summarize, as long as we do not specify the question we are trying to answer when talking about the effect of real interest rates on investment, we can argue endlessly. Saying that "real interest rates are low" does not imply that investment is high in all sectors. It compares current credit conditions to some historical norm. If they improve, then everything else equal Tobin's q will go up and investment will go up everywhere.

Now, let us proceed to another issue. In a monetary union, with inflation differentials, and a common nominal interest rate, will there be more investment in countries with higher inflation? If so, then aggregate demand

would go up, which would increase inflation, etc...in other words, the well known Mundell-Tobin effect could be a dramatic mechanism of instability in a monetary union.

I guess the answer depends on whether investment goods are traded or non traded. If they are traded, then they have a single price in the monetary union, and the cost of capital is not larger in countries with larger inflation. This does not eliminate all the differential in aggregate demand, though, since sectors that produce non traded goods are likely to invest more if their relative price appreciates (but it is not a cost of capital effect). If investment goods are non traded (which is partly true in the case of construction), then the high-inflation country will have a lower cost of capital.

22/01/03

Welfare, labor supply, and wages: lessons from a stupid model.

In recent decades, wages at the bottom of the distribution of income in the US have fallen in real terms, while Americans are working more and more. At the same time, this phenomenon is far less pronounced in continental Europe, where people are working less and less. Many see cultural differences there. I claim that it is more likely to be explained by the greater generosity of the welfare state on this side of the Atlantic (which admittedly deserves an explanation of its own, which could be cultural).

In thinking about this, I found the following oversimplified model rather illuminating. Assume people have the following utility function:

$$u(c, l) = \ln(c - \bar{c}) - e.l, \tag{6}$$

where c is consumption and l labor supply. $\bar{c}$ is the individual's subsistence level and e measures the disutility of effort. Assume next that the government receives a transfer T from the government, and that T is not means-tested. Thus,

$$c = w.l + T, \tag{7}$$

where w is the wage.

The solution to maximizing (6) with respect to (7) is

$$\begin{aligned} l &= \frac{w - e(T - \bar{c})}{ew} \\ &= \frac{1}{e} - \frac{T - \bar{c}}{w}. \end{aligned}$$

It has a property which I really find fascinating: *If the government gives you more than your subsistence level, then your labor supply goes up with your wage* (the substitution effect dominates), *while it goes down if it gives you less* (the income effect dominates).

Assume that European governments are compassionate enough to guarantee $T > \bar{c}$. Then a fall in w will trigger a fall in l, so that people will work less. If in the US $T < \bar{c}$, then a fall in w induces an increase in hours worked. Furthermore, a European will become totally idle as soon as

$$w < e(T - \bar{c}),$$

which is more likely to happen, the lazier the individual, the smaller his needs, the larger the transfer, and the lower the wage. This result may help

the puzzled american tourist understand why Europe's inner cities sidewalks are so crowed on Tuesday afternoons at 3 p.m.

Hence, a reduction in wages for unskilled workers triggers divergent responses between Europe and the US. Furthermore, in the US the increase in unskilled labor supply deepens the initial drop in wages, while in Europe the reduction in unskilled labor supply dampens it. Thus we expect a larger fall in hourly wages in the US than in Europe.

If, within a given group of workers, people differ in their needs $\bar{c}$, inequality in hours worked (and thus in income if these workers are otherwise identical), will be larger, the lower the wage w. A fall in wages induces an increase in hours worked for those most in need, who are those who work the most, and a reduction in hours worked for those with a lower $\bar{c}$. If these people were to choose between higher wages (via say an earned income tax credit) or transfers, those most in need are more likely to favor an increase in wages. To see this, compute indirect utility and note that it is given by

$$u^*(w,T) = \ln(w/e) - 1 + \frac{e(T-\bar{c})}{w}.$$

While $\partial u^*/\partial T = e/w$ does not depend on needs (but would be higher for lazier people), we have

$$\partial u^*/\partial w = 1/w - e(T-\bar{c})/w^2 > 0,$$

which is larger, the larger $\bar{c}$.

25.02.03

People who do not live in this country have no idea of the daily stalinism faced by people like us, academics. Virtually all universities are public and once you have finished your thesis you're supposed to apply to universities as an assistant professor. But before that you must be *allowed* to do so by some central planning committee. Admittedly this is an nth-best solution to prevent lousy universities from producing bad professors and hiring them, as it is unconceivable to close these universities, let them die, prevent them from hiring their own students, give them bad official rankings, discourage students to go there, and so on. Therefore if for whatever reason the central planning committee does not allow you to apply, you are virtually unemployed; you have to leave academia or else go to the limboes of Euro-funded postdocs (meaning expatriation) for a couple of years before ending up in the same situation. You may find a university which considers you good enough for them, no hope: they are *prohibited* from hiring you. But we all know that capitalism and competition are ugly and that the state takes care of people much better, don't we?

This central planning committee is a schizophrenic institution. On the one hand it performs a quality check, meaning that you have a better chance to be approved, everything else equal, if you are better. But, on the other hand, as all French educational institutions, it is egalitarian, and cannot cope with the fact that some doctoral programmes are better than others. So doctors from the worst doctoral programme have the same chance of approval as those from the best one. Which creates an incentive to maintain the bad programmes instead of closing them, and reduces the capacity of the best programmes to attract good students (who end up going to the US).

A graduate of us has recently been denied approval because he has co-authored two papers with his thesis advisor. No matter that we have been hailed by the press as the best economics department in Europe, that it is much harder to enter our programme than other ones. The central planning committee has decided that having written two papers with your advisor makes you unfit to teach undergraduates students for 1,500 Euros a month, regardless of whether your department is the best in Europe or the worst in France.The central planning committee will never recognize that it has to blindly approve all our doctors, for the simple reason that they have been carefully selected and trained, and that we had a much greater incentive for that than the central planning committee, because we bear all the consequences, in terms of our international reputation, of letting a lame duck go to the market. What mechanism makes the central planning committee accountable for the unemployed people it is creating and for its destruction of our efforts to create a world-class doctoral programme?