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## **PRODUCTIVITY NOTES: ONLY FOR POLITICIANS IS PRODUCTIVITY EVERYTHING**

Today's growth debates in government departments from London to Pretoria, from Canberra to Ottawa circulate around productivity. The MPC member Martin Weale has queried recently whether the UK productivity contraction during the crisis will be permanent [Weale 2011]. Business in Canada is alarmed that the country's productivity growth lags behind that of the US [Deloitte 2011]. While there seems to be a shared conviction that productivity is a crucial driver of growth, neither the productivity concept itself nor its impact on growth is entirely clear.

Therefore, the following note will explain the major productivity concepts and their underlying assumptions about growth. These are (1) total factor productivity (TFP), (2) labour productivity, and (3) unit labour cost (ULC). Since most of the underlying assumptions are inadequate for modern economies, policy focus on productivity as precondition for growth is a major red herring in economics. Instead, investment and employment should return into the focus given sluggish growth and persistent unemployment after the recent crisis.

### **1. TOTAL FACTOR PRODUCTIVITY (TFP)**

The concept of TFP was introduced into the Solow-Swan growth model [Solow 1956, Swan 1956] in order to account for growth, which could empirically be assigned neither to labour nor capital inputs:

$$(1) \quad Y = A f(K, L)$$

where  $Y$  is output,

$A$  is total factor productivity,

$K$  is capital,

$L$  is labour.

Hence, output is the function of capital and labour inputs multiplied by some exogenous variable representing productivity increases for all factors.  $A$  is often called the Solow residual, since it is equated to the share of economic expansion not explained by accumulation of traditional production factors (capital, labour, or land). In a hypothetical situation where neither capital nor labour input grew, the resulting growth would be an outcome of productivity improvements alone. The Solow-Swan model is the dominant growth model in conventional economics.

The idea behind the Solow residual is that exogenous productivity improvements in the form of technological change increase the efficiency of labour and capital, yielding over-proportional output growth (relative to inputs). Productivity is exogenous and empirically makes up the bulk of economic growth. As consequence, conventional economic theory cannot explain growth dynamics, assigning them to external determinants, which in the eyes of serious economists such as Friedrich von Hayek must suffer from theoretical impoverishment. Hayek [1929] argued that every exogenous factor introduced into a model had to be explained by a separate theory, exposing the theoretical weakness of the initial model.

Neglecting exogenous determinants endangers theory to turn into banality since structural aspects are pushed aside by ad hoc explanations (often described as exogenous shocks).

Moreover, the assumptions supporting the neoclassical Solow-Swan model are extremely restrictive, as every conventional economist will admit. Perfect competition and the absence of increasing returns to scale are among the problematic assumptions, just to name a few. Any deviation from these assumptions might find its way into the Solow residual by the very nature of the concept. Residuals pick up any influence, which is not accounted for by inputs explicitly considered (labour and capital).

Dropping perfect competition, growth in oligopolistic sectors might be wrongly interpreted as productivity improvements while in fact it is the manifestation of pricing power. Allowing for increasing returns to scale might show that productivity advances are embedded in investment like suggested by Nicholas Kaldor [1989] rather than exogenous. Companies do not merely invest to replace wear and tear or to expand

when reaching full capacity. Often firms invest in new equipment when more advanced technology is available, making current production techniques out-dated. The idea that productivity is part of investment has not been popular with conventional economists because it makes measurement practically impossible. How to disentangle productivity-enhancing from output-expanding effects of capital investment?

An alternative view to investment-embedded technology change is the concept of learning. Here increases in productivity originate from rising skill and ability of the labour force. This could be a result of increasing educational achievement as argued by New Endogenous Growth proponents but is more likely an outcome of on the job learning and practical experience. Learning by doing has also been put forward by Kaldor [1989] (as source of increasing returns to scale) but it was Theodor Paul Wright [1936] who introduced learning curves into industrial production. He described the acceleration of plane manufacturing due to learning and productivity gains by the labour force.

## 2. LABOUR PRODUCTIVITY

Since the origins of TFP are poorly explained, policy advice would be at best limited, at worst impossible. Labour productivity is seemingly a more adequate tool to be used by policy makers since it tries to measure the efficiency of workers. Nevertheless, the concept is also ambiguous at closer examination. Labour productivity can be defined as output per worker:

$$(2) \quad \textit{Labour productivity} = \textit{Output} / \textit{Total number of workers employed}^1$$

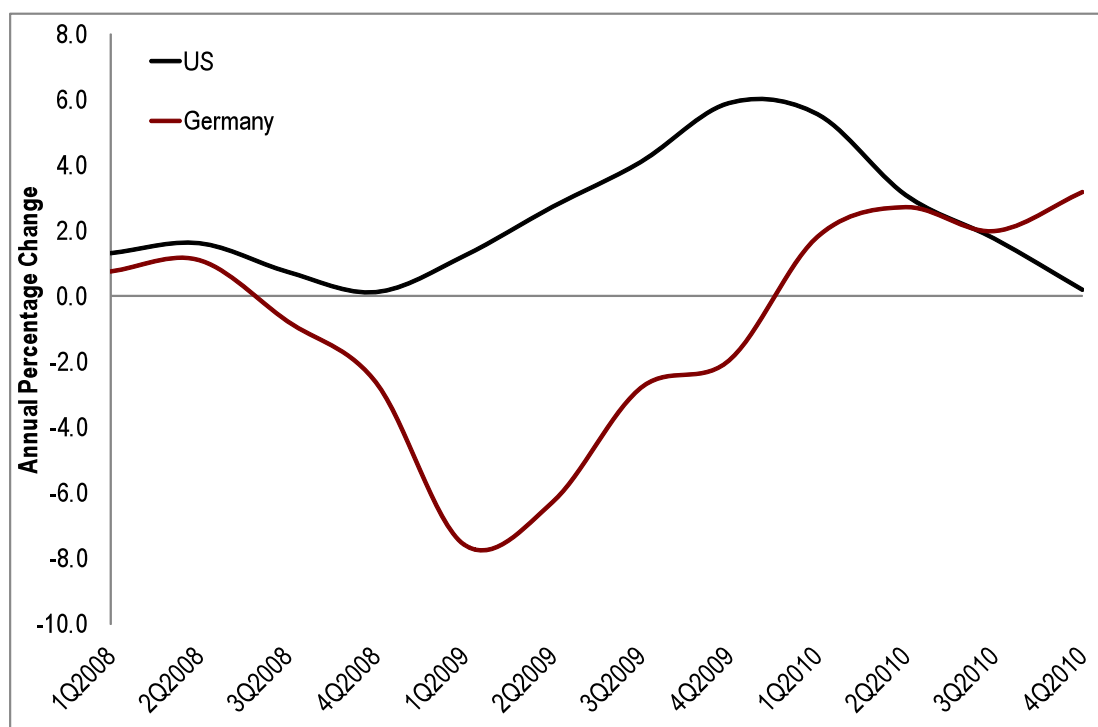
In the case of (2) firing workers will lead to higher levels of productivity, while employing people will reduce it. This explains why labour productivity increased during the recent crisis in the US, whereas German productivity slumped since workers were retained on short-term working schemes (see *chart 1*). It could be

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<sup>1</sup> Sometimes labour productivity is also measured as output-to-total hours worked. There might be a discrepancy between this measure and the one in (2) in sectors where short-time working schemes like the 35-hour workweek in France are introduced. Hence, it is possible that productivity is high given this alternative measure while it appears low using measure (2). This illustrates once again that productivity measures are not unambiguous.

argued that Germany managed to preserve skills and purchasing power despite short-term declines in productivity because of its labour market policies. The US on the other hand experienced a once-off boost in productivity but struggles with high and persistent unemployment as consequence, while Germany recently managed to reduce its unemployment rate to a historical low.

**Chart 1. Changes in German and US labour productivity, 2008-2010**



Source: Author's own calculations based on data by EIU, EuroStat, and BLS.

These examples illustrate that the labour productivity concept only illuminates part of the growth story. It depicts how efficiently employed labour is used. It does not account for the labour force as a whole, which apart from primary resources, is in conventional economics the main factor endowment a nation possesses. Hence, productivity assesses the status quo but does not consider the potential of a nation. Unemployed labour is a wasted resource. Therefore, a productivity measure increasing because of crisis-related labour shedding must be misleading.

Generally, the calculation of labour productivity appears meaningless since it typically refers to the ratio of total GDP to workers employed (2) or to hours worked (see *footnote 1*). Hence, intensified investment effort would be interpreted as rising labour productivity except if matched with identical labour force expansion. This result is an outcome of the underlying neoclassical Solow model assuming that increases in labour and capital inputs in the economy as a whole are gradual over time and balanced between the two factors. In reality this is hardly the case since investment projects are not simply undertaken to match wear and tear. Especially large projects such as infrastructure investment are lumpy and not likely to be accompanied by an identical rise in employment because capital-intensive production techniques are often prevalent. As consequence output, to a lesser extent employment, and therefore GDP per worker employed all rise. For economists who have a thorough understanding of the workings behind the business cycle such as Michał Kalecki [1954] this is not surprising, since they identify investment as driving growth. Productivity rises as side effect of increased output through intensified investment. This interpretation is also coherent with learning curves [Wright 1936] and Kaldor's [1989] dynamic competitive advantage. The more often a product is manufactured the faster and more efficient is the labour force in the production process. However, this productivity gain is only achieved once demand accelerates e.g. through higher investment activity. Therefore, those countries that managed to increase productivity while creating large amounts of employment have done so due to high and accelerating investment levels (see *chart 2*). While investment levels as a share of the GDP have been declining gradually in advanced economies, the sharp fall between 2000 and 2010 is a consequence of the recent crisis, illustrating that these economies have not recovered yet.



## Chart 2. Productivity, employment, and investment indicators for selected economies

	Increase in labour productivity 2000-2010 in %	Change in employment 2000-2010 ('000)	As % of population	Investment as % of GDP	Change in investment 2000-2010 (% points)
Brazil	10.9	18331	16.4	19.3	1.0
China	170.2	65421	7.7	48.2	13.0
India	65.9	70973	11.5	36.8	12.5
Germany	5.4	2257	3.6	17.3	-5.0
UK	9.4	1669	3.9	15.0	-2.6
US	16.2	5649	2.8	15.8	-5.0

Source: ILO, IMF.

The residual nature of productivity is to some extent justified since it is a by-product of economic growth. A problem arises when the direction of causality is confused. Today, policy makers, business and popular knowledge assume that heightening productivity is a pre-condition for growth. This explains why productivity measures are so widely debated. The goal is to increase labour productivity, believing that growth will follow. Holding output constant productivity will only grow given (2) if employment falls. This situation is interpreted as more efficient labour utilisation. Alternatively, labour can be introduced into the productivity equation as measured by the wage bill rather than total workers employed (or total hours worked), leading us to the concept of unit labour cost (ULC). Here, a reduction of the wage bill without a change in output is interpreted as productivity boost.

### 3. UNIT LABOUR COST (ULC)

Unit labour cost (ULC) measures the average cost of labour per unit of output:

$$(3) \quad \text{Unit labour cost} = \text{Wage bill} / \text{Output}$$

According to the OECD, ULC can be interpreted as “direct link between productivity and the cost of labour used in generating output. A rise in an economy’s unit labour costs represents an increased reward for labour’s contribution to output. However, a

rise in labour costs higher than the rise in labour productivity may be a threat to an economy's cost competitiveness" [OECD 2011].

Theoretically, rising ULC could be a manifestation of increasing labour productivity if high-tech production is expanding, utilising more high-skilled labour for instance. Dual sector growth models such as Arthur Lewis's one [1954] describe this process as desirable absorption of surplus labour and development. Here, labour possesses homogenous skills, making upward wage pressures an outcome of labour shortage due to full employment.

In practice, rising ULC is often interpreted as alarming, eroding the price competitiveness of a nation. In fact, Lewis [1954] admitted that development might be slowed if wages increase prematurely (e.g. due to trade union power) leaving a large share of the population unemployed. Other non-conventional economists such as Richard M. Goodwin [1967] introduced rising ULC as source of economic instability into growth and business cycle analysis. In Goodwin's growth model high employment levels lead to wage inflation, which eats into capitalists' profit, slowing down investment and growth. Subdued economic activity reduces the employment-to-population ratio again, easing wage pressures. An acceleration of economic activity in the model is once again possible given lower wage levels.

Despite not figuring in today's economic mainstream, the two models described illustrate the preoccupation of policy makers and business with ULC. While business tends to lobby for low wage levels to enlarge the profit share, policy makers assume an automatic transformation of profits into investment. In modern economies profit is not fully channelled into productive investment creating new jobs, as is the case in Goodwin's or dual sector models. Financial investment is one alternative destination for profit, which has a negligible effect on job creation as already pointed out by John Maynard Keynes [1936]. Therefore, as *chart 2* shows modern (advanced) economies can experience productivity increases despite slumping investment and moderate job creation.

Not accounting for employment levels and unemployed/wasted labour resources, the productivity concept does not consider the possibility of deficient demand. Reducing wages and/or employment boosts productivity measures once off, subsequently

reducing output since domestic demand shrinks because of the declining wage bill. Export-oriented economies like Germany can deal with deficient demand originating from low wage levels and lacking wage growth through amassing trade surpluses. However, financial-sector-oriented markets with poor export abilities such as the UK and the US feel the effects of deficient demand more strongly in low growth and high unemployment rates.

#### 4. CONCLUSION

This article argues that the policy focus on productivity in times of low investment growth combined with high and persistent unemployment is misguided. Productivity measures are ambiguous and unmeaning for policy formulation. They do not identify the correct causal directions and relationships between economic variables. A reorientation towards employment creation is therefore necessary instead of the current productivity debate, following “some academic scribbler of a few years back” [Keynes 1936, p. 383].





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