

The (negative) impact of supply-side labour market reforms on productivity: an overview of the evidence¹

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In spite of impressive stories about artificial intelligence or *Industry 4.0*, the USA, Japan and Western Europe experience a severe productivity crisis since about 2005. This article fills a gap in recent attempts at understanding the productivity crisis, arguing that there is a negative impact of supply-side labour market reforms on innovation and productivity. The negative impact of more flexible labour relations is significant in medium-high and high-tech sectors with a high ‘cumulateness’ of knowledge, that is if the historical accumulation of firm-specific and often tacit knowledge is important for innovative competencies. In low-tech sectors as well as for high-tech entrepreneurship, where cumulateness of knowledge is low, there is little or no effect.

Key words: Varieties of capitalism, Structural reforms of labour markets, Innovation, Productivity crisis

JEL classifications: J53, K31, O31

1. Introduction: a labour productivity crisis

Recently the [OECD \(2015\)](#) and Brookings (e.g. [Bailey and Montalbano, 2016](#)) showed concern about low growth of labour productivity and of total factor productivity in the OECD area since about 2005. While their reports are valuable in that they describe the productivity crisis in some detail, their attempts at explaining it are rather disappointing. In Section 2, this article gives a brief assessment of five candidate explanations. These relate to possible mismeasurement of productivity in the age of IT, low investment, an exhaustion of technological opportunities, a shift of economic activities from manufacturing to services and the emergence of ‘superstar’ firms that

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seem to monopolise their knowledge rather successfully, which makes it hard for lag-gard firms to raise their productivity through imitation.

Figure 1 shows long run growth rates of labour productivity (i.e. GDP per working hour) in the USA, Japan and Western Europe. During the *Golden Age of Capitalism* after World War II, we see high growth rates, followed by a tough decline in 1970s. The latter has also been interpreted as the fading of a long post-war Kondratieff up-swing (Kleinknecht and Van der Panne, 2008). From 1970s onwards, growth rates in Japan and Europe still tend to be well above 2% per year, but are persistently lower in the USA. After 1995, however, US productivity performance resumes remarkably which has been ascribed to a successful IT sector (Acemoglu et al., 2014; Bailey and

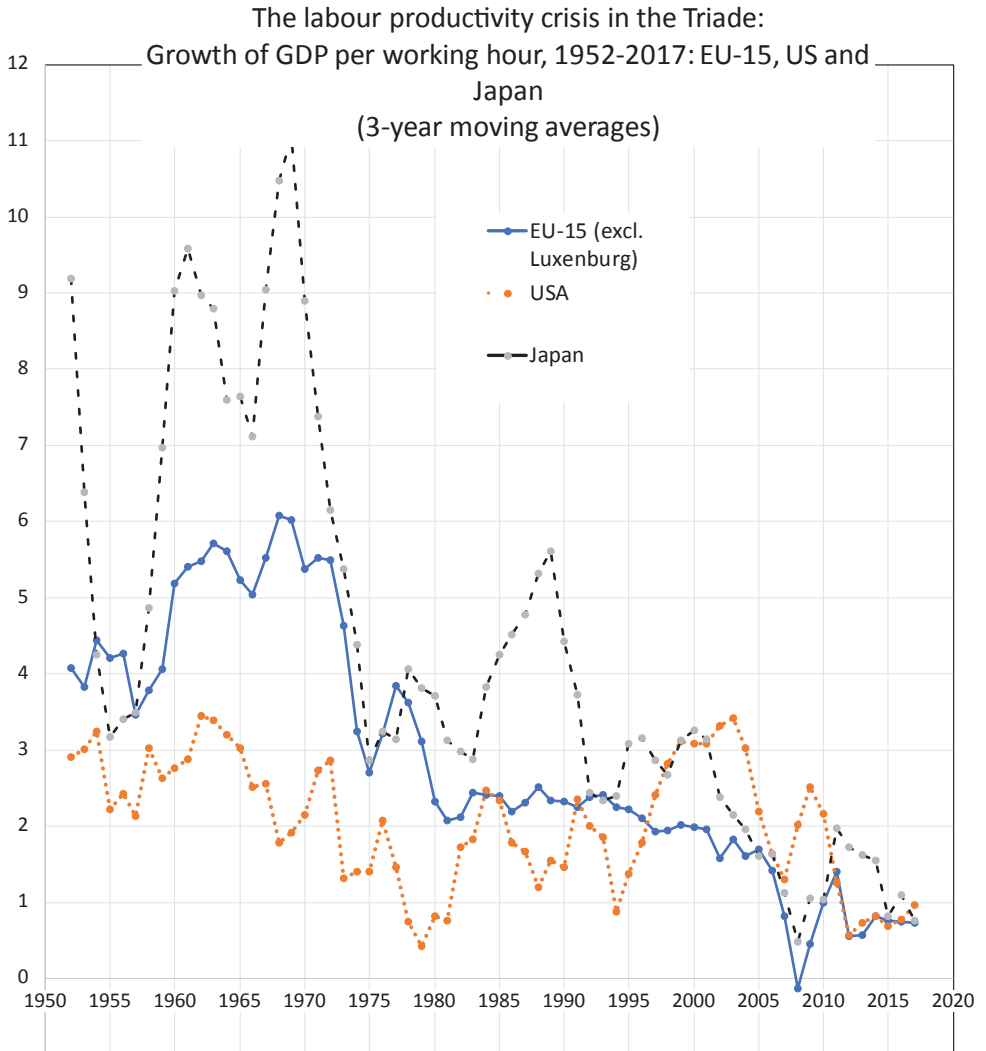


Fig. 1. *The labour productivity crisis in the Triade. Growth of GDP per working hour, 1952–2017: EU-15, USA and Japan (3-year moving averages).*

Data source: The Conference Board, Total Economy Database (TCB adjusted).

Bosworth, 2014). The renewed decline of US productivity growth around 2005 has been interpreted as signalling an exhaustion of the US IT boom (Gordon, 2016).

As is obvious from the logic of the National Accounts system, a declining growth of GDP per working hour implies that less National Income can be distributed (extra) between capital, labour and government. This reduces options for solving distributional conflicts, and it is no good message against the background of an ageing population in many countries. Moreover, given that supply-side economics brought about a more unequal distribution of income (e.g. Stiglitz, 2012), the productivity slowdown is likely to result not only in increased pressures towards cutting public sector budgets, but also in downward pressure on wages, probably most felt in the lower ranges of the earnings distribution.

This article is structured as follows: Section 2 discusses attempts at explaining the productivity slowdown after 2005. There is strong evidence that the productivity crisis is real and cannot be ascribed to statistical mismeasurement. Section 3 discusses theoretical arguments of how and why supply-side labour market reforms can harm innovation and productivity. A key argument is that the negative impact of flexible labour on productivity is significant in industries where the long-run accumulation of firm-specific and tacit knowledge is important for innovative competencies. As such knowledge tends to be 'embodied' in people, high rates of labour turnover make knowledge accumulation difficult. In the remainder of this article, the latter industries will be referred to as 'high cumulateness' or 'Schumpeter-II' industries. Flexible labour, however, tends to be insignificant in sectors in which the 'cumulateness' of knowledge is low. This holds mainly for low-technology industries as well as for (high-tech) industries in which entrepreneurial garage business (i.e. a 'Schumpeter-I innovation model') is dominant. The theoretical rationale is that the latter industries rely more on general knowledge rather than on historically accumulated and firm-specific knowledge for innovation.

Section 4 discusses alternative views by supply-siders. Section 5 reviews empirical evidence, suggesting that past research suffered from an omitted variable bias, that is from not controlling for the dominant innovation model in a sector. In other words, there was no control for whether knowledge required for innovation has a high or low degree of 'cumulateness'. Section 6 concludes by discussing implications for economic theory and policy, emphasising that there are a number of trade-offs between (static) Walrasian and (dynamic) Schumpeterian efficiency: What is good for an efficient allocation of scarce resources can be counter-productive to innovation that makes resources less scarce.

2. Attempts at explaining the productivity crisis

This section briefly addresses five issues that emerged in recent discussions of the productivity crisis, that is (i) measurement issues, (ii) low investment, (iii) exhaustion of technological opportunities, (iv) structural change towards services and (v) a growing divergence of productivity growth between 'superstars' and laggards.

2.1 Is it a measurement problem?

After the supply-side turn in economics in 1970s, supply-siders made some progress in deregulating factor markets and in privatising public services, in changing

the income distribution, in weakening trade unions or in sobering the welfare state. In general, progress has been more rapid in Anglo-Saxon countries (e.g. USA, UK, Canada, New Zealand, Australia) and less so in Old Europe or Japan (Albert, 1992; Hall and Soskice, 2001). Supply-siders expected of course that, to the degree that their reforms were realised, the economy should become more ‘dynamic’, implying that innovation and productivity should prosper rather than decline. If intuition and facts do not match, the first question that comes to one’s mind is: are the facts correct? Do statisticians measure productivity adequately? Is the productivity crisis real or is it a statistical artefact?

This can be brought down to one key question: Could it be that, in the IT age, consumers enjoy much higher consumer surpluses compared to previous periods? In other words, could it be that most of the welfare gains from IT are not appropriated by producers, but by users, and thus are not measured as productivity gains? (Hartwig and Krämer, 2017). The coincidence of quality increases and declining prices of IT hardware and software since 1980s is somehow suggestive here. Moreover, a number of products are given away for free (e.g. Gmail, Skype, Wikipedia). As far as such free services replace previously paid goods or services (e.g. subscription fees or printed lexica), their free distribution might actually *reduce* measured productivity, in spite of substantial welfare gains for their users. There are three counter arguments to this.

First, the weight of free IT services in National Product is too small to have a significant impact on aggregate productivity figures (Byrne *et al.*, 2016; Hartwig and Krämer, 2017).

Second, even if it were true that undercounting of productivity growth is more serious with respect to IT when compared to older technologies, there remains the problem that we have to explain why productivity growth declined *after 2005*. It appears hard to make the case that hidden (unmeasured) quality improvements and/or higher consumer surpluses would apply to the post-2005 period, but *not* to IT in the years before. Byrne *et al.* (2016) argue that rather the opposite may hold, at least in the USA. Observations about diminishing returns to IT by Gordon (2016) and of the strongly declining impact of IT on productivity after 2005 (Cette *et al.*, 2015), make it indeed plausible that underestimation of productivity could have been larger before than after 2005.

Third, Syverson (2017) demonstrates that differences in productivity growth across countries are *not* related to inter-country differences in either IT production or IT use, which further weakens the argument that mismeasurement of IT goods and services could explain the decline in measured productivity growth. In conclusion, the productivity crisis is not a statistical artefact, but real.

2.2 *Is it the by-product of a balance sheet recession?*

Analysing the long Japanese stagnation from 1990 to today, Koo (2011) developed the hypothesis of a balance sheet recession. In his view, the bursting of speculative bubbles can be followed by long stagnation periods. After the crash, as assets prices decline, attempts to compensate for losses from asset price deflation result in increased savings, trying to repair balance sheets. While higher savings are rational at micro-level, they can be counterproductive at macro-level as we face the problem of a Keynesian savings paradox that can lead to longer periods of stagnation (Koo, 2011). This is consistent

with historical observations by [Reinhart and Rogoff \(2009\)](#) who also warn against longer recessions that can follow the implosion of major financial bubbles.

At this moment, it remains to be seen whether a scenario of long-run slow growth in Japanese style is realistic for the USA or Europe. It could well be that Quantitative Easing by Central Banks will unleash the build-up of new financial bubbles that (partly) eliminate losses from asset price deflation after 2008. This might shorten the balance sheet recession.

In any case, we have to note that, since the outbreak of the *Great Recession* after the Lehman Crash in 2008, investment activity in major OECD countries remained weak. As far as productivity gains are ‘embodied’ in new investment goods, the low investment ratios after 2008 certainly contributed to low productivity performance. So far, Koo’s balance sheet hypothesis can add to our understanding of the severity of the productivity crisis. One should note, however, that the decline in productivity growth in [Figure 1](#) started well before the Lehman Crash of 2008 that brought down investment ratios. Hence, low investments and *Verdoorn-Kaldor Law* effects can have aggravated the productivity crisis once it was under way, but it cannot have caused it.

2.3 *Is there an exhaustion of technological opportunities?*

The latter argument hints to a role for ‘structural’ factors such as [Gordon’s \(2016\)](#) observations about an exhaustion of the US IT boom. Among others, Gordon observes a slowing pace of start-ups and of capital and personnel dedicated to start-ups, or the obsolescence of Moore’s Law: The years taken for the number of transistors in a chip to double is now between 4 and 8 years, rather than 2 years ([Gordon, 2016](#), pp. 585–93). Related evidence of diminishing returns of IT is reported by [Cette et al. \(2015\)](#). They find (i) a stabilising share of ICT capital stock in GDP since 2000, following a period of sustained growth; (ii) a considerable fall of the contribution of ICT to labour productivity growth after 2004, following a steep rise during 1994–2004 and (iii) they add that the latter ‘only remains positive as a result of the continued advances in ICT performance as proxied by the continued fall of ICT prices. Unfortunately, the pace of improvement also appears to be rapidly decreasing’ ([Cette et al., 2015](#), p. 81).

Another structural factor may be cuts in basic research during the period of supply-side economics, as is obvious from published statistics (e.g. [OECD, 2015](#)). The latter can have been enhanced by short-termism of management (e.g. [Lazonick and O’Sullivan, 2000](#); [Kleinknecht, 2018](#)). This suggests that the World-wide pool of breakthroughs in fundamentally new knowledge is growing too slowly.

In this context, the lack of ‘absorptive capacities’ ([Cohen and Levinthal, 1989](#)) in using the pool of basic knowledge might also be important. The ‘absorptive capacities’ argument implies that, after having cut their basic research, firms miss an ‘antenna’ for absorbing the results of basic research done elsewhere. To absorb new knowledge from other’s basic research, firms need engineers who perform basic research and can evaluate research published in top journals. In other words, firms that cut their basic research not only stop contributing to the pool of fundamentally new findings; they are also less capable of tapping knowledge from this pool (see also [Rosenberg, 1990](#)).

2.4 *Does it come from a shift towards services?*

Advanced economies experience a well-known shift from manufacturing (and agricultural) employment to service employment. [Baumol and Bowen \(1966\)](#) observed that a number of service industries experience notoriously low productivity growth, as peoples' work is hard to replace by machines. An outstanding example are the performing arts (think of operas and concerts), but hotels, restaurants, teaching and marking exams, nursing and personal care suffer in a similar way from Baumol's *Cost Disease*. Could the 'tertiarisation' of the economy explain the productivity slowdown? There have been attempts to test the impact of Baumol's Law on productivity growth. For example, [Vergeer and Kleinknecht \(2011, 2014\)](#) included the share of services in a country's total employment in their productivity equation. They found the expected negative sign, which was, however, insignificant. Recently, [Pariboni and Tridico \(2019\)](#) divided services into 'skilled' services (e.g. IT services, finance and insurances or real estate) versus 'unskilled' services (e.g. retail trade, hotels and restaurants, care and health services, etc.), finding that high shares of unskilled services reduced aggregate productivity growth, while skilled services did not. This suggests that tertiarisation could have some impact on the slowdown of productivity growth. On the other hand, in [Figure 1](#), we see two moments in time when productivity growth declined quite suddenly: in 1970s and around 2005 while structural change towards services is a rather gradual process. This suggests that structural change has a limited impact on the productivity crisis.

2.5 *Low productivity due to laggards not catching up?*

[Andrews et al. \(2015\)](#) observe that the productivity crisis does not apply to what they call 'superstar' firms with high levels of productivity. It does apply to laggard firms. They further suggest that laggards may have difficulties raising their productivity as the superstar firms seemingly succeed to block imitation of their technologies. It should be noted, however, that attempts at testing the [Andrews et al.](#) hypothesis in other countries do not identify a group of superstar firms that succeed maintaining a superior productivity performance compared to laggards (see [Schiersch, 2019](#) for Germany, and [Van Heuvelen et al., 2018](#) for the Netherlands). But the [Andrews et al.](#) hypothesis can still hold for the USA. If true, the [Andrews et al.](#) hypothesis seems to be at odds with what is suggested below: market power can be 'good' for innovation in a Schumpeterian perspective. A possible reconciliation of the two positions could be that market power can be bad, even for innovation, if it exceeds a certain threshold.

Summing up, the productivity crisis is real; although the IT sector poses some challenges to the measurement of productivity, this cannot explain the productivity slowdown after 2005. Among the five candidate explanations, the hypothesis that cuts of basic research in the last decades reduce technological options holds the best cards. Combined with evidence of diminishing marginal returns to IT investments ([Gordon, 2016](#)) and of a diminishing contribution of IT to productivity growth in major OECD countries ([Cette et al., 2015](#)), this suggests a rather dark outlook on productivity growth in the foreseeable future.

We now turn to an explanation that has been ignored in the named reports by [OECD \(2015\)](#) or by [Bailey and Montalbano \(2016\)](#): more 'flexibility' in labour relations may have damaged the functioning of the Schumpeter II innovation model.

3. A new explanation: supply-side labour market reforms

The rise of supply-side economics in 1970s brought an attack on fiscal policy and on the Keynesian welfare state and strong pleas for structural reforms of labour markets. The latter include pleas by numerous economists for easier firing, trimming of social benefits and minimum wages, or the decentralisation of wage bargaining, which also penetrated policy papers by official institutions like the OECD (e.g. [The OECD Jobs Study, 1994](#)). A key aim of supply-siders is achieving (downward) wage flexibility. How could such a policy influence innovation and productivity?

Let us summarise relevant arguments under three headings:

- (1) Supply-side reforms change power relations between capital and labour, leading to weaker wage growth, which, in turn, reduces labour productivity growth through a slower speed of diffusion of labour-saving technology.
- (2) Easier firing and a larger labour turnover create unfavourable conditions for organisational learning and for the management of knowledge, in particular, if knowledge is 'embodied' in people.
- (3) Decentralisation of wage bargaining widens the gap between innovative leaders and laggards as it allows for a slower adoption of advanced process technology by the latter.

3.1 *Weaker growth of wages reduces labour productivity growth*

[Vergeer and Kleinknecht \(2011\)](#) show that the five champions of supply-side labour market reforms of 1970s and 1980s (i.e. USA, UK, Canada, New Zealand and Australia) show a substantially weaker growth of real wages and of labour productivity up to the mid-1990s, compared to Old Europe ([2011: 272–4](#)). Seemingly, structural reforms have changed power relations between capital and labour, resulting in modest wage growth. In a panel data analysis of 19 OECD countries (1960–2004), it turns out that low wage growth has a significantly negative influence on labour productivity growth: A one-percent lower growth of real wages causes an 0.32–0.49% lower growth of GDP per working hour, depending on the specification ([Vergeer and Kleinknecht, 2011, 2014](#)).

Neoclassical theory offers three explanations for this finding. The oldest one is from [Hicks \(1932\)](#) on capital for labour substitution. Another explanation is about induced innovation ([Samuelson, 1965](#)). A bit less known are vintage models of the capital stock. In vintage models, wage growth triggers a more rapid scrapping of old vintages of capital stock and their replacement by new (and more productive) ones, as older vintages become unprofitable due to their lower productivity ([Hartog and Tjan, 1974; Muysken and van Ardenne, 1976; Tjan and Den Hartog, 1980](#)).

A fourth (rather evolutionary than neoclassical) explanation relates to Schumpeterian 'creative destruction'. It can be argued that innovative market leaders can easily pay higher wages, owing to their monopoly rents from innovation. But technological laggards may run into difficulties. Hence, an industry-wide aggressive wage policy by trade unions will enhance Schumpeterian creative destruction, which pushes the technological laggards towards either modernising their equipment (and/or their product offerings) or going out of business.

3.2 *Worsening conditions for knowledge management at firm-level*

One might argue that the division between ‘liberal market economies’ (LME; i.e. USA, UK, Canada, New Zealand or Australia) versus ‘coordinated market economies’ (CME, i.e. Old Europe or Japan) as proposed by [Albert \(1992\)](#) or [Hall and Soskice \(2001\)](#) gets gradually somehow blurred as some countries in Europe engaged in labour market reforms that adopt (parts of) the supply-side policy agenda (as e.g. Germany, Italy, or, more recently, France). But even in countries that do not undertake such reforms and maintain the protection of insiders (as e.g. the Netherlands), firms can engage in ‘do-it-yourself’ labour market reforms, for example by increasingly hiring people from manpower agencies, by offering temporary contracts, or by hiring freelance workers. Notably the pressure from high unemployment made many people accept such ‘atypical’ and often precarious jobs. Whatever be the route to more flexibility, there are a number of reasons to expect a negative impact of increased flexibility of labour on innovation and productivity, which can be summarised under eight headings:

First, easier firing will unavoidably lead to shorter job tenures, which make firm sponsored training less attractive to employers ([Bassanini and Ernst, 2002](#)). Moreover, employees themselves might be more interested in general training that improves their employability on the external labour market, rather than in firm-specific training, if there is no perspective of staying longer in the firm ([Belot et al., 2002](#)).

Second, under shorter job tenures, historical memories of firms can become weaker, the firm turning into an *unlearning* organisation. This has a negative impact on the development of routines, on learning-by-doing, or on learning from past managerial mistakes.

Third, easy firing will erode loyalty and commitment of workers. This can mean that technological knowledge and trade secrets are more easily leaked to competitors, thus increasing the problem of Pigouvian externalities.

Fourth, reduced loyalty requires more monitoring and control. [Naastepad and Storm \(2006\)](#) show that private firms in Anglo-Saxon *Liberal Market Economies* have substantially higher percentages of managers in their personnel than firms in Old Europe or Japan. Moreover, it can be shown with firm-level data that higher shares of flexible personnel correlate with thicker management layers ([Kleinknecht et al., 2016](#)). The latter are probably a good indicator of social distrust. More managers not only create higher overhead costs; they can also be an impediment to creative people.

Fifth, Schumpeter described two different innovation models. [Schumpeter \(1912\)](#) described the inventor/entrepreneur of the 19th century (‘Schumpeter-I model’). [Schumpeter \(1943\)](#) admired the large corporation with market power, arguing that the innovative process itself had undergone an innovation: Individual inventors have been replaced by professional R&D labs of large corporations (‘Schumpeter-II model’). Schumpeter’s two innovation models have been at the basis of an older literature on whether market power is conducive to innovation (e.g. [Kamien and Schwartz, 1982](#); [Scherer, 1992](#)).

More recent literature worked out Schumpeter’s idea in a different direction, suggesting that both models are associated with different knowledge bases. Schumpeter-I innovators rely heavily on general (and generally available) knowledge, while the professional R&D lab relies more on firm-specific knowledge that has been accumulated over longer periods (e.g. [Breschi et al., 2000](#)). Much of the accumulated knowledge is

‘tacit’ (Polanyi, 1966). Tacit knowledge is typically poorly documented and ill-codified; being based on personal experience, it tends to be ‘embodied’ in workers.

The latter implies that, under a Schumpeter-II innovation model, well-protected insider positions and long job tenures are attractive to employers, as they greatly enhance the accumulation and protection of precious knowledge. In a neoclassical perspective, however, insider positions are a labour market rigidity that prevents the efficient allocation of scarce resources. In a Schumpeterian perspective, insider positions are crucial for managing and protecting a firm’s knowledge base. In this context, evidence from innovation surveys is relevant, suggesting that loyalty of people and long job tenures are actually more important than patent protection for safeguarding an innovator’s lead above imitators.²

Sixth, thanks to Adam Smith’s famous pin factory parable, economists generally recognise the advantages of division of labour and specialisation for productivity (e.g. Corsi, 1991). Notably under a Schumpeter-II model, technicians are needed who are sometimes deeply specialised. Narrow specialisation makes them more valuable to the firm, but it also restricts their options on the external labour market in case of firing. For your external employability, having a broad working experience is better than having spent many years on a narrow specialism. Hence, if labour market reforms break up safe insider positions, this may reduce workers’ willingness to engage in deep specialisation which will negatively affect the working of the Schumpeter-II innovation model.

Seventh, the option of easy firing gives more power to (top) managers towards the shop floor. This can favour autocratic management practices as people will not easily contradict their bosses. As a consequence, management receives poor feedback from the shop floor, which may have a direct impact on technology diffusion. For example, Lorenz (1999) argues that, for the implementation of automation technology, one often needs the tacit knowledge of the people who do the work that is to be automated. If these people have no safe insider position (a labour market rigidity!), they will refuse collaborating. More generally, under easy hire and fire, people have motives for hiding information about how their work could be done more efficiently.³

Eighth, another aspect of a culture of fear is that people who search for solutions of problems will tend to pick the least risky options. More risky solutions might be more rewarding to the firm, but also carry a larger risk of failure that can be punished by firing (Acharya *et al.*, 2010). Analysing US patent and patent citation data, Acharya and Krishnamurthy find that an improvement of firing protection in the USA lead to higher numbers of patents and more highly cited patents.⁴

² In *Community Innovation Survey* data in the Netherlands, it turned out that among the mechanisms for protecting monopoly rents from innovation against imitators, ‘time lead on competitors’ and ‘secrecy’ ranked first and second. ‘Keeping qualified people in the firm’ ranked third and ‘patent protection’ fourth (Brouwer and Kleinknecht, 1999). One should note that the second and third ranked factors depend on loyalty and commitment of workers that will erode under flexible hire and fire practices (see also Svensson, 2011).

³ Smulders *et al.* (2013) show empirically that tenured workers take substantially more initiatives for innovative activities in Dutch firms, compared to flexible workers.

⁴ Exploiting time-series variation in changes of dismissal laws, they conclude that ‘innovation and growth are fostered by stringent laws governing dismissal of employees, especially in the more innovation-intensive sectors. Firm-level tests within the United States that exploit a discontinuity generated by the passage of the federal *Worker Adjustment and Retraining Notification Act* confirm the cross-country evidence’ (2010, p. 1).

3.3 *Decentralised wage bargaining curtails the diffusion of advanced process technology*

In Continental Europe, industry-level wage bargains are often imposed by government directives on everyone in the industry, including non-unionised workers. Supply-siders have always interpreted this as a labour market rigidity that supports a trade union wage cartel. Decentralisation of wage bargaining has a prominent place on the supply-side reform agenda, as was recently again exemplified by the Troika's treatment of Greece. Under decentralised bargaining, unions could sacrifice wages in firms that are in trouble, thus protecting jobs.

This has, however, a negative impact on the Schumpeterian process of 'creative destruction': technological laggards can stay competitive as workers are willing to sacrifice wages to rescue their jobs. Downward wage flexibility for their workers is hence an alternative to modernising their equipment and/or their product offerings. On the other hand, under decentralised bargaining, innovators can lose (part of) their monopoly profits that are an incentive for accepting high risks and uncertainties.

The tendency towards decentralised wage bargaining may be one explanation for the widening productivity gap between 'superstar firms' and laggards (Andrews *et al.*, 2015). Hence, while centralised bargaining is dismissed as a labour market rigidity that negatively affects the efficient allocation of scarce resources, it is an extremely useful vehicle for innovation and speedy technology diffusion among laggards in a Schumpeterian perspective.

4. Counter-arguments by supply-siders

A number of arguments have been made in the literature about *favourable* effects of flexible labour relations for innovation. These can be summarised under six headings:

First, strong firing protection will slow down the reallocation of labour from old and declining sectors to new and dynamic ones (e.g. Bartelsman *et al.*, 2016).

Second, the difficult or expensive firing of redundant personnel can frustrate labour-saving innovations at the firm level (Scarpetta and Tressel, 2004).

Third, well-protected and powerful insiders could appropriate rents from innovation through higher wage claims, thus reducing incentives for taking innovative risks (Malcomson, 1997).

Fourth, firms will more easily engage in risky new ventures if they can be sure they can easily quit their personnel in the case of failure (Bartelsman *et al.*, 2016).

Fifth, in the framework of job-matching theory (e.g. Pissarides, 2000), one can argue that easier termination of less productive job matches increases the chance that people will find jobs in which they are more productive. Relating this argument to innovation, one could add that higher labour turnover enhances the inflow of 'fresh blood': People with new ideas and new networks may foster innovation. Moreover, there is less chance that employees will be entrenched in safe jobs, gradually losing their creativity.

Sixth, in the tradition of efficiency wage theory (see e.g. Raff and Summers' 1986 case study of Henry Ford's five-dollar-day in 1914), one can argue that the (latent) threat of easy firing may prevent 'shirking'.

Against such arguments, several objections are possible. As to the first argument, emerging new industries obviously offer better career opportunities and higher pay than declining industries. Why should we not rely that such incentives will make people

move voluntarily into new industries? Is strict firing protection in the coal mines indeed the reason that people do not move into the IT industry?

As to the second argument, rates of job turnover have been estimated as being around or even above 10% per year, thus offering some potential for downsizing without forced leave.⁵ Moreover, if firing is difficult, firms have incentives to invest in functional flexibility by means of training, which allows labour to be shifted from old to new activities in internal labour markets. In other words, a lack of external (or numerical) flexibility will enhance internal (or functional) flexibility.⁶

The third argument about workers capturing profits from innovation may indeed be relevant under decentralised wage-bargaining that is typical of deregulated Anglo-Saxon labour markets. ‘Rhineland’-type labour markets still rely more on industry-level bargaining in which wage bargains are often imposed by government on everyone in a sector. While the latter is a labour market rigidity from a neoclassical perspective, the above-mentioned vintage models suggest that such a labour market rigidity may increase investments and enhance technology diffusion, as technological laggards may be forced making productivity-increasing investments in response to rising wages.

The fourth argument about encouraging new ventures: This may be relevant as it allows part of the entrepreneurial risks to be shifted to employees which might encourage start-ups. On the other hand, firing protection in Europe is usually build up during many years of service in the same firm. People in start-ups that go bankrupt tend to have only minor claims against the firm (if there is still anything left to be claimed).

As to the fifth argument about job matches and inflow of ‘fresh blood’: whether this is favourable to innovation or not depends on whether firms can rely on readily available general knowledge in a Schumpeter-I model, or whether they are dependent on continuous accumulation of firm-specific and often tacit knowledge in a Schumpeter-II model.

In addition to the latter counter-arguments, there is a serious argument, coming from the OECD’s Economics Department that propagated the deregulation of labour markets during many years. OECD economists noticed in the OECD Employment Report (2003) that ‘... a weak trade-off may exist between gains in employment and productivity...’. Further, they argue that this has to do with newly created jobs for low-qualified workers:

For example, decentralisation of wage bargaining and trimming back of high minimum wages may tend to lower wages, at least in the lower ranges of the earnings distribution. Similarly, relaxing employment protection legislation ... may encourage expansion of low-productivity/low-pay jobs in services. (OECD, 2003, p. 43; Box 1.4)

As a justification for the deregulation of labour markets, they argue that such low-productive jobs are created in countries with flexible labour markets and *not* in the highly regulated labour markets of Old Europe. In the latter, labour is (too much) protected and hence expensive, keeping low-productive people out of work. In this view,

⁵ Kleinknecht *et al.* (2006) report that, on average, 9–12% of a firm’s personnel in the Netherlands leave voluntarily each year, the exact percentage depending on the state of the business cycle. Nickell and Layard (1999, p. 363) report that this figure amounts to more than 10%.

⁶ Acemoglu and Pischke (1999) emphasise that wage compression (a labour market rigidity) in rigid German labour markets enhances training for highly educated *and* for low-educated workers, while in the liberalised US system mainly highly educated workers receive training.

the productivity crisis is just a negative by-product of job creation in the low-wage segment.

There is a certain plausibility to this argument, but one question remains: Should we speak about low productive *people* or about low productive *jobs*? Our above-named arguments suggest that most of the *jobs* are low-productive. The mix of low wages and easy-to-fire people is a brake on the diffusion of labour-saving technology. There is less training and old vintages of capital goods are only slowly replaced by new and more productive ones. Moreover, as discussed above, under downward wage flexibility, the Schumpeterian process of creative destruction may work weakly, thus increasing the probability of survival of less talented entrepreneurs. All this can have favourable employment effects, at least in the short run. But it also creates a lock-in of people in low-productive work and firms are under-utilising their talents.

Finally, the OECD researchers provide no empirical support for their hypothesis that low-productive jobs would have a significant influence on overall labour productivity growth. A recent test by [Vergeer and Kleinknecht \(2014\)](#) arrives at insignificant outcomes.⁷ There are of course people with low productivity. The question is, however, whether such people cannot better be helped by subsidising their work. This is probably more efficient than bringing down economy-wide productivity growth through supply-side reforms.

Some of the above arguments come close to efficiency wage theory ([Shapiro and Stiglitz, 1984](#)). For instance, [Rebitzer \(1995\)](#) found a relationship between higher wages and lower supervision costs. This implies that shirking is less likely as workers who earn wages above the market-clearing level have more to lose if they are fired after their shirking is discovered. While such arguments focus narrowly on wages and on the disciplinary effects of easy firing, the idea of an implicit contract ('gift exchange') between employer and employees ([Akerlof, 1982](#); [Akerlof and Yellen, 1990](#)) comes closer to our argument.

Other than the key arguments around efficiency wages, however, the main thrust of our above arguments relates to labour market rigidities such as firing protection, (implicit) job guarantees for insiders, or centralised bargaining. Such labour market rigidities increase mutual trust, commitment and loyalty, which, in turn, makes the management of innovation, the mobilisation of (tacit) knowledge from the shop floor and knowledge accumulation easier. More trust and loyalty also reduce costs of supervision and reduce externalities as dedicated employees will not so easily leak knowledge to competitors. All this contributes to a better working of the 'routinised' Schumpeter-II innovation model ([Schumpeter, 1943](#); for an update see [Breschi et al., 2000](#)) and can result, in the end, in higher innovation rates and higher productivity.

5. A review of empirical findings

Many empirical studies used country or sector data, trying to find a relationship between, on the one hand, measures of labour market flexibility (e.g. the OECD's Employment Protection Legislation Index; or data about job tenures or atypical jobs)

⁷ Trying to test the OECD hypothesis, [Vergeer and Kleinknecht \(2014\)](#) included the growth of numbers of workers (which is supposed to be higher if, after structural reforms, more low-productive workers enter the labour market) as an explanatory variable in their productivity equation. The variable had the expected negative sign, but the coefficient was insignificant.

and, on the other hand, figures on productivity, innovation or patents. Studies by, for example, [Buchele and Christiansen \(1999\)](#), [Auer *et al.* \(2005\)](#), [Pieroni and Pompei \(2008\)](#), [Rizov and Croucher \(2009\)](#), [Sánchez and Toharia \(2000\)](#), and [Storm and Naastepad \(2012\)](#) found negative relationships. Many studies of firm-level data also find a negative relationship between measures of 'low road' personnel policies and innovation or productivity (e.g. [Huselid, 1995](#); [Michie and Sheehan, 2001, 2003](#); [Kleinknecht *et al.*, 2006](#); [Lucidi and Kleinknecht, 2010](#); [Zhou *et al.*, 2011](#); [Cappellari *et al.*, 2012](#); [Franceschi and Mariani, 2015](#)). But a single study arrives at insignificant results (e.g. [Arvanitis, 2005](#)) or even concludes to the opposite (e.g. [Scarpetta and Tressel, 2004](#)). Other studies find a non-linear relationship: a low share of flexible workers has favourable effects while a higher share has unfavourable effects (e.g. [Serano and Altuzarra, 2010](#); [Hirsch and Mueller, 2012](#)).

A common weakness in all these studies is the neglect of controlling for the dominant innovation model in a firm's sector of principal activity. Drawing from the above-named distinction between Schumpeter-I and Schumpeter-II models, [Kleinknecht *et al.* \(2014\)](#) have classified sectors by the degree to which either of the two innovation models is more relevant. They found that the probability of a firm having innovative activities is negatively related to shares of flexible personnel in sectors that tend towards the Schumpeter-II model, while in Schumpeter-I sectors, flexible work is insignificant.

The latter result has meanwhile been independently confirmed by [Wachsen and Blind \(2016\)](#) for the probability of innovation, and by [Vergeer *et al.* \(2015\)](#) for labour productivity growth using different firm-level databases in the Netherlands. [Lisi and Malo \(2017\)](#) report somehow comparable results for Italy: Temporary contracts have a negative impact on productivity in 'skill intensive' sectors, but have weaker negative effects in less skill-intensive sectors. The most recent contributions are by [Cetrulo *et al.* \(2018\)](#) and [Hoxha and Kleinknecht \(2019\)](#). [Cetrulo *et al.*](#) analyse 38 manufacturing and service industries across five countries (France, Italy, Germany, Netherlands and Spain). Their outcomes confirm that flexible work has a *negative* impact on the probability of innovation in industries that show a high 'cumulativeness of knowledge' according to [Peneder \(2010\)](#) and/or tend towards a Schumpeter-II innovation model according to the classification by [Kleinknecht *et al.* \(2014\)](#). The study by [Hoxha and Kleinknecht \(2019\)](#) uses the firm-level database of the German Employment agency (IAB). They find that in industries classified by [Peneder \(2010\)](#) as 'medium and highly cumulative', flexible labour has a negative impact on the probability to innovate, while in sectors with 'low cumulativeness', many coefficients turn out insignificant.

It seems that in econometric work, control for the dominant innovation model in an industry is crucial. Earlier studies might have had an omitted-variable bias which can explain why not all studies arrived at unambiguous results. In controlling for Schumpeter-I versus Schumpeter-II industries, it does not seem to make much difference how we define them. In [Kleinknecht *et al.* \(2014\)](#), the concentration of R&D budgets in an industry was taken as an indicator, assuming that a more scattered distribution of R&D in an industry hints either to a high incidence of small entrepreneurial firms and/or to a stronger presence of low-technology firms, while a high concentration of R&D indicates oligopolistic structures with a few technologically dominant firms. The latter is characteristic for a Schumpeter-II innovation model.

The alternative indicator by Peneder (as used by [Cetrulo *et al.*, 2018](#) and by [Hoxha and Kleinknecht, 2019](#)) measures more directly the 'cumulativeness' of knowledge

by counting numbers of sources of innovative ideas used by firms in an industry (as reported in several countries and vintages of the *EU-Community Innovation Survey*). A closer look at [Peneder's \(2010\)](#) classification (see table 5 in [Peneder, 2010](#), p. 331) shows that, within manufacturing industry, his sectors with a 'high cumulateness' of knowledge correlate strongly with industries that have high R&D and innovation intensities. In service industries, however, there is no strong correlation between 'cumulateness' and R&D since service firms often perform innovative activities that tend not to be covered by the OECD's Frascati-Manual definition of R&D but can be measured by other indicators included in the *Community Innovation Survey* ([OECD/Eurostat, 2018](#)).

It can be concluded that the hypothesis of a negative impact of flexible labour on innovation and productivity holds in Schumpeter-II industries in which innovative competencies strongly depend on (tacit) knowledge that is 'embodied' by people and accumulated in the past. The latter are identical to the highly R&D intensive industries within manufacturing and to knowledge-intensive services. In typical Schumpeter-I industries, however, one finds only weak or no evidence of a negative impact of flexible labour.

In conclusion, supply-side labour market reforms cannot do much harm in low-technology manufacturing and in less knowledge-driven services, as well as for high tech start-ups. This can explain why the US, in spite of their highly flexible labour market, have been successful in the entrepreneurial phase of IT (e.g. in Silicon Valley), but performed much weaker in a range of 'old' industries in the US Rust Belt.

6. Discussion and conclusions

An economy can create more value added in two ways only: Either by working *more* hours or by working more *productive* hours, through the use of modern technologies, by better management or whatsoever. If two countries have the same GDP growth, but one of them achieves more value-added growth per working hour than the other, the more productive country will need fewer working hours. Hence the less productive country may create more jobs. This suggests that supply-side economists were right when promising us more employment through 'structural reforms' of labour markets. But they did not tell us that the extra employment gains are mainly achieved through lower gains in labour productivity. The latter imply that, per hour worked, there is each year less income to be distributed extra between capital, labour and government which reduces the room for solving distributional conflicts.

Given the power relations in the era of supply-side economics, the productivity crisis can be expected to result mainly in two developments. First, there is likely to be increased pressure towards cutting welfare state provisions. Second, against the background of a more unequal income distribution, low productivity gains enhance the growth of a class of working poor and a breakdown of the middle class. All this brings trade unions and classic social-democratic parties in Europe under pressure as they have little to offer to their constituency; at the same time, it provides a favourable breeding ground for populism.

An additional question here is, whether a low-productive and hence labour-intensive growth path in deregulated economies indeed brings down unemployment rates. Some have argued that this is the case, trying to show that deregulation of labour markets

causes lower rates of unemployment (e.g. Nickell *et al.*, 2005). Vergeer and Kleinknecht (2013) have demonstrated, however, that the (highly cited) results by Nickell *et al.* (2005) are *not* robust. Outcomes change decisively with small (and plausible) changes of regression specifications (Vergeer and Kleinknecht, 2013). Others have argued that results of such studies are also quite sensitive to the selection of countries or time periods (Baker *et al.*, 2005; Baccaro and Reij, 2007; Howell *et al.*, 2007; Piasna and Myant, 2017).

It is of course true that, owing to lower labour productivity growth, you get more jobs for each per cent of GDP growth. There are, however, at least three reasons of why this does not need to translate into lower unemployment rates. First, during many years, the deregulated Anglo-Saxon economies have increased their labour supply through generous immigration policies. Second, supply-side reforms have changed power relations such that trade unions can hardly push anymore for shorter standard working times. Actually, in some cases, working hours have been increased rather than reduced. Third, Central Banks believe in the theory of the NAIRU.⁸ The latter is certainly not a hot topic at this moment, but if, at some time in the future, unemployment should fall below the NAIRU rate, Central Banks have, in principle, the task of avoiding an ‘overheating’ of the business cycle by means of restrictive monetary policies that raise unemployment rates. In conclusion, it is by no means sure that the low-productive and hence labour-intensive growth in deregulated Anglo-Saxon labour markets will, in the end, lead to lower unemployment, and this explains why the empirical evidence is far from clear-cut.

On the other hand, in 1950s and 1960s, when labour productivity growth in Europe was still high (see Figure 1) we experienced a reduction of total hours worked in the total economy—in spite of high GDP growth (Vergeer and Kleinknecht, 2011). Nonetheless, there was only moderate unemployment, and this was achieved through shorter working weeks per worker. For example, an average German worker worked 2.427 hours per year in 1950, 1.756 hours in 1980 and 1.354 hours in 2017.⁹ This helped achieving moderate unemployment rates, in spite of a growing labour supply due to women entering the labour market. In principle, having a high speed of diffusion of labour-saving technology thanks to high wages, powerful trade unions and strict regulation of labour markets does not need to lead to high structural unemployment, provided that high productivity gains are not exclusively used for wage increases, but also for financing adequate labour time policies.

Finally, the above observations also form a challenge to neoclassical thinking. It is a merit of Joseph A. Schumpeter that he recognised as early as 1943 that there is a discrepancy between neoclassical (static) efficiency (‘how to allocate scarce resources efficiently?’) and dynamic efficiency (‘how to make resources less scarce through innovation?’). What is good for static efficiency can be counter-productive for dynamic efficiency and vice versa. Hence neoclassical theory has little to offer for an innovation policy agenda:

⁸ NAIRU stands for: *Non-Accelerating Inflation Rate of Unemployment*, which means that, for the sake of keeping inflation constant, the Central Bank should strive for an unemployment rate that is high enough to prevent wage increases that could push up inflation (for a thorough criticism of NAIRU theory, see Storm and Naastepad, 2012).

⁹ The Conference Board Total Economy Database™ (Adjusted version), November 2018, <http://www.conference-board.org/data/economydatabase/>.

Perfect competition ... is a condition for optimal allocation of resources ... But ... introduction of new methods of production and new commodities is hardly conceivable with perfect ... competition ... And this means that the bulk of ... economic progress is incompatible with it. As a matter of fact, perfect competition is and always has been temporarily suspended whenever anything new is being introduced (Schumpeter, 1943, p. 104–5)

There are several trade-offs between static and dynamic efficiency. For example, in neoclassical theory, monopoly power is undesirable, as it leads to welfare losses. From a Schumpeterian perspective, large firms with monopoly power are valued much more positively, due to three reasons: First, large firms reaping monopoly profits from innovation can more easily finance risky innovation projects and can more easily absorb losses from failed projects. Second, due their size, large conglomerates tend to have larger portfolios of innovative projects running in parallel. A diversified portfolio encourages innovation as it reduces innovation risks. Third, innovation itself can be defined as a deliberate attempt at creating an imperfect market with high entry barriers. The unique knowledge embodied in a new product or process serves as a market entry barrier. The higher the entry barrier, the higher are the monopoly profits—and the higher is the incentive to invest in highly risky innovative projects.

In conclusion, once we recognise the high risks and uncertainties of innovative projects, we also have to accept that firms need the prospect of high (and sustained) monopoly profits to accept those potential risks. This means that, under perfect competition, when entry barriers are absent and above-normal profits are quickly competed away through new entrants, innovation will hardly occur. The innovative process benefits from *im*perfect markets and it creates *im*perfect markets as its result.

A similar argument can be made about centralised wage bargaining. As discussed above, this is a labour market rigidity in neoclassical theory, but it enhances the diffusion of advanced process technology among laggards. This holds, in particular, if there is an additional labour market rigidity: government imposing the bargained wage increases on everyone in the industry.

Moreover, strong insider positions are valued negatively in neoclassical theory. In an innovation perspective, however, this is an investment in the loyalty and commitment of personnel, which has a number of advantages for knowledge management, for using knowledge from the shop floor, for risk-taking by employees, for limiting the leaking of trade secrets, or for limiting the growth of management bureaucracies that can impair the autonomy of professionals, as discussed above. Such arguments are an admittedly hard message to supply-side economists: market imperfections can be extremely useful for innovation, while impeding the efficient allocation of scarce resources.

Dealing with innovation, we have to recognise that market failure is not just a rare exception. This has a lot to do with the public goods character of knowledge that makes it hard protecting property rights and assuring the appropriation of innovation benefits by the innovator. Searching for solutions, one often tries to repair one market imperfection by introducing another one. For example, trademarks, copyrights or patents give a degree of monopoly power to creative people. In a neoclassical perspective, the latter create welfare losses, but in a Schumpeterian perspective, they are highly desirable incentives for investment in creative but risky and uncertain solutions.

To conclude, the above may shed some light on the observation that, in spite of a highly flexible labour market, the USA did quite well during the entrepreneurial phase of IT ('Schumpeter-I') in 1980s and 1990s (e.g. in Silicon Valley). Our arguments

might, however, also be an explanation of why, during a long period, a broad range of classical industries in the USA had hard times competing against Japanese and German suppliers, thus creating the US Rustbelt. Under a highly flexible labour market, admired by neoclassical economists, US firms are weak in mastering the Schumpeter-II innovation model. This can explain the difference between Wolfsburg and Detroit.

Obviously, since 1990s, successful Silicon Valley firms were gradually shifting towards a Schumpeter-II innovation model. This means that path-dependent learning, accumulation of (tacit) knowledge, longer job tenures and loyalty of personnel are becoming increasingly important. Our arguments suggest that the US hire and fire labour market is no longer an optimal environment for those firms. The rigid German labour market (preferably *before* the Hartz labour market reforms of 2003–5) would have provided them a better environment.

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