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Labour market institutions, distribution conflict and productivity growth

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Abstract
Since the 1980s falling labour productivity growth and stagnation tendencies, have been accompanied by labour market deregulation, with different degrees in different countries. In this contribution, we review these two trends in the G7 economies for the period 1981 – 2019 and link them within a post-Kaleckian endogenous growth model augmented by Kaldorian, Marxian and Schumpeterian features. Within this model, we differentiate between the direct effects of labour market institutions on productivity growth and the indirect effects conveyed through distributional conflict. Labour market regulation can affect productivity growth rates through each of these channels. Differences in the development of productivity growth in the G7 are traced back to the dominance of certain channels and their direction in the respective economies, in our terminology different socio-institutional productivity regimes. This sheds light on the institutional background of technical change, while underpinning the relevance of demand-led growth and distribution conflict for productivity growth.

Key words: Labour market institutions, endogenous technical change, post-Kaleckian model, Schumpeter, G7 economies
JEL code: E02, E12, O47

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1. Introduction

In advanced capitalist economies, productivity growth has experienced a falling trend since the 1970s (Hartwig 2014, Bergeaud *et al.* 2016, Syverson 2017, Goldin *et al.* 2024). Among the G7 economies, however, the pattern has not been unique. While there has been a general decline in productivity growth trends, countries such as Canada, the UK and the US have experienced sub-periods with slightly rising productivity growth since the 1980s (Figure 1). In this contribution, we focus on the effects of labour market institutions (LMIs) – the legal rules and structures under which employers and workers meet on the labour market; for example, the employment protection legislation or trade union density – on productivity growth trends, drawing on contributions from different economic paradigms. In particular, we apply a post-Keynesian perspective augmented by Schumpeterian ideas about innovation incentives and different innovation types. This then generates a post-Keynesian/post-Kaleckian demand-led growth model with endogenous technical change, including the Kaldor-Verdoorn relationship, Marxian considerations on the effect of distribution conflict on productivity growth and Schumpeterian contributions on direct and indirect effects of LMIs.[1]

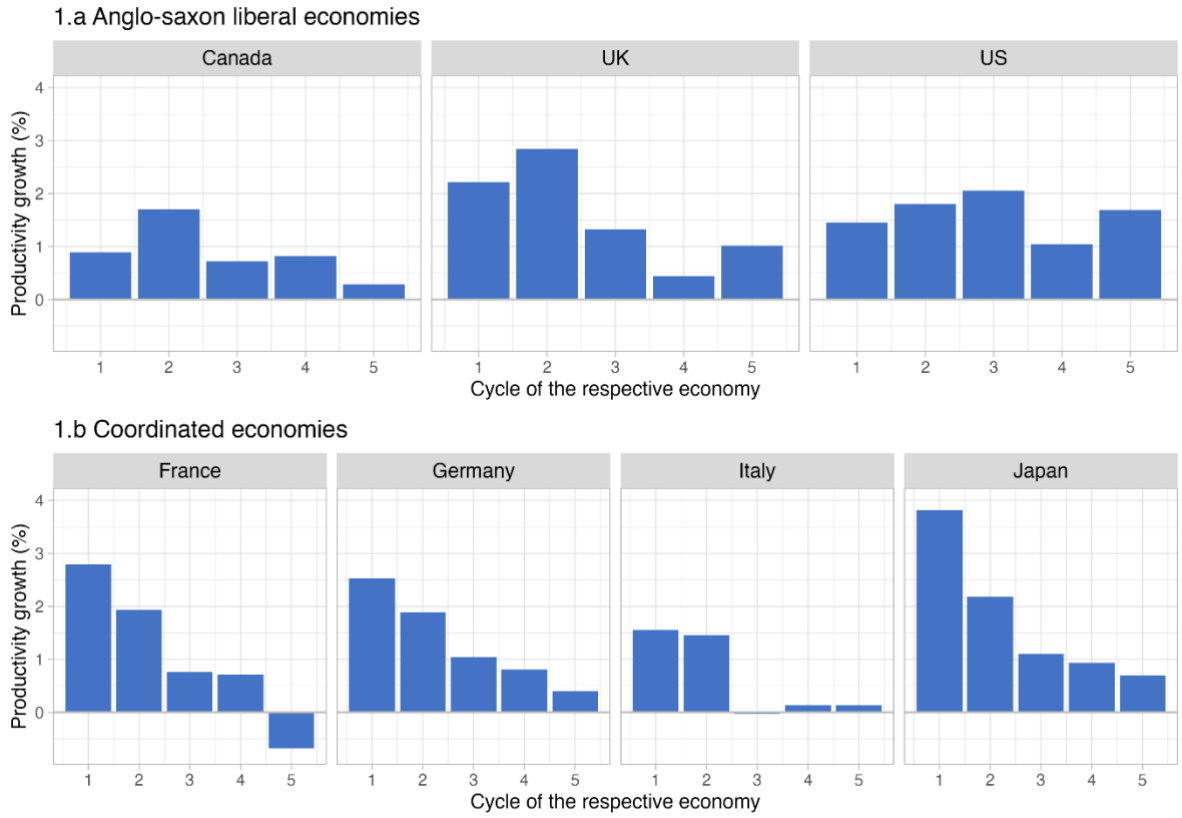


Figure 1. Productivity growth, G7 economies, trade cycle average, 1981–2024, per cent
Notes: Own calculations and presentation based on European Commission (2025). Productivity growth is the annual change of GDP per hour worked. Cycles classified for each economy individually based on first year of a recession as start of the cycle and the last year before the next recession as the end, see Appendix A for years.

[1] We should mention here that we are by no means the first to combine Keynesian, or Kaldorian, research with Schumpeterian thought. Dosi et al. (2010) and the following models of the 'Schumpeter meeting Keynes' family, in particular Dosi et al. (2018) in our context, are, of course, seminal in this regard. As well, Romero (2014, 2019) and Romero and Britto (2017) propose different theoretical syntheses of both strands. We see our theoretical contribution in the explicit consideration of the Schumpeterian labour market effects and the derivation of respective theoretical cases in a post-Kaleckian framework.

For the model, we build on a long tradition of endogenous growth theory in post-Keynesian economics. Most relevant in this context are Kaldor's technical progress function (Kaldor 1957, 1961) and Kaldor's adoption of Verdoorn's (1949) law (Kaldor 1966, 1975). According to these, capital stock growth or output growth affect productivity growth positively. Simultaneously, the literature on induced technical change highlights the relevance of distribution conflict for productivity growth in the Marxian tradition (Kennedy 1964, Duménil and Levy 1992, 1995, 2010, Kurz 2010, Tavani 2012, 2013, Tavani and Zamparelli 2017, Kemp-Benedict 2022, 2024). Several post-Keynesian authors have already combined both effects in their models (Cassetti 2003, Dutt 2003, Naastepad 2006, Hein and Tarassow 2010, Storm and Naastepad 2012, 2013, 2017).

Institutions have by no means been excluded from these demand-led endogenous growth models. However, there have been different ways of dealing with them – explicitly or implicitly (e.g., Setterfield and Cornwall 2002, Hein 2012, Storm and Naastepad 2012, Angelone *et al.* 2025).[2] Recently, Blees (2026) has explicitly analysed different channels through which institutions may affect the productivity regime, making use of some elements put forward in the French Regulation School, i.e. the form of the state, the form of competition and the wage-labour nexus, and integrating them into a post-Kaleckian endogenous growth model. We are applying a similar approach in the current contribution, focussing on the direct and indirect roles of LMIs for income distribution, demand generation and productivity growth. For this purpose, we review the determination of productivity growth in post-Keynesian demand-led endogenous growth models, survey institutionalist and in particular Schumpeterian work on the effects of LMIs on productivity growth, integrate some Schumpeterian features into a post-Kaleckian demand-led endogenous growth model, and derive potential overall regimes. Finally, we apply our approach in a qualitative way to the G7 economies in the period of the Great Moderation (1981 – 2019), associated with a falling trend of productivity growth. We develop an index for LMIs and relate the changes of this index to the changes in the wage share, GDP growth and productivity growth in the respective countries.

In what follows, 'technical progress' and 'technical change', we use these terms interchangeably, refer to the development of new technology and its implementation. Productivity growth is the measure of technical change in terms of GDP per hour worked. Conceptually, several post-Keynesian demand-led growth models have incorporated technical change, following a modelling procedure suggested by Setterfield and Cornwall (2002). They distinguish a demand regime, in which productivity growth is taken as exogenous, and a productivity regime, in which demand or capital stock growth is taken exogenous, and then analyse overall regimes with endogenous demand, capital stock and productivity growth generated by the interaction of demand and productivity regimes. In our model in Section 4, we follow this approach with slightly different terminology, reserving the 'regime' label for the socio-institutional context and instead talk about the demand and productivity 'components' of the model. The interaction of these components, affected by the socio-institutional framework, in this contribution particularly the LMIs, may then generate different socio-institutional productivity regimes (Blees 2026).

[2] Storm and Naastepad (2012) have added a labour market institution variable to the productivity component of the post-Kaleckian distribution and growth model, for example, while Hein (2012) has included shareholder power variables associated with institutional change towards financialization into the demand and the productivity components of the model and derived the implications for the long-run overall equilibrium outcomes.

The remainder of this contribution is organised as follows. Section 2 reviews the post-Keynesian research on the determinants of productivity growth, while Section 3 does so for the Schumpeterian work on LMIs, innovations and technical change. In Section 4, we combine these two strands and provide a model including direct and indirect effects of LMIs on demand generation and productivity growth, from which different socio-institutional productivity regimes are derived. In Section 5, we apply the model to the G7 economies, i.e. the advanced capitalist economies of Canada, France, Germany, Italy, Japan, the UK and the US, in a qualitative way, considering the changes of our index for LMIs, the wage share, GDP growth and productivity growth. Section 6 concludes.

2. Productivity growth in post-Keynesian distribution and growth models: Kaldor-Verdoorn's Law and Marx-Hicks cost push effects

In post-Keynesian distribution and growth theory, Kaldor provided different ways to endogenise technical change and hence labour productivity growth.[3] In his early equilibrium growth models (Kaldor 1957, 1961), labour productivity growth depends positively on the growth rate of capital intensity, as captured by a technical progress function. Technical progress is viewed to be capital-embodied and for given basic technologies regarding energy extraction, transportation and communication, productivity growth is a rising function of capital accumulation and the growth rate of capital intensity, assuming the labour force to be constant, but with falling marginal gains. This allows to generate a long-run growth equilibrium with constancy of capital stock growth and labour productivity growth, constant profit share and capital-potential output ratio, and capital intensity growth equal to labour productivity growth (Hein 2014, ch. 4).

In his later applied economics of growth, making use of cumulative causation and path dependence, and thus abandoning steady state equilibrium growth theory, Kaldor (1966, 1975) suggested another way of endogenising productivity growth and applied Verdoorn's law in order to explain slow growth in the United Kingdom (McCombie 2002). Verdoorn (1949) had found that in several advanced capitalist economies the growth rate of labour productivity in industrial production was positively associated with the growth rate of output. This can be explained by static and dynamic economies of scale: The expansion of aggregate demand, sales and hence the market allows for improved division of labour, for learning by doing, positive spill-overs, as well as increasing rationalisation and mechanisation, thus generating favourably effects on technical progress and labour productivity growth. Of course, Verdoorn's Law and Kaldor's technical progress function can be linked with each other, not least because capital accumulation and output growth are directly connected: even without technical progress, output growth is associated with capital stock growth via technology (capital-potential output ratio) and capital stock growth is stimulated by the growth of (expected) output. Since at least part of technical progress is capital embodied, the relationship between capital stock growth and productivity growth in Kaldor's technical progress function is reinforcing the process.[4]

Empirical tests of the Kaldor-Verdoorn mechanism to explain productivity growth are numerous. McCombie et al. (2002) provided a survey on more than 80 studies on Verdoorn's Law, from the original study by Verdoorn (1949) until 2001. The Verdoorn effect was confirmed in the overwhelming majority of these studies with different methods and data,

[3] For a review of technical change in different economic paradigms, see Tavani and Zamparelli (2017).

[4] On the relationship of Kaldor's technical progress function with Verdoorn's Law and the differences from neoclassical aggregate production functions, see in particular McCombie and Spreafico (2016).

ranging from cross-section estimations for countries or regions (USA, UK, countries of the European Union, among others) or for industry branches (USA, UK, France, Germany, among others), to time series econometrics for single countries or regions (USA, UK, Germany, among several others). According to these results, an increase in output (or investment) growth by one percentage point raises productivity growth by 0.3 – 0.6 percentage points. According to Hein (2014, pp. 328–329), updating Storm and Naastepad (2013, p. 106), several more recent studies until 2013 and further studies not included in the McCombie et al. (2002) overview, broadly confirm these results. Since then, several further studies have been produced. Amongst them are Antenucci et al. (2020) on G7 countries, Barbieri Góes et al. (2026) and Chrysanthakopoulos et al. (2026) on European regions, Deleidi et al. (2021) on Italian macro regions and areas, and Deleidi et al. (2023) on 52 advanced and emerging capitalist economies included in the Penn World Tables, which have refined the results by means of including capital-labour ratio dynamics on top of output dynamics, in line with the augmented technical progress function proposed by Michl (1985).

As reviewed in Hein (2014, ch. 8) and in Lavoie (2022, ch. 6.9), starting with Rowthorn (1981), post-Keynesian distribution and growth models in the Kalecki (1954) and Steindl (1976) tradition have made use of the Kaldor-Verdoorn mechanism and have endogenised the growth rate of labour productivity via the dynamics of output and/or capital stock growth. Demand determined output and capital stock growth thus positively affects technical change and productivity growth. And since the latter is capital-embodied to a large degree, technical progress feeds back on investment decisions and stimulates capital accumulation and growth. Modelling examples are Lavoie (1992, pp. 322–327), Cassetti (2003), Dutt (2003), and Hein and Tarassow (2010), usually assuming Harrod-neutral technical change, hence capital intensity growing in line with labour productivity, such that the capital-potential output ratio remains constant.

Cassetti (2003), Dutt (2003), and Hein and Tarassow (2010) not only introduced the Kaldor-Verdoorn effect into the productivity growth equations of their models, but also took wage-push effects into account. These can also be found in Taylor (1991, pp. 225–228), Naastepad (2006), and Storm and Naastepad (2017), for example. The idea of a wage-push effect on productivity growth goes back to Marx (1867) and Hicks (1963), and it has been elaborated extensively in the classical-Marxian distribution and growth literature on cost-induced technical change (Duménil and Levy 1995, 2010, Kurz 2010, Tavani 2012, 2013, Zamparelli 2015, Kemp-Benedict 2022, 2024, Stamegna 2024).[5] Low unemployment and increasing bargaining power of employees and their labour unions will speed up the increase in nominal and real wages which will finally generate some pressure towards a rising wage share and hence a falling profit share. Low productivity firms are squeezed out of the market and firms' efforts to improve productivity growth to prevent the profit share from falling is accelerated. In a similar vein, Dutt (2006) has argued that increasing pressure from lower unemployment and rising real wages will accelerate the diffusion of innovations and will thus increase productivity growth. Referring to the original work by Sylos Labini (1984, 1993), Fontanari and Palumbo (2023) have distinguished two direct effects of real wage growth on productivity growth, one acting through induced technical progress (mechanisation effect) and another one through more efficient use of the labour input through re-organization of the production processes (organisation effect).

[5] Lavoie (2022, p. 328) relates this channel to Webb (1912), who argued that the introduction of legal minimum wages had productivity enhancing effects for similar reasons as those put forward in Marx (1867) and Hicks (1963).

Several econometric studies have supported positive effects of real wage growth (or of changes in the wage share) on productivity growth for advanced capitalist economies, as summarised in Storm and Naastepad (2013, p. 107) and extended by Hein (2014, p. 331). The quantitative effects of real wage growth on productivity growth found in econometric studies show some dispersion, but in most studies an increase in real wage growth by one percentage point raises productivity growth by around 0.3 – 0.4 percentage points. This has also been confirmed later by Hartwig (2014) in a panel estimations for OECD countries. Recently, Fontanari and Palumbo (2023) found support for positive effects of real wage growth on productivity growth at the sectoral level on a panel of 19 US manufacturing sub-sectors over the period 1950–2018, both via the mechanisation and the organisational channels. Employing a panel Structural Vector Autoregressive approach for Italy over the period 1980-2023, Salvati and Tridico (2025) confirm a positive elasticity of productivity toward changes in the real wage on the aggregate level.

Given these considerations, a productivity regime, or a productivity component in our terminology, has been derived and integrated into post-Keynesian demand-led growth models, together with the demand regime/component, following the procedure proposed by Setterfield and Cornwall (2002), and then also applied by Cassetti (2003), Naastepad (2006), Hein and Tarassow (2010), Storm and Naastepad (2013, 2017), Hartwig (2013, 2014), among others. While for the productivity component goods market equilibrium demand or capital stock growth are taken to be exogenous, for the demand component productivity growth is exogenous. The interaction of the two components may then generate an overall equilibrium in a demand-led endogenous growth model.[6] The models mentioned above differ in two essential ways. Cassetti (2003) and Hein and Tarassow (2010) take the profit share determined by mark-up pricing over unit direct labour costs to be exogenous for the demand and productivity components of the model and they include a direct positive effect of productivity growth into the investment function of the demand component based on the notion of capital-embodied technical change. The other models, however, take real wage growth determined by institutions and power relations to be exogenous, affecting both productivity and demand components. Functional income distribution thus turns endogenous in these models. In contrast, in a long-run equilibrium with constant functional income distribution, there would be no effect of technical change on demand and growth anymore. Furthermore, it remains unclear why, in the short run, any positive growth rate of the real wage should stimulate productivity growth even though it may remain below the latter and thus generate a rising profit share.[7] In our view, real wage growth should only stimulate productivity growth if it exceeds the latter and thus causes a fall in the profit share. In our model extension in Section 4, we will therefore follow that approach.

With such a model, a stable overall demand-led endogenous growth equilibrium can be derived, if demand and productive components do not respond too strongly to each other, as shown in Hein and Tarassow (2010) and Hein (2014, ch. 8). An increase in the profit share will then have uniquely contractionary effect on the overall regime if the demand component is wage-led, since the effect on the productivity component is always wage-led. The overall regime will thus be wage-led, too. With a profit-led demand component, an increase in the profit share may have contractionary, intermediate or expansionary effects on the overall regime, which may hence be wage-led, intermediate or profit-led. The stronger the positive

[6] See also the presentations in Hein (2014, ch. 8, 2023, ch. 7.10), Lavoie (2022, ch. 6.9).

[7] On the interaction of real wage growth and productivity growth, in which the former stimulates the latter but the latter also provides the distribution neutral space for the former, see Bhaduri (2006).

effect of an increase of the profit share on the profit-led demand component, and the weaker the negative effect on the wage-led productivity component, the more likely is an overall profit-led regime.

3. The effects of LMIs on productivity growth: Schumpeterian perspectives

3.1 'Creative destruction', 'creative accumulation' and different types of innovation creation

The core concept in Schumpeterian innovation theory is the process of 'creative destruction' (Schumpeter 2005, ch. 7). Broadly summarised, creative destruction refers to technical progress and associated changes in market structure. Old firms with rather outdated production technology exit markets when upcoming innovative firms and entrepreneurs outcompete them with new technology, new products and/or lower unit costs. The concept of 'technological or creative accumulation', however, refers to technical change by large firms with R&D labs and barriers of entry to new innovators (Bell and Pavitt 1993, Malerba and Orsenigo 1995). In this case, incumbent big firms accumulate knowledge and skills, and market structure does not change. The concepts of 'creative destruction' and 'creative accumulation' have given rise to two different innovation models, Schumpeter Mark I and Mark II, in Schumpeterian evolutionary research.

In their seminal work on Schumpeter models, Malerba and Orsenigo (1995, 1996, 1997) differentiate two main kinds of innovation patterns, acknowledging that specific technologies are embedded into a social context. This then generates different 'technological regimes', Schumpeter Mark I and Mark II.[8] Considering the theory of creative destruction and the prominent role of the entrepreneur, innovation in a Schumpeter Mark I type is characterised by low concentration in the market, high birth-rate of new firms with a high inducement to innovate. Contrarily, the Schumpeter Mark II type of innovation is based on creative accumulation and is characterised by high market concentration and high stability of large firms. Their R&D labs innovate based on existing production processes. These different models are employed in various strands of research, such as in Kleinknecht et al. (2014) theoretically or in Hoxha and Kleinknecht (2020, 2024) empirically, whose specific effects derived in this context we will examine in detail below.

The type of innovation is affected by production technologies and products, and thus mainly refers to product groups or industries. Economies composed of different sectors may thus follow both types of innovation, Schumpeter Mark I and Mark II, as will sectors composed of different industries (Malerba and Orsenigo 1997), and, to some degree, even industries composed of different firms (Peneder 2010). However, as pointed out by Malerba and Orsenigo (1996), technological specialisation makes economies tend to focus more on one type of innovation – together with the required socio-institutional environment, including LMIs. Of course, these are evolutionary processes, which may not linearly follow a certain strategy or functionality, as we will also see in our empirical Section 5.

The distinction between Schumpeter Mark I and Mark II innovation types resembles the discussion of innovations in the Varieties of Capitalism (VoC) approach. According to Hall and Soskice (2001a), liberal market economies (LMEs) with deregulated labour markets focus on radical innovations, similar to the Schumpeter Mark I type, while in coordinated market

[8]The applicability of the simple distinction between Mark I and II to contemporary forms of innovation creation was recently questioned. Instead of this dichotomy, Rikap (2024) puts forward intellectual monopoly as a third, new pattern of innovation. As we do not see the implications for labour market institutions in this revived discussion, we keep the distinction between Schumpeter Mark I and II for our purpose.

economies (CMEs) with organised labour markets incremental innovation dominates, similar to the Schumpeter Mark II type. However, the VoC findings have been criticised because the distinction between radical innovations in LMEs versus incremental innovations in CMEs does not hold for all sectors (Taylor 2004, Akkermans *et al.* 2009). This is no surprise from an Schumpeterian perspective, because the innovation pattern are seen not to be economic-specific but technology-specific (Malerba and Orsenigo 1996). However, this does not imply that for economic comparison, countries cannot be seen to be dominated by one type of innovation or the other. For example, Akkermans et al. (2009) admit that LMEs innovate more radically to a certain degree. This is how we will use these categories in what follows.

3.2 Schumpeterian Effects of Wages and LMIs on Technical Progress

3.2.1 Wage Development and Wage Bargaining

First, we focus on the effects of wages and wage bargaining in a Schumpeterian perspective. Throughout the literature, real wage growth and a centralised wage bargaining process have positive effects on productivity growth. These effects take place regardless of the dominant Schumpeterian innovation model, Mark I or Mark II, with varying intensity and thus relevance for technical progress.

Wage growth imposes pressure on technological laggards and induces technical progress at the technological frontier

According to Kleinknecht (1998), with some technology and productivity heterogeneity among firms in an industry, rising wage growth allows firms with more advanced production technology to retain a lower, but still positive profit rate, while firms with less advanced technology and lower firm-level productivity may get shifted towards a negative profit rate. Thus, pressure from real wage growth is distributed unequally towards technological laggards and may force such firms to exit the market, while firms at the technological frontier survive and gain market share. The average level of productivity increases due to the changes in the firm composition of the industry, with the productivity level of each firm remaining constant – a pure re-composition effect. The result is thus in line with the Marx-Hicks effect outlined above, while the channel is not via labour-saving innovation at the firm level, but the restructuring within sectors because of creative destruction and the effect on the firm composition at the industry level.

Schumpeterian literature, however, refers to the direct effect of real wage growth on the technological frontier in a Marx-Hicks line as well, and presents it as further argument in favour of the theory (e.g., Vergeer and Kleinknecht 2014, Kleinknecht 2020, 2026). From our perspective, it follows that despite being able to better cope with wage increases as argued before, the profit rate of firms at the technological frontier decreases with real wage increases. This may lead to efforts to increase firm-level productivity growth to restore profits again. Therefore, also firms at the technological frontier will invest in new, labour-saving technology, thus shift the technological frontier contributing to technical progress and productivity growth.

Centralised wage bargaining on industry level supports creative destruction

The creative destruction process triggered by an increase in real wages will be more pronounced if wage setting is coordinated and centralised at the industry level, and real wages rise for all firms. More decentralised wage bargaining, contrarily, would allow for the survival of technological laggards (Kleinknecht 2020). For a given average trend of wage

growth, decentralised bargaining enables firms with lower productivity (growth) to stay competitive through lower (growth of) wages. Vice versa, more centralised bargaining prevents wage dispersion and imposes pressures on technological laggards which may lead to their market exit. Temporarily, this can cause unemployment in the short run, but higher average productivity growth in the long run. Simultaneously, with coordinated or centralised wage bargaining, firms at the technological frontier reap higher unit profits, which raises the incentive for innovations (Kılıçaslan and Taymaz 2008).

Beyond the industry level, the argument above applies as well for economy-wide structural change from low-wage, low-productivity sectors to high-wage, high-productivity sectors via centralised wage bargaining, what would again increase aggregate productivity growth. Under opposite sign, structural change to more labour-intensive sectors, that exerts a drag on productivity growth, is feasible only to the extent that these sectors can draw on low-wage labour, that employment relations are flexible, and that wage bargaining is decentralised (Kleinknecht 2026). The empirical findings by Kleinknecht et al. (2006) for the Netherlands confirm the argument. Lucidi and Kleinknecht (2010) present similar results for Italy. Ultimately, centralised wage bargaining may facilitate productivity-enhancing structural transformation at both the industry and aggregate economic levels.

3.2.2 The Positive Effects of Labour Market Rigidities on Innovation

In the Schumpeterian perspective, apart from the indirect effects via the wage rate, LMIs directly affect productivity growth, mainly via employment protection and the regulation of temporary contracts. According to the related arguments, rigid labour markets are better for innovation than fully flexible ones. Contrarily to the wage-related arguments above, this channel works differently in Schumpeter Mark I and Mark II economies.

LMIs shape knowledge acquisition

While basic neoclassic models hold that flexible labour markets efficiently allocate labour and improve overall productivity (Kleinknecht 2020, pp. 454–456) – and also generate full employment –, some Schumpeterian authors have argued that innovation is not a matter of efficient allocation of labour (Kleinknecht 2026). Quite the opposite, innovations depend on the ‘accumulation, generation and exploitation of knowledge’ (Antonelli 2019, p. 1). Flexible labour markets with a high degree of fluctuation of workers, that is, a low average tenure of employees with one employer, tend to prevent this accumulation. Workers need decent wages and in particular job security, i.e. high levels of employment protection, to gather firm-specific knowledge and skills and carry out related training, as pointed out by Nickell and Layard (1999) and Bassanini and Ernst (2002). Several empirical studies confirm the positive relation between labour market regulation and knowledge acquisition (Kleinknecht 1998, 2020, Vergeer and Kleinknecht 2010, 2014, Kleinknecht *et al.* 2014, Hoxha and Kleinknecht 2020, 2024). Some further work focuses on temporary contracts. Booth et al. (2002) show with household data that temporary workers receive less job training compared to their colleagues on a permanent contract. Daveri and Parisi (2010) and Pariboni and Tridico (2020), both for the Italian case, find lower productivity (growth) of sectors with a higher share of temporary workers. Furthermore, liberalisation of employment relations does, in fact, affect the productivity of existing workers by undermining their job security (Lucidi and Kleinknecht 2010, Vergeer and Kleinknecht 2014). As is clear, these arguments apply to Schumpeter Mark II type of innovations since they rely on the accumulation of firm-specific knowledge. Schumpeter Mark I innovations, however, would not benefit from regulated labour markets.

Tight labour market regulation would rather harm the innovation process based on a dynamic system with quick emergence, entries and exits of firms.

Industrial relations and social relations in the firm
Further work specifies the positive effects of rigid labour market structures on productivity growth via trust conducive industrial and social relations. As summarised in Storm and Naastepad (2009, 2012), loyalty and trust towards the employer lay the basis for workers' contributions to technological progress. High employment protection and the promise of sharing productivity gains is one way of achieving this trust. Kleinknecht et al. (2014) add that the leakage of firm-specific knowledge to competitors becomes less likely if the relation between employers or the management and workers is characterised by loyalty, which then incentivises firms' investment in R&D. Furthermore, loyalty reduces supervision costs. These arguments bear broad similarities with New Keynesian labour market approaches, which acknowledge asymmetric information and incomplete contracts, which then have given rise to efficiency wage and insider-outsider theories (Akerlof 1984, Shapiro and Stiglitz 1984), as pointed out by Kleinknecht (2020). Firm-level productivity hence with wage growth, because it prevents shirking, motivates insiders, etc.

4. Direct and indirect effects of LMIs on productivity growth in a post-Kaleckian demand-led endogenous growth model

We can now integrate the direct and indirect effects of LMIs derived from the discussion of the Schumpeterian perspective into a post-Kaleckian demand-led endogenous growth model, which we have sketched in Section 2. As pointed out, the procedure in this model follows Setterfield and Cornwall (2002), which means starting with a demand component, taking productivity growth to be exogenous, and a productivity component, taking demand dynamics to be exogenous, and then analysing the interaction of these two. We add the explicit consideration of LMIs, with effects on distribution and the productivity component of the model, in particular. LMI is understood here as a summary index covering employment protection, union density, bargaining coverage, and wage bargaining coordination. Empirically, this index is specified in Section 5. A high index indicates a high degree of employment protection, union density, bargaining coverage and wage bargaining coordination.

4.1 A closed economy post-Kaleckian distribution and growth model with endogenous productivity growth and explicit consideration of LMIs

We assume a closed private economy with capitalists, who own the capital stock (K), which does not depreciate, receive profits (Π), and for finance purposes have access to credit endogenously generated in the financial sector also owned by capitalists (and not modelled here), and workers who sell their labour power and earn wages (W). For the sake of simplicity, we assume the production of one single good, which can be consumed and invested, and which is produced with a fixed coefficient technology. With given technology, labour productivity ($\mathrm{y} = \mathrm{Y}/\mathrm{L}$), relating output ($\mathrm{Y}$) to labour input ($\mathrm{L}$), is constant up to full capacity output ($\mathrm{Y^p}$) given by the capital stock. The capital-potential output ratio ($\mathrm{v} = \mathrm{K}/\mathrm{Y^p}$) is constant, too, and the capital stock is usually not fully utilised, such that the rate of capacity utilisation ($\mathrm{u} = \mathrm{Y}/\mathrm{Y^p}$) is usually below unity. Also, labour is generally in excess supply and does not pose a constraint to production. Technical change is capital-embodied and of the

Harrod-neutral type. It thus raises labour productivity but keeps the capital-potential output ratio constant.

Distribution

The profit share (h), relating gross profits to national income consisting of profits and wages ($pY = W + \Pi$), is determined by the degree of price competition in the incompletely competitive goods market. It is also affected by the long-run bargaining power of labour, which itself is positively related to the degree of labour market regulation (Λ), i.e. the LMI (employment protection, union density, wage bargaining coverage, wage bargaining coordination, among others). Therefore, we get for the wage share ($\Omega = 1 - h$):

$$(1) \qquad \Omega = \frac{W}{pY} = \Omega_0 + \Omega_1 \Lambda, \qquad 0 < \Omega_0 < 1, 0 < \Omega_1,$$

with Ω_0 representing all the other determinants of the wage share and Ω_1 the influence of the degree of labour market regulation.

Demand component

Saving (S) only consists of saving out of profits (S_Π), because we assume that workers do not save. We obtain for the saving rate (σ), which relates total saving to the nominal capital stock (pK):

$$(2) \qquad \sigma = \frac{S_\Pi}{pK} = \frac{s_\Pi \Pi}{pK} = s_\Pi (1 - \Omega) \frac{u}{v}, 0 < s_\Pi \leq 1.$$

Investment is modelled according to the post-Kaleckian approach following Bhaduri and Marglin (1990) and Kurz (1990, ch. 10): Capital accumulation is a positive function of animal spirits and the profit rate, which is decomposed into the profit share, the rate of capacity utilization and the capital-potential output ratio [$r = (1 - \Omega)u/v$]. We also include technical progress, which for the demand component is assumed to be exogenous, into the investment function. Since technical progress is embodied in the capital stock, it will stimulate investment as described above. This effect on investment will be the more pronounced the more fundamental technical change is: The invention of new basic technologies will have a stronger effect on real investment than marginal changes in technologies already in existence.

Since the capital-potential output ratio is assumed to be constant with technical change, capital accumulation is positively affected by the profit share, indicating unit profits, and hence negatively by the wage share, positively by the rate of capacity utilization, indicating (expected) demand, and by potential productivity growth ($\hat{y}$) made available by new technologies:

$$(3) \qquad g = \frac{I}{K} = \alpha + \beta u + \tau(1 - \Omega) + \gamma \hat{y}, \quad \alpha, \beta, \tau, \gamma > 0.$$

The goods market equilibrium requires:

$$(4) \qquad \sigma = g,$$

and the goods market equilibrium is stable if:

(5) $$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} > 0 \Rightarrow \frac{s_\Pi}{v}(1-\Omega) - \beta > 0.$$

In what follows, we will only consider stable goods market equilibria. Making use of equations (1) – (4), we get for the equilibrium demand component, either in terms of the goods market equilibrium rate of capacity utilisation (u^*) or the goods market equilibrium rate of capital accumulation (g^*):

(6) $$u^* = \frac{\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)+\gamma\hat{y}}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta}$$

and

(7) $$g^* = \frac{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)[\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)+\gamma\hat{y}]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta}.$$

For the effects of changes in LMIs raising the wage share on the demand component, we receive:

(6a) $$\frac{\partial u^*}{\partial \Lambda} = \frac{\left(u^*\frac{s_\Pi}{v}-\tau\right)\Omega_1}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta}$$

and

(7a) $$\frac{\partial g^*}{\partial \Lambda} = \frac{\frac{s_\Pi}{v}\Omega_1[\beta u^*-\tau(1-\Omega_0-\Omega_1\Lambda)]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta}.$$

An improvement of LMIs conducive to a rise in the wage share may now have wage- or profit-led effect on the demand component. A wage-led demand component with $\partial u^*/\partial\Lambda > 0$ and $\partial g^*/\partial\Lambda > 0$ requires a strong effect of redistribution on consumption, and hence a high propensity to save out of profits, and an only weakly negative effect of profitability on investment. Furthermore, a strong accelerator effect is required for boosting equilibrium capital accumulation when utilisation is rising but profitability is falling. If these conditions are not given, we will see a profit-led demand component with $\partial u^*/\partial\Lambda < 0$ and $\partial g^*/\partial\Lambda < 0$. In what follows, we ignore the discussion of an intermediate regime with $\partial u^*/\partial\Lambda > 0$ and $\partial g^*/\partial\Lambda < 0$, which is possible if a high propensity to save out of profits and a low profitability effect on investment are associated with a low accelerator in the investment function (Hein 2014, ch. 6). We also ignore non-linearities in the effects of changes in distributions triggered by changes in LMIs, i.e. the higher the rate of utilisation the stronger are the effects of an increase in the wage share on consumption and the related accelerator effects on investment and hence the expansionary effect in a wage-led economy (Prante 2019).

Productivity component

For the productivity component, we can make use of the Kaldor-Verdoorn channel relying on demand and capital stock growth effects on productivity growth and on the Marx-Hicks/Webb wage-push channel, as outlined in Section 2. Furthermore, we must include the two Schumpeter cases for the direct effect of LMIs on productivity growth. From this, we get

the following alternatives for the productivity component, making already use of equation (1) for the wage share:

(8) $\hat{y} = \eta + \rho u + \theta(\Omega_0 + \Omega_1 \Lambda) + \phi\Lambda, \quad \eta, \rho, \theta > 0, \phi = ?,$

(9) $\hat{y} = \eta + \varepsilon g + \theta(\Omega_0 + \Omega_1 \Lambda) + \phi\Lambda, \quad \eta, \varepsilon, \theta > 0, \phi = ?.$

The constant in both equations captures the influence of other features than demand and capital stock dynamics, distribution and LMIs, like government technology policies and R&D expenditures, the education system, etc. We have separated the Kaldor-Verdoorn channel in a pure demand dynamics channel a la Verdoorn in equation (8) and a capital stock growth channel a la Kaldor's technical progress function in equation (9), which are both exogenous for the analysis of the productivity component. Of course, de facto both channels will be at work, and since productivity growth rates in equations (8) and (9) are equal, we have $\rho/\varepsilon = g/u$. According to our discussion of Schumpeterian channels, the direct influence of the degree of labour market regulation on productivity growth will be negative with the Schumpeter Mark I type of innovation, and positive with the Schumpeter Mark II type of innovation dominating. For the effect of an improvement of LMIs, we thus have:

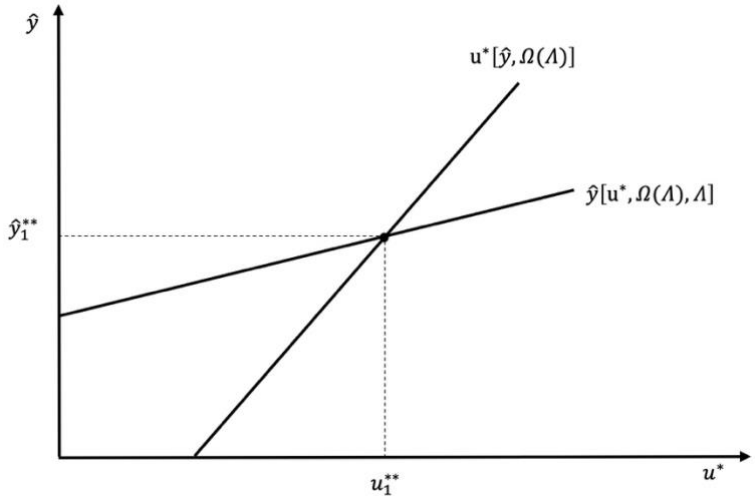
(8a, 9a) $\frac{\partial \hat{y}}{\partial \Lambda} = \theta\Omega_1 + \phi.$

For the Schumpeter II type, with $\phi > 0$, an improvement of wage share enhancing LMIs have an unambiguously positive effect on productivity growth, and we have an LMI-led productivity component with $\frac{\partial \hat{y}}{\partial \Lambda} > 0$. For the Schumpeter I type, with $\phi < 0$, however, direct and indirect effects, via the wage-push channel of improved LMIs, work in operate directions, and the total effect will depend on the relative strength of each of these channels. We may thus also have an LMI-burdened productivity component with $\frac{\partial \hat{y}}{\partial \Lambda} < 0$, if the negative direct effect overwhelms the positive indirect effect via distribution and the Marx-Hicks channel ($\theta\Omega_1 < \phi$), or again an LMI-led productivity component with $\frac{\partial \hat{y}}{\partial \Lambda} > 0$, which requires that the direct effect is weaker than the indirect effect via distribution and the Marx-Hicks channel ($\theta\Omega_1 > \phi$).

Overall equilibrium

To analyse the overall effect of changes in LMIs we have to derive the overall equilibrium given by the interaction of demand and productivity components. Graphically, this is presented in Figure 2.a for the interaction of the goods market equilibrium rate of capacity utilisation from equation (6) and the productivity growth equation (8) or in Figure 2.b for the interaction of the goods market equilibrium rate of capital accumulation in equation (7) and the productivity growth equation (9).

2.a Capacity utilisation and productivity growth



2.b Capital accumulation and productivity growth

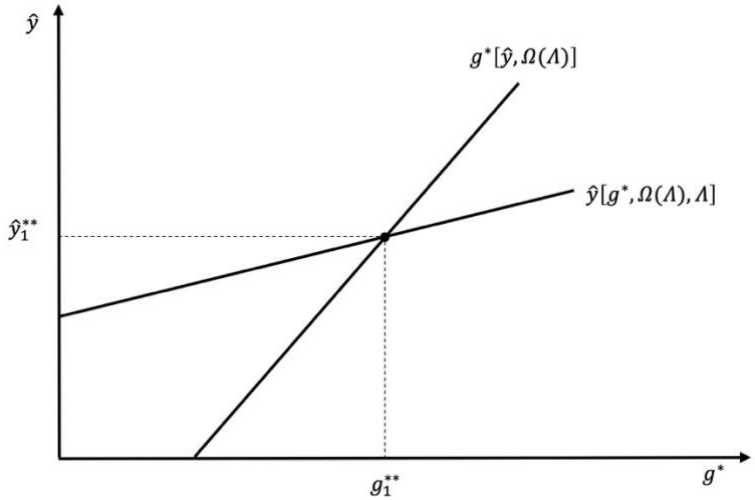


Figure 2. A Kalecki-Steindl-Kaldor-Marx-Schumpeter endogenous growth model
Notes: Own presentation.

Analytically, the interactions of the respective equations yield the following overall equilibria. From equations (6) and (8), we get:

$$(10) \qquad u^{**} = \frac{\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)+\gamma[\eta+\theta(\Omega_0+\Omega_1\Lambda)+\phi\Lambda]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta-\gamma\rho}$$

and

$$(11) \qquad \hat{y}^{**} = \frac{\rho\{\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)\}+\left[\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta\right][\eta+\theta(\Omega_0+\Omega_1\Lambda)+\phi\Lambda]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta-\gamma\rho}.$$

From equations (7) and (9) we get:

(12) $$g^{**} = \frac{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)\{\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)+\gamma[\eta+\theta(\Omega_0+\Omega_1\Lambda)+\phi\Lambda]\}}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)(1-\gamma\varepsilon)-\beta}$$

and

(13) $$\hat{y}^{**} = \frac{\varepsilon\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)[\alpha+\tau(1-\Omega_0-\Omega_1\Lambda)]+[\eta+\theta(\Omega_0+\Omega_1\Lambda)+\phi\Lambda]\left[\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta\right]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)(1-\gamma\varepsilon)-\beta}.$$

The existence and the stability of the overall equilibrium require that the slope of the graph for the capacity utilization equation (the capital accumulation equation) of the demand component exceeds the slope of the graph representing the productivity growth equation of the productivity component in Figure 2. Therefore, from equations (6) and (8) we obtain the following condition for the existence and stability of an overall long-run equilibrium of capacity utilization and productivity growth:

(14) $$\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta-\gamma\rho>0.$$

From equations (7) and (9) the condition for existence and stability of an overall equilibrium of capital accumulation and productivity growth is:

(15) $$\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)(1-\gamma\varepsilon)-\beta>0.$$

Comparing the stability condition of the overall equilibrium with the one for the demand component (5), we find that the requirements for stability are now more difficult to meet when productivity growth becomes endogenous. Generally, overall stability requires that demand and productivity components not respond too strongly to each other. If conditions (14) or (15) are violated, we will see explosive capacity utilization, capital accumulation and productivity growth, as can easily be checked with the help of Figure 2a) and b).

4.2 LMIs and potential overall socio-institutional productivity regimes

Focussing on stable overall equilibria, we have the following effects of changes of LMIs on the overall equilibrium values of capacity utilisation, capital accumulation and productivity growth:

(10a) $$\frac{\partial u^{**}}{\partial\Lambda} = \frac{\Omega_1\left(\frac{s_\Pi}{v}u^{**}-\tau+\gamma\theta\right)+\gamma\phi}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta-\gamma\rho}.$$

(11a) $$\frac{\partial\hat{y}^{**}}{\partial\Lambda} = \frac{\Omega_1\left\{\frac{s_\Pi}{v}[\hat{y}^{**}-2\theta(\Omega_0+\Omega_1\Lambda)-\phi\Lambda+\theta-\eta]-\rho\tau-\theta\beta\right\}+\phi\left[\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta\right]}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta-\gamma\rho}.$$

(12a) $$\frac{\partial g^{**}}{\partial\Lambda} = \frac{\Omega_1\frac{s_\Pi}{v}[(1-\gamma\varepsilon)g^{**}-\alpha-\gamma(\eta+\theta(\Omega_0+\Omega_1\Lambda)+\phi\Lambda)+(1-\Omega_0-\Omega_1\Lambda)(-2\tau+\gamma\theta)]+\gamma\phi\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)}{\frac{s_\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)(1-\gamma\varepsilon)-\beta}$$

(13a) $$\frac{\partial \widehat{y^{**}}}{\partial \Lambda} = \frac{\Omega_1\langle\frac{s\Pi}{v}\{(1-\gamma\varepsilon)\widehat{y^{**}}-\varepsilon[\alpha+2\tau(1-\Omega_0-\Omega_1\Lambda)]-\eta-\theta(\Omega_0+\Omega_1\Lambda)-\phi\Lambda\}+\theta\left[\frac{s\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta\right]\rangle+\phi\left[\frac{s\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)-\beta\right]}{\frac{s\Pi}{v}(1-\Omega_0-\Omega_1\Lambda)(1-\gamma\varepsilon)-\beta}$$

Each of the derivatives show, that an improvement of LMIs affects the overall equilibrium via different channels, as also shown in Figure 3. First, there is the direct effect on the productivity component (ϕ), which may be positive or negative depending on the dominant Schumpeter innovation case in the economy. It has positive effects on the overall equilibrium in the Schumpeter Mark II case and negative ones in the Schumpeter Mark I case. Second, there is the positive effect of LMIs on the wage share (Ω_1), which then has directly positive effects on the productivity component (θ), with positive feedback on the demand component (γ) and on the overall regime. The increase in the wage share also directly affects the demand component, positively in the wage-led case and negatively in the profit-led case, which then also feeds back on the productivity component (ρ or ε) and the overall regime.

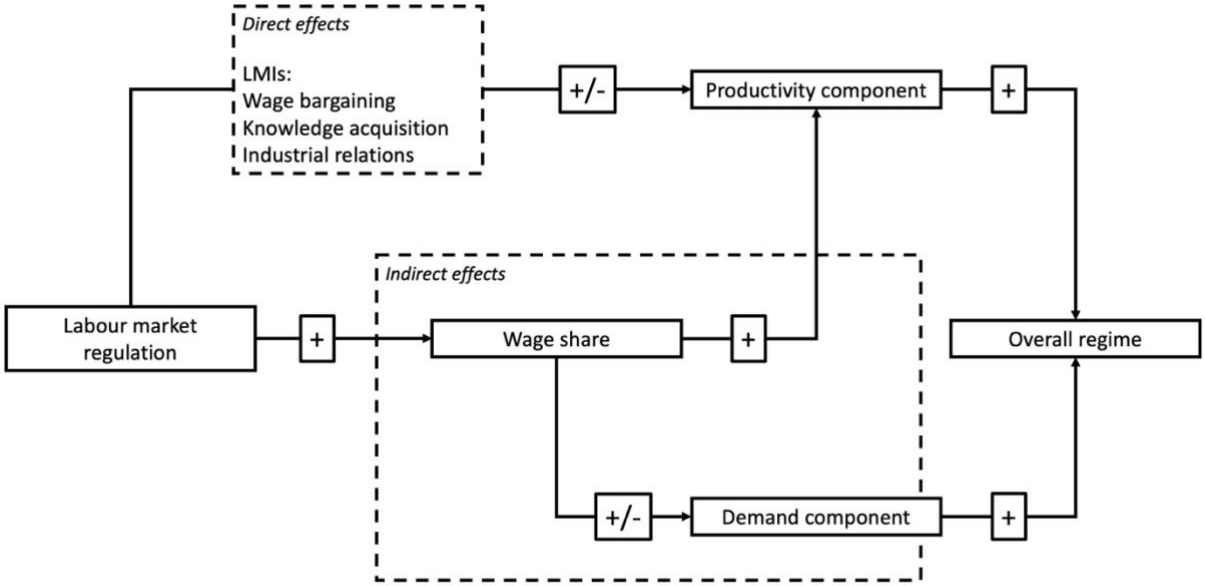


Figure 3. Direct and indirect effects of labour market regulation

Notes: Own presentation. A plus indicates a positive effect between respective elements, a minus a negative one.

Based on the presented model, the following potential overall socio-institutional productivity regimes can be distinguished. Tables 1 and 2 present the theoretical cases for the overall regime in the face of an increase in LMIs, for a wage- and a profit-led demand component, respectively. The outcome can be expansionary, intermediate or contractionary. An expansionary overall regime means that the overall equilibrium values of capacity utilisation, capital accumulation and productivity growth each increase with an increase in LMIs. In an intermediate regime, either the overall equilibrium values of capacity utilisation and capital accumulation increase while overall equilibrium productivity growth decreases, or vice versa. If higher labour market regulation causes a fall in each overall equilibrium value, we have a contractionary overall regime.

For a wage-led demand component (Table 1) combined with an LMI-led productivity component, we get a uniquely expansionary overall regime. If the wage-led demand component is associated with an LMI-burdened productivity component, we may still obtain an expansionary overall regime, if the productivity component is only weakly LMI-burdened. If the productivity regime is strongly LMI-burdened this may turn the overall regime contractive. With an intermediately LMI-burdened productivity component, the overall regime may turn intermediate, too, with positive effects on overall equilibrium capacity utilisation and capital accumulation, and negative effects on overall equilibrium productivity growth. It should be noticed that with a wage-led demand component, the Schumpeter Mark II innovation type will always generate an LMI-led productivity component and thus an expansionary overall regime. Moreover, the Schumpeter Mark I innovation type might be associated with an expansionary overall regime if the productivity regime remains LMI-led or turns only weakly LMI-burdened.

Table 1. Effects of an increase in LMIs on the overall equilibrium with a wage-led demand component

	Wage-led demand component $(\partial u^*/\partial\Lambda) > 0;\ (\partial g^*/\partial\Lambda) > 0$			
	LMI-led productivity component $(\partial\hat{y}/\partial\Lambda) > 0$	LMI-burdened productivity component $(\partial\hat{y}/\partial\Lambda) < 0$		
		Weak	Intermediate	Strong
$\partial u^{**}/\partial\Lambda$	+	+	+	–
$\partial g^{**}/\partial\Lambda$	+	+	+	–
$\partial\hat{y}^{**}/\partial\Lambda$	+	+	–	–
Overall regime	Expansionary	Expansionary	Intermediate	Contractionary

Notes: Own presentation.

For a profit-led demand component, we obtain opposite results for an increase in LMIs. If the profit-led demand component is associated with an LMI-burdened productivity component, the overall regime will be uniquely contractionary. This result will also be obtained with a weakly LMI-led productivity component. If the latter is strongly LMI-led, the overall regime will turn expansionary. With an intermediately LMI-led productivity component, the overall regime may be intermediate too, with contractionary effects on overall equilibrium capacity utilisation and capital accumulation, and expansionary effects on overall equilibrium productivity growth. With profit-led demand, the increase in LMIs will always be contractionary if the Schumpeter Mark I innovation type is sufficiently strong and overwhelms the Marx-Hicks effect on productivity growth. Even if it does not and the productivity regime turns weakly LMI-led, the Schumpeter Mark I innovation type will be associated with a contractionary regime. However, a Schumpeter Mark II innovation type may make the productivity regime strongly LMI-led, which then will lead to an intermediate or even expansionary effect of improving LMIs on the overall regime, although the demand component is profit-led.

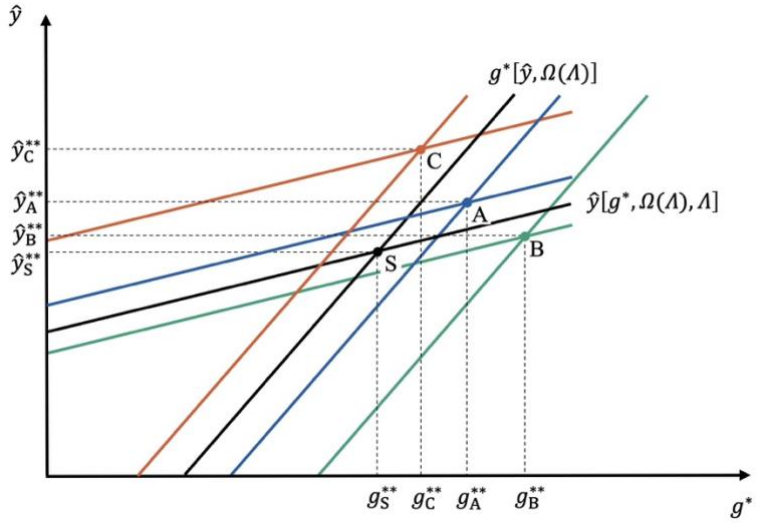
Table 2. Effects of an increase in LMIs on the overall equilibrium with a profit-led demand component

	Profit-led demand component $(\partial u^* / \partial \Lambda) < 0;\ (\partial g^* / \partial \Lambda) < 0$			
	Weak	LMI-led productivity component $(\partial \hat{y} / \partial \Lambda) > 0$ intermediate	Strong	LMI-burdened productivity component $(\partial \hat{y} / \partial \Lambda) < 0$
$\partial u^{**} / \partial \Lambda$	–	–	+	–
$\partial g^{**} / \partial \Lambda$	–	–	+	–
$\partial \hat{y}^{**} / \partial \Lambda$	–	+	+	–
Overall regime	Contractionary	Intermediate	Expansionary	Contractionary

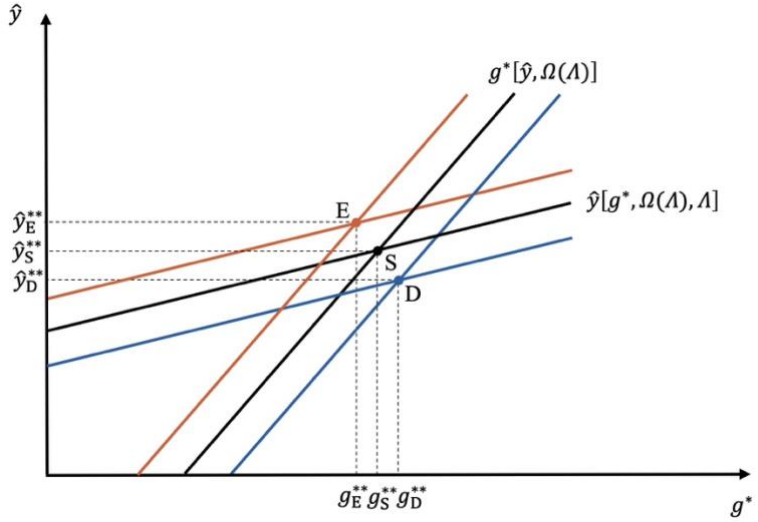
Notes: Own presentation.

Figure 4 shows all three possible overall regimes for productivity growth and capital accumulation in the face of improving LMIs. Figure 4.a shows the expansionary overall regimes, which may arise with a wage-led demand component and an LMI-led productivity component, which moves the equilibrium from S to A, with a wage-led demand component and a weakly LMI-burdened productivity component, moving the equilibrium from S to B. In addition, a profit-led demand component combined with a strongly LMI-led productivity component may generate an expansionary overall regime and move the equilibrium from S to C. An intermediate overall regime, as shown in Figure 4.b, may result from a wage-led demand component and an intermediately LMI-burdened productivity regime, moving the equilibrium from S to D, or from a profit-led demand component and an intermediately LMI-led productivity regime, shifting the equilibrium from S to E. Lastly, as shown in Figure 4.c, a contractionary overall regime may emerge with the following constellations: a wage-led demand component associated with a strongly LMI-burdened productivity component, shifting the equilibrium from S to F, a profit-led demand component and a weakly LMI-led productivity component, shifting the equilibrium form S to G, or a profit-led demand component and an LMI-burdened productivity component, moving the equilibrium form S to H.

4.a Expansionary overall regime



4.b Intermediate overall regime



4.c Contractionary overall regime

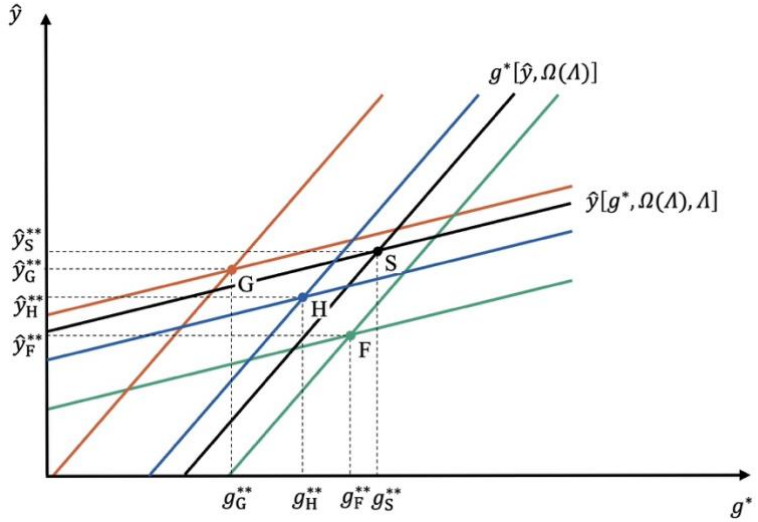


Figure 4. The possible overall regimes for an increase in LMIs

Notes: Own presentation. Equilibrium S refers to the starting point; A, B, C, D, E, F, G and H to the overall equilibria after an increase in LMIs.

5. LMIs, distribution conflict, GDP and productivity growth in the G7 economies since the 1980s

Having so far outlined the theoretically possible overall socio-institutional productivity regimes, we now turn to an application of our theoretical approach to the development in the G7 countries since the 1980s, i.e. to the advanced capitalist economies of Canada, France, Germany, Italy, Japan, the UK and the US. We examine their GDP and productivity growth trajectories, as well as the changes in functional income distribution and relate these to the change in LMIs, finally allocating the identified respective patterns to the regimes derived from the theoretical model.

5.1 Trends of GDP growth, productivity growth, labour income shares and LMIs

Since we are interested in the trends of our variables, cyclical averages are calculated for annual values. A trade cycle is defined to start with the first year of a recession and to end with the last year before the next recession. A recession year is a local minimum of annual GDP growth rates. Appendix A presents GDP growth and the cycles for all economies examined.[9] There are five cycles, with the fifth one from 2020 to 2024 incomplete. Furthermore, LMI values are not fully available for this last period. Hence, we focus on the four complete cycles from the early 1980s until 2019.

Table 3 shows the trade cycle average values for real GDP growth and productivity growth for the G7 countries. A falling trend is evident both in real GDP growth and in productivity growth for all countries during the first four cycles.[10] While GDP growth has a continuously falling trend for all countries, the decline of productivity growth is interrupted in Canada in the second and fourth cycle, in the UK in the second cycle and in the US in the second and third cycle (see also Figure 1). Italy as well sees a slight increase of productivity growth in the fourth cycle – from a negative value in the third cycle. While the CMEs with a coordinated labour market (France, Germany, Italy, Japan) exhibit a clear continuous fall of productivity growth rates, the LMEs with more deregulated labour markets (Canada, the UK, the US) show a hump-shaped development and end on a higher productivity growth than the coordinated economies. Furthermore, LMEs in our sample have had a higher GDP growth rate on average over all cycles (2.38%) than the CMEs (1.53%).

[9] Data for Germany is data for West Germany until 1991 and data for reunified Germany thereafter. Growth rates for 1991 are calculated on data for West Germany; growth rates for 1992 on data for reunified Germany. The Eurozone crisis is considered to be part of a longer cycle from 2009-2019 for the three Eurozone countries, France, Germany and Italy.

[10] Interestingly, this falling trend is continued in the fifth period, covering the Covid crisis 2020 and the first recovery years from that crisis, in all countries but Italy and US. Analysing the causes for this – presumably different macroeconomic policy approaches – is beyond the scope of the current paper. It also remains to be seen whether a full post-2020 crisis cycle will confirm this change of the trend in these two countries.

Table 3. GDP growth and productivity growth, G7 economies, trade cycle averages, 1981–2024, per cent

Country/Variable	Unit	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
Canada		**1982-1990**	**1991-2002**	**2003-2008**	**2009-2019**	**2020-2024**
GDP growth	%	2.58	2.80	2.30	1.79	1.66
Productivity growth	%	0.89	1.70	0.72	0.82	0.29
France		**1981-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
GDP growth	%	2.32	2.22	1.89	1.02	0.90
Productivity growth	%	2.80	1.94	0.76	0.71	-0.68
Germany		**1982-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
GDP growth	%	2.73	1.45	1.53	1.29	0.18
Productivity growth	%	2.53	1.89	1.04	0.81	0.40
Italy		**1982-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
GDP growth	%	2.17	1.68	0.76	-0.28	1.46
Productivity growth	%	1.55	1.46	-0.03	0.14	0.13
Japan		**1981-1992**	**1993-2001**	**2002-2008**	**2009-2019**	**2020-2024**
GDP growth	%	4.22	1.04	1.03	0.58	0.18
Productivity growth	%	3.81	2.18	1.10	0.94	0.69
UK		**1981-1990**	**1991-2001**	**2002-2008**	**2009-2019**	**2020-2024**
GDP growth	%	2.94	2.61	2.16	1.37	0.98
Productivity growth	%	2.21	2.84	1.33	0.44	1.02
US		**1982-1990**	**1991-2000**	**2001-2008**	**2009-2019**	**2020-2024**
GDP growth	%	3.43	3.45	2.22	1.84	2.38
Productivity growth	%	1.45	1.81	2.06	1.05	1.69

Notes: Own calculations based on European Commission (2025). Productivity growth is the annual change of GDP per hour worked. Cycles classified for each economy individually based on first year of a recession as start of the cycle and the last year before the next recession as the end, see Appendix A for details.

Table 4. Summary index for LMIs, G7 economies, trade cycle averages, 1981–2019

Country	Cycle 1	Cycle 2	Cycle 3	Cycle 4
Canada	0.257	0.242	0.227	0.222
France	0.509	0.518	0.532	0.528
Germany	0.584	0.515	0.445	0.423
Italy	0.710	0.658	0.598	0.605
Japan	0.262	0.234	0.199	0.190
UK	0.454	0.318	0.292	0.265
US	0.153	0.137	0.125	0.118

Notes: Own calculations based on OECD (2024) and OECD and AIAS (2025). The LMIs index is the weighted average of indicators normalised to a scale from 0 to 1; 0 indicates a fully deregulated labour market, 1 a fully regulated one. Cycles classified for each economy individually based on first year of a recession as start of the cycle and the last year before the next recession as the end, see Appendix A for years.

The LMI index shown in Table 4 is a summary index including measures on employment protection, the wage bargaining level, union density and bargaining coverage. A detailed overview of these measures for all countries can be found in Appendix B. To calculate the summary index, each indicator is normalised to a continuous scale ranging from 0 to 1, where a value of 0 represents a fully deregulated feature of the labour market and a value of 1 corresponds to a fully regulated feature. The average is weighted so that we equally consider employment protection, the bargaining level, union density and bargaining coverage, as is explained in Appendix C. NA values for indicators in cycles 1 to 4 are stripped before calculating the average. As already mentioned, the fifth period had to be excluded due to insufficient data.

While the single indicators for the components of our LMI index show some variance among countries, the summary index reveals the usual pattern regarding LMIs in LMEs and CMEs that has already been put forward in the VoC approach (Hall and Soskice 2001b). We see high values of the index for France, Germany and Italy and low values for Canada and the US for all four cycles, confirming Thelen (2001). Somewhat unclear are the cases of the UK and Japan. While the UK is usually categorised as LME (Hall and Soskice 2001a), its LMI index is relatively high, especially in cycle 1 and 2. This mainly stems from high union density and bargaining coverage. Employment protection is low and the bargaining level has been decentralised, especially since the 1990s. Japan is the opposite case , which is usually classified as CME (Hall and Soskice 2001a), while Table 4 shows a low LMI index. One of the reasons for this is that, although the level of wage bargaining is low, the coordination on the employer side has been considered to be quite high (Soskice 1990). As these deviations are already present in the work by Hall and Soskice (2001b) and can be explained, we keep the original classification of these economies as LME and CME.

Common to both types of capitalist economies has been a trend towards deregulation of the labour market. Except for France, all economies have seen a fall in the LMI index over the cycles. However, the causes of these declines in the summary index differ between liberal and coordinated economies, as becomes clear when considering the values of the components of the LMI index in Appendix B. While CMEs have removed employment protection, especially regarding temporary workers, LMEs with low employment protection at the beginning, have seen a fall in union density and bargaining coverage. Union density and bargaining coverage has also fallen in the CMEs and contributed to a fall in their LMI index.

Following the post-Keynesian/post-Kaleckian model in Section 4, labour market deregulation lowering workers' and trade unions' bargaining power should contribute to a fall in the wage share. Figure 5 contains the average wage share over the cycles, showing a falling trend from the first to the fourth cycle in Canada, France, Germany, Italy, Japan and the US. For Japan and the US this trend is continuous, while the EU countries France, Germany and Italy display some slight recovery in the fourth cycle, and Canada in the second and fourth cycle. The UK, on the opposite, has seen a trend increase of the wage share over these four cycles. With that, we have two exceptions from the general simultaneous trend of falling LMI index and falling wage share since the early 1980s: first, in the UK there is a trend of labour market deregulation associated with an increase in the wage share, and, second, in France we have a rising LMI index accompanied by a falling trend of the wage share. It should be remembered that in Kaleckian distribution theory, workers' bargaining power is only one determinant of the wage share among several others, like the degree and relevance of price competition, as well as overhead costs, which also affect the mark-up in firms pricing, and then the relationship of unit material costs to unit wage costs, and finally the sectoral

composition of the economy (Hein 2014, ch. 5, 2015). Furthermore, the components of our LMI index do not fully determine workers' bargaining power, which may also be affected by unemployment benefits, minimum wage policies, etc., and, last but not least, by the unemployment rate. Explaining the causes for level and trend of functional income distribution in each of the G7 countries is well beyond the scope of this contribution.

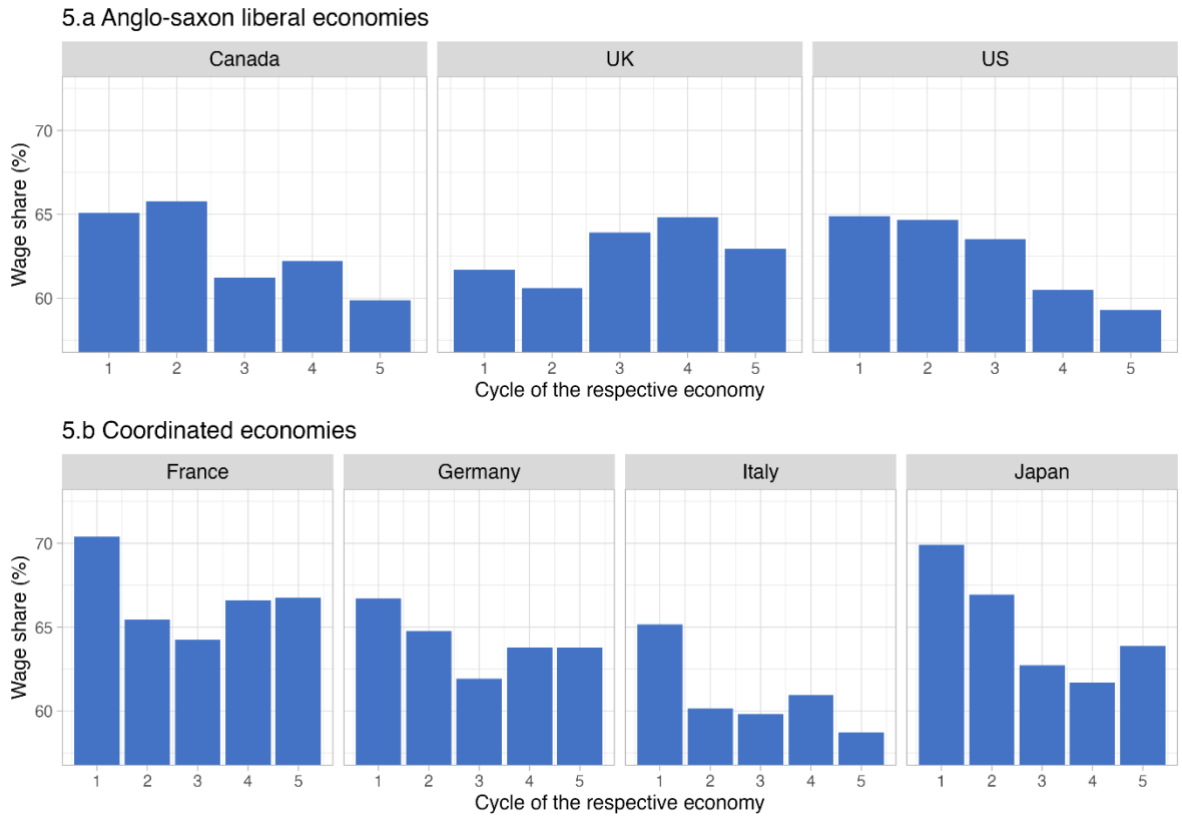


Figure 5. Adjusted wage shares, G7 economies, trade cycle averages, 1981–2024, per cent of GDP at factor costs

Notes: Own calculations and presentation based on European Commission (2025). Cycles classified for each economy individually based on first year of a recession as start of the cycle and the last year before the next recession as the end, see Appendix A for years.

5.2 Patterns and socio-institutional productivity regimes

In order to identify patterns of changes in LMIs, distribution, GDP growth and productivity growth, and to link these to our socio-institutional productivity regimes generate in Section 4, Figure 6 maps the cumulative changes of our LMI index and the cumulative changes in the key macroeconomic variables for the cycles from 1981 until 2019. We refrain from running regressions because of the lack of observations and, more importantly, because our interest lies in potentially different socio-institutional productivity regimes dominating in each country. The empirical part is thus rather illustrative than analytical.

Figure 6.a mainly confirms a positive relationship between labour market regulation and the wage share. In most cycles, a fall in the LMI index is associated with a fall in the wage share, except for the UK and France, as explained above. Furthermore, Figure 6.b shows that the fall in the LMI index and hence the deregulation trend is accompanied by stagnation tendencies in real GDP growth. All economies except France develop towards the lower left quadrant.

Looking at the cumulative relationship between changes in the LMI index and changes in productivity growth in Figure 6.c, we see that for all countries but France in the long-run labour market deregulation is related with falling labour productivity growth. Only in France the fall in productivity growth is associated with a rise in the LMI index. Furthermore, in the LMEs Canada, the UK and the US in one or two cycles, labour market deregulation is associated with a rise in labour productivity growth without breaking the overall trend of falling LMI indices accompanied by falling productivity growth rates.

Next, we look at the cumulative changes of the wage share or of real GDP growth and labour productivity growth in Figure 7. All economies move towards the lower left quadrant indicating a common trend between the wage share and productivity growth, on the one hand, and between GDP growth and productivity growth, on the other hand, as indicated by the Marx-Hicks wage-push channel and the Kaldor-Verdoorn Law. The exception is the UK where falling productivity growth rates are associated with a rising wage share. Furthermore, for the second cycle in the UK and the second and third cycle of the US a positive relationship between GDP growth and productivity growth cannot be found.

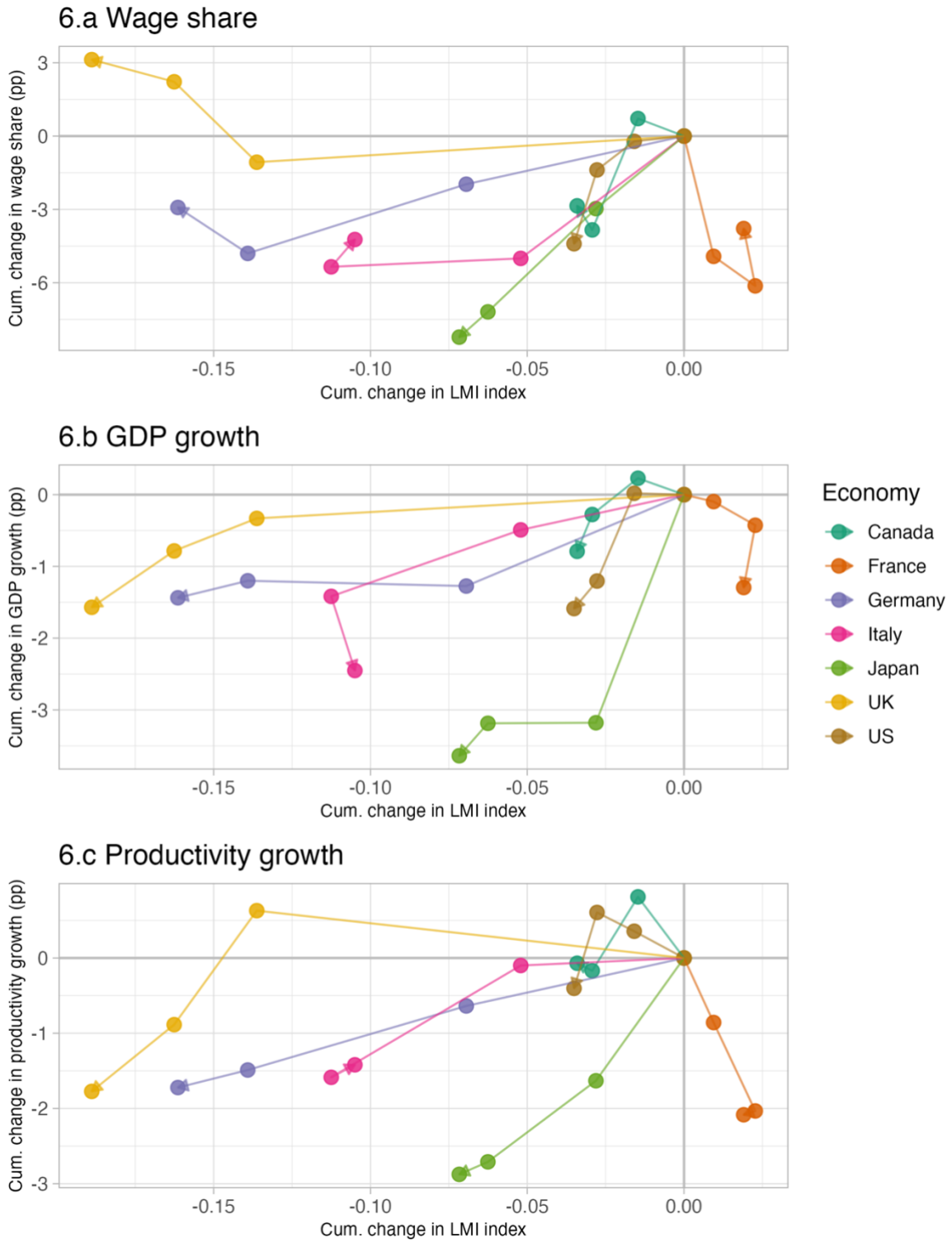


Figure 6. Cumulative change in LMIs and in selected variables, G7 economies, trade cycles, 1981–2019

Notes: Own calculations and presentation based on European Commission (2025), OECD (2024) and OECD and AIAS (2025). The LMI index is the weighted average of indicators normalised to a scale from 0 to 1; 0 indicates a fully deregulated labour market, 1 a fully regulated one. Dots indicate cumulative change of both variables for each cycle, relative to cycle 1. Lines connect cycles in chronological order.

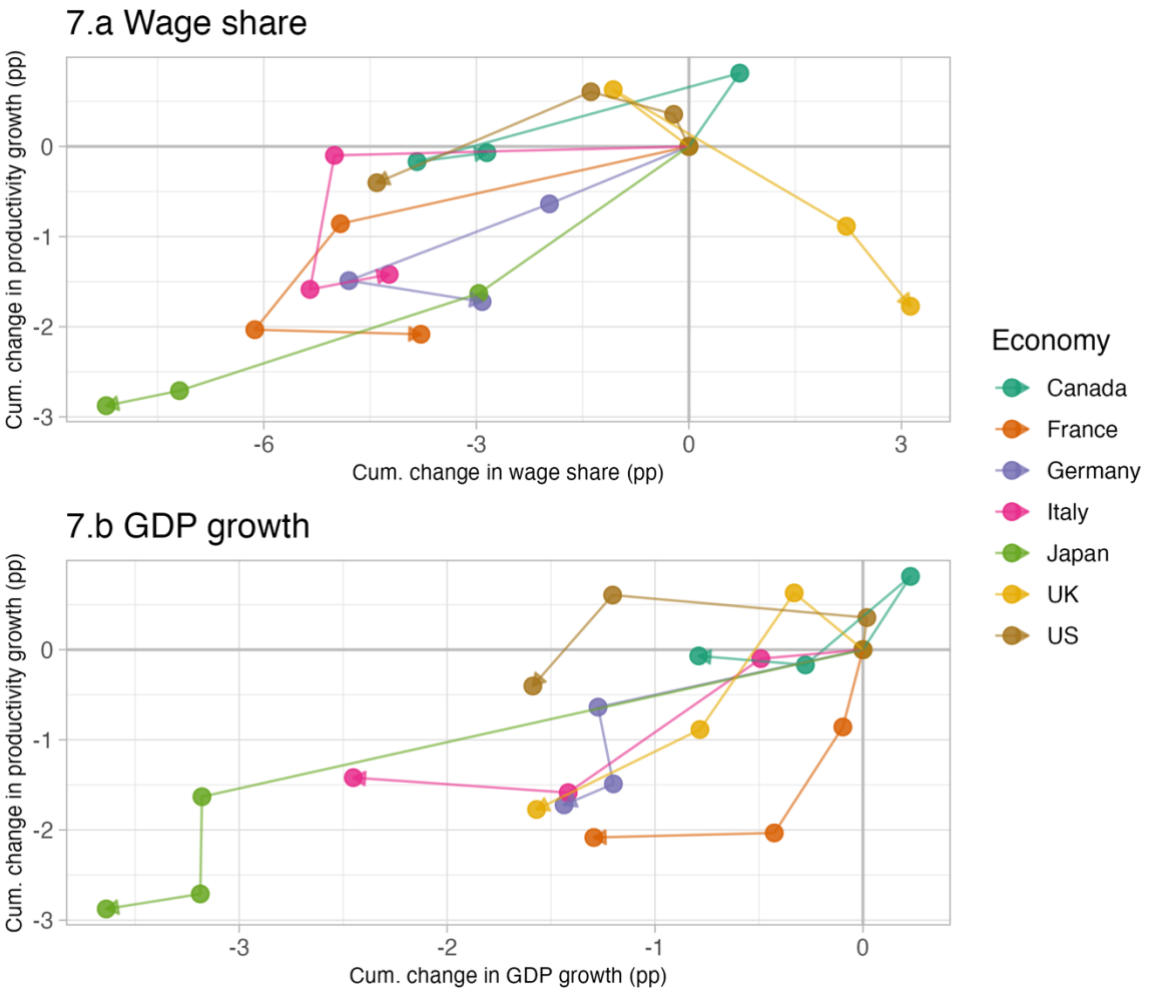


Figure 7. Cumulative change in the wage share or in real GDP growth and in productivity growth, G7 economies, trade cycles, 1981–2019

Notes: Own calculations and presentation based on European Commission (2025). Dots indicate cumulative change of both variables for each cycle, relative to cycle 1. Lines connect cycles in chronological order.

Finally, we can link these patterns with the socio-institutional productivity regimes derived in Section 4, summarised in Tables 1 and 2 and in Figure 4. Two caveats are at place here. First, in the theoretical model we have examined a closed economy, while the empirical data presented are for more or less open economies. Including net exports is usually the channel through which domestically wage-led economies may turn totally profit-led. We have allowed for profit-led demand via the post-Kaleckian investment function in our theoretical model, so that this does not pose a problem for the illustrative data exercise here, which is not explicitly focussing on the dynamics of the different demand components. Second, we have derived overall equilibrium capacity utilisation and capital stock growth in the theoretical model, while in the empirical illustration we have looked at real GDP growth. This is not a problem either because in the short run real GDP growth and capacity utilisation are positively correlated, while in the medium to long run, comparing trade cycle averages, real GDP growth and capital accumulation are linked technologically via the capital-output ratio, which does not seem to change much over the period we have considered.

For allocating the observed pattern to the theoretically possible overall productivity regimes, we first focus on the trends in each country and hence on the final position including the cumulative changes from the early 1980s until 2019 in Figures 6 and 7. For our interpretation, we have to take into account that the correlations of cumulative changes in Figures 6 and 7 already include the interaction of demand and productivity components of our model.

First, we need some information about the type of distribution-led demand and growth regimes in our G7 countries. Results on all our countries are included in the study by Onaran and Galanis (2014) who have applied a single equations estimations approach and found France, Germany, Japan, Italy, the UK and the US to be wage-led, and Canada to be profit-led. Onaran and Obst (2016) have confirmed these results for France, Germany, Italy, and the UK. Wage-led results for France, Germany, the UK and the US have also been found by Hein and Vogel (2008). Naastepad and Storm (2007) also have Germany, France, Italy and the UK with wage-led demand, while they claim Japan and the US to be profit-led. Stockhammer et al. (2011) have also found Germany to be wage-led, while Onaran et al. (2011) claim the same result for the US. Therefore, in what follows, based on these studies, we assume France, Germany, Japan, Italy, the UK and the US to be dominated by a wage-led demand component, while in Canada we have a profit-led demand component.

Taking into account the results from Figure 6 regarding the relationship between the change in the LMI index and the change in the wage share, we have for Germany, Italy, Japan and the US, that the fall in the LMI index contributed to fall in the wage share and thus, with wage-led demand, reduced the demand component and shifted it to the left in Figure 8 below. For France, which also features wage-led demand, the same effect on the demand component applies, although the LMI index rose, because the wage share was falling nonetheless. For the UK, also with wage-led demand, the LMI fell, but the wage share increased, thus improving the demand component and shifting it to the right in Figure 8. This improvement and rightwards shift of the demand component also applies to Canada, albeit for different reasons. Here we also have a falling LMI index and a falling wage share but profit-led demand.

Since for all economies we have seen a fall in productivity growth from the first to the fourth cycle associated with falling LMI indices (except for France), for Canada and the UK the productivity component must have fallen and shifted downwards in Figure 8 and this shift must have overcompensated the expansion and rightwards shift of the demand component,

such that the overall equilibrium has shifted down from S to B. For the other economies, to obtain the final position with the fourth cycle, a dampening effect of the falling (or rising in France) LMI index and of falling wage shares on the productivity component are technically not required, but given the positive correlation of changes in the wage share and in productivity growth quite likely, which then leads to a shift of the overall equilibrium from S to A. Therefore, we have two cases in Figure 8, one representing the shifts for Canada and the UK (S to B), and one representing the shift for the other five countries (S to A). Regarding the final position, from the early 1980s until 2019 over almost four decades, we thus see no systematic difference between LMEs and CMEs, each show contractionary outcomes regarding changes in the LMI (with France being an outlier). However, the underlying forces differ between the LMEs Canada and the UK, on the one hand, and the CMEs France, Germany, Japan, Italy, as well as the LME US, on the other. This result implies that, at least for the long run, the types of LMIs are of rather minor importance when it comes to explaining differences in the trend of productivity growth, for which the Kaldor-Verdoorn demand channel and the Marx-Hicks cost-push channel seem to be more important factors. For these two, however, changes in LMIs are relevant since they have indirect effects, as explained.

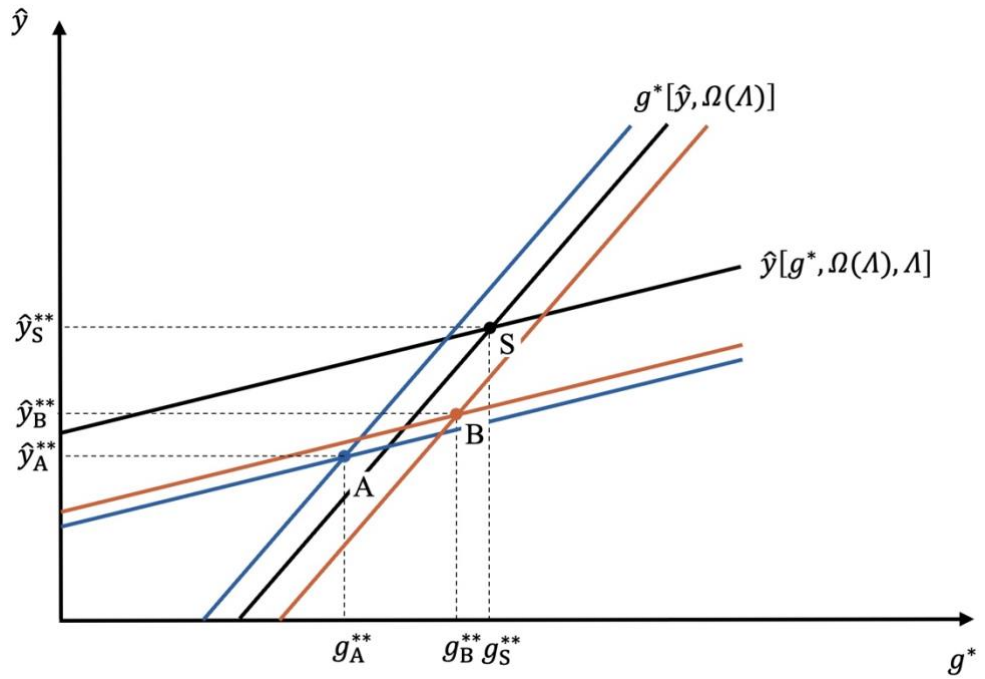


Figure 8. Falling LMI index and long-run changes in overall regimes

Notes: Own presentation. Equilibrium S refers to the starting point; A and B to resulting equilibria in different kinds of economies. Interpretation of these equilibria is only possible in relation to the starting point, not relative to each other.

So far, we have presented the long-run trend regimes for the period from the early 1980s until 2019, i.e. for almost four decades. The picture slightly changes when we look at short-run cycle to cycle episodes, here the changes to the second and third cycle of the 1990s and early 2000s, for which we only focus on the LMEs UK and US, on the one hand, and the CMEs Germany and Italy, on the other hand, which are all wage-led. For these two CMEs we obtain the same results as for the long run: falling LMI indices, falling wage shares, hence dampening effects on the demand component, falling productivity and GDP growth rates, reinforced by

dampening effects on the productivity component, and hence overall contractionary effects, as shown in Figure 9 by the shift from S to A. For the US and the UK (only for the change towards the second cycle in the 1990s), however, we now obtain intermediate overall effects. Falling LMI indices and falling labour income shares have dampening effects on the demand components, shifting this component leftwards in Figure 9. At the same time, the falling wage share also has a dampening effect on the productivity component via the Marx-Hicks channel, which is, however, counteracted by the direct stimulating effects of falling LMI indices on the productivity component. We thus have an LMI-burdened productivity component, and the upwards shift of the productivity component in Figure 9 generates a new overall equilibrium at point B, with higher productivity growth and constant or even lower real GDP growth. Both the Marx-Hicks cost-push effect and the Kaldor-Verdoorn aggregate demand effect on productivity growth are thus relegated to a secondary role. Therefore, we see a difference between the productivity regimes in CMEs and LMEs, with the Schumpeter Mark I type of innovation dominating in the latter – in the short run.

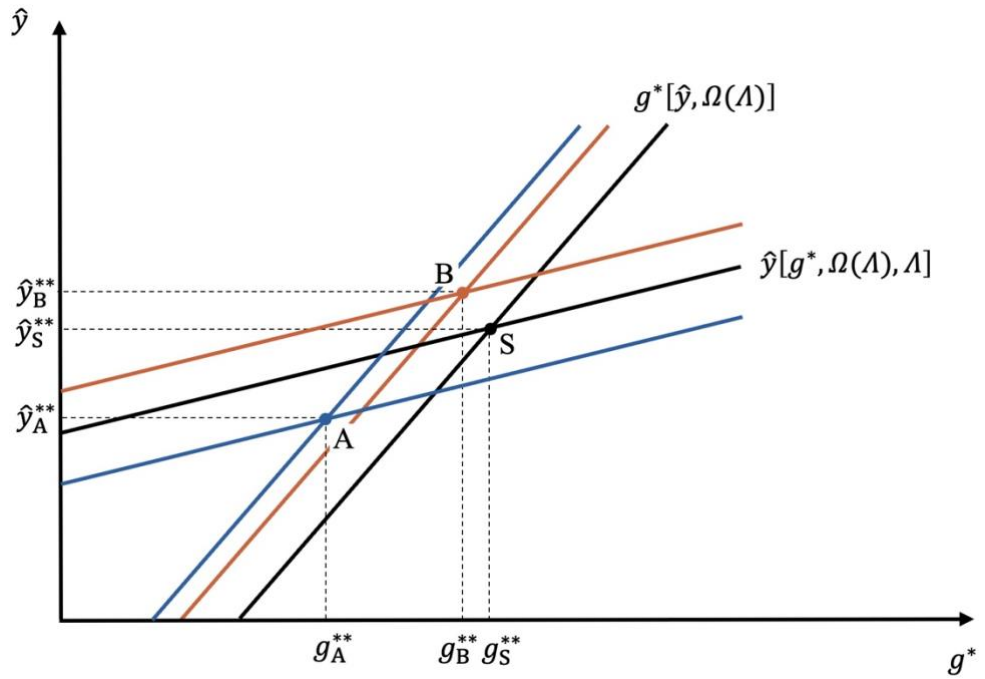


Figure 9: Falling LMI index and short-run changes in overall regimes of CMEs (Germany, Italy) and LMEs (UK, US)

Notes: Own presentation. Equilibrium S refers to the starting point; A and B to resulting equilibria in CMEs (Germany, Italy) and LMEs (UK, US) respectively. Interpretation of these equilibria is only possible in relation to the starting point, not relative to each other.

6. Conclusions

Starting from the observed trend of falling labour productivity growth in advanced capitalist economies, here represented by the G7 countries since the early 1980s, we have analysed the relationship between labour market institutions, distribution conflict and productivity growth. For this purpose, we have reviewed the determination of productivity growth in post-Keynesian demand-led endogenous growth models, which have included the Kaldor-Verdoorn effect of demand dynamics on productivity growth, as well as the Marx-Hicks cost-push effects. In the next step, we reviewed Schumpeterian approaches towards innovations, the 'creative destruction' and the 'creative accumulation' approach, the role of LMIs in this

context, and finally the distinction between Schumpeter Mark I and Mark II types of innovation corresponding with different types of LMIs. Integrating these Schumpeterian ideas into the productivity component of a post-Kaleckian demand-led endogenous growth model has first led to the distinction between an LMI-led and an LMI-burdened productivity component and second to the generation of different potential overall socio-institutional productivity regimes in the face of falling LMIs, ranging from contractionary, over intermediate to expansionary. These regimes depend on the distribution effects of changing LMIs, the type of distribution-led demand (wage- or profit-led) and hence the effect of changing LMIs on the demand component of the model, as well as on the direct and indirect effects of changes in LMIs on the productivity component (LMI-led or -burdened) of the model.

In the last section of this contribution, we have reviewed the trends and the patterns of changes in a composite LMI index, integrating measures of employment protection, wage bargaining level, union density and bargaining coverage, relative to changes in the wage share, real GDP growth and productivity growth for the G7 countries. These include the LMEs Canada, the UK and the US, and the CMEs France, Germany, Italy and Japan. We have examined four trade cycle averages from the early 1980s until 2019. For the whole period we have found contractionary effects on GDP growth and productivity growth via depressing effects of labour market deregulation and falling wage shares for each country, however, with varying effects on demand and productivity components of the model. For the rather short-run changes from trade cycle to trade cycle in the 1990s and early 2000s, however, some differences between CMEs and LMEs emerged. While the representative CMEs examined for this period, Germany and Italy, show the same contractionary outcomes as over the whole period, the representative LMEs, the UK and the US, have shown intermediate outcomes with falling GDP growth but rising productivity growth. We have related this to the dominance of an LMI-burdened productivity component based on the Schumpeter Mark I innovation type. Therefore, labour market deregulation may have different effects in the short run comparing LMEs and CMEs, while the long-run effects seem to be rather similar, since they seem to be dominated by the Kaldor-Verdoorn and Marx-Hicks channels, on which deregulation has similar effects in CMEs and LMEs. Furthermore, government demand management and R&D policies, not explicitly considered here, should matter, too.

The contribution of our work is rather theoretical and conceptual, and the empirics we have presented serve illustrative purposes. We hope this contribution provides a basis for further empirical work, either looking at more detailed comparative case studies or applying multi-country econometrics to identify the dominant socio-institutional productivity regime in an individual country or in a set of countries.

Data

Data used and replication code is available with final publication of the paper via:
https://github.com/pblees

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Appendix

A: Classification of trade cycles

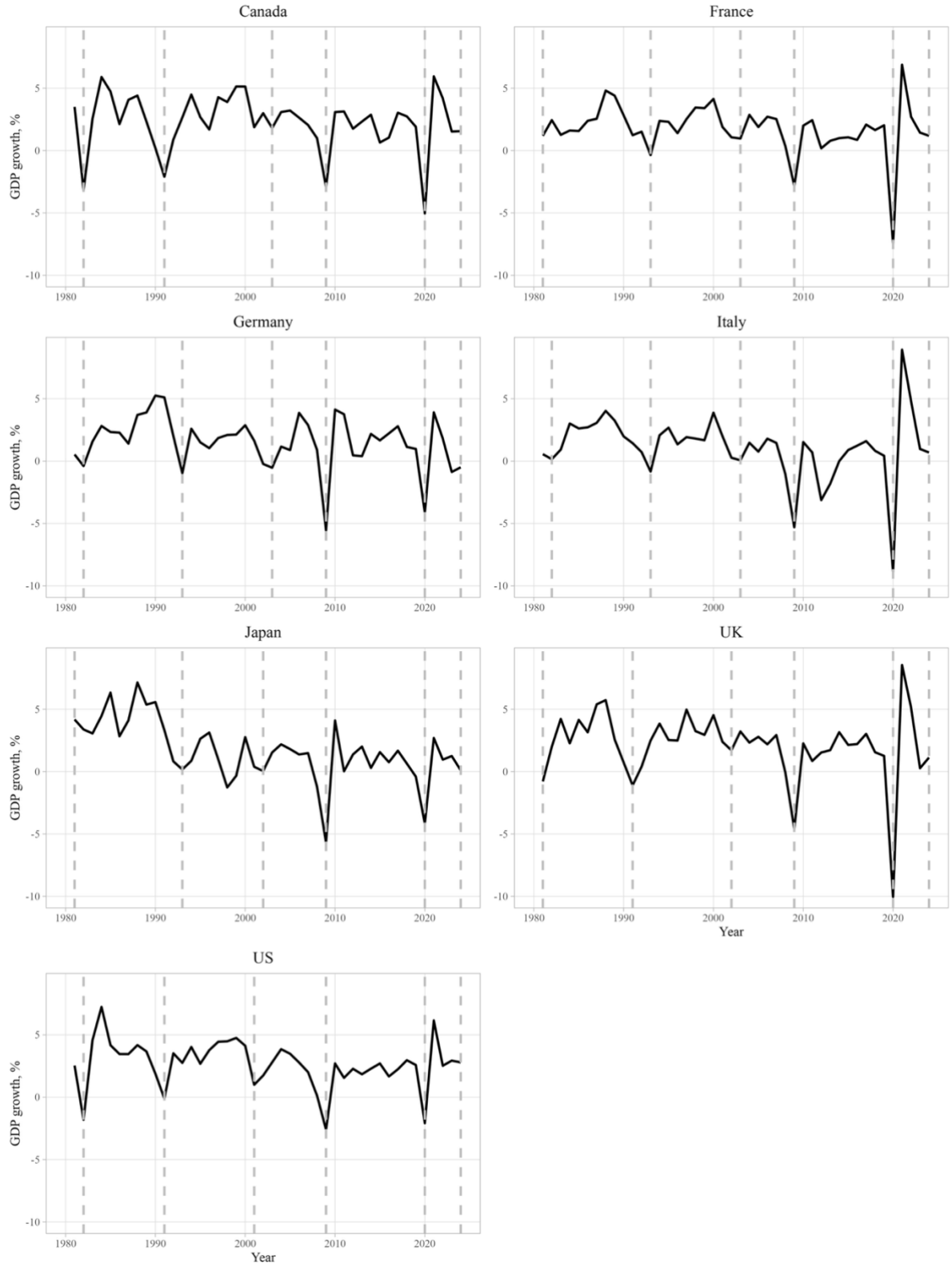


Figure A1. Economic growth over business cycles, %, G7 economies, 1981–2024

Notes: Own calculations and presentation based on European Commission (2025). Dashed lines indicate starting points for a new business cycle.

B: Indicators for labour market institutions

Table B1. Indicators for labour market institutions, G7 economies, trade cycles, 1981–2024

Country/Variable	Unit	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
Canada		**1982-1990**	**1991-2002**	**2003-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	0.59	0.59	0.59	0.59	
EPL (temporary workers)	Index	0.25	0.25	0.25	0.25	
Bargaining level	Index	1.00	1.00	1.00	1.00	
Union density	%	34.54	34.49	32.32	31.75	
Union density (survey data)	%	36.48	31.84	29.47	28.45	28.65
Unadjusted bargaining coverage	%	37.68	37.75			
Unadjusted bargaining coverage (survey data)	%	39.77	32.63	31.63	30.50	30.65
Adjusted bargaining coverage	%	37.68	37.75			
Adjusted bargaining coverage (survey data)	%	39.77	32.63	31.63	30.50	30.65
Wage share	%	65.08	65.80	61.24	62.23	59.90
France		**1981-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	2.58	2.54	2.69	2.51	
EPL (temporary workers)	Index	2.70	3.13	3.13	3.08	
Bargaining level	Index	3.00	3.00	3.00	3.00	
Union density	%	12.13	8.40	8.02	8.33	
Union density (survey data)	%	14.43	10.80	10.63	10.68	
Unadjusted bargaining coverage	%	65.90	68.50	72.80	73.65	74.75
Unadjusted bargaining coverage (survey data)	%					
Adjusted bargaining coverage	%	89.10	93.70	97.70	98.00	98.00
Adjusted bargaining coverage (survey data)	%					
Wage share	%	70.38	65.46	64.26	66.60	66.77

Table B1 (continued). Indicators for labour market institutions, G7 economies, trade cycles, 1981–2024

Country/Variable	Unit	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
Germany		**1982-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	2.50	2.59	2.60	2.60	
EPL (temporary workers)	Index	3.47	2.53	1.08	1.13	
Bargaining level	Index	3.00	3.00	3.00	3.00	
Union density	%	31.78	24.83	19.23	16.35	14.65
Union density (survey data)	%	26.30	23.40	18.20	15.93	
Unadjusted bargaining coverage	%					
Unadjusted bargaining coverage (survey data)	%		68.96	61.03	54.57	48.65
Adjusted bargaining coverage	%	85.00				
Adjusted bargaining coverage (survey data)	%		72.50	64.12	57.08	50.75
Wage share	%	66.73	64.77	61.94	63.81	63.78
Italy		**1982-1992**	**1993-2002**	**2003-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	3.02	3.02	3.02	2.80	
EPL (temporary workers)	Index	5.00	3.99	2.00	1.97	
Bargaining level	Index	3.18	3.00	3.00	3.27	
Union density	%	39.65	33.51	31.47	32.36	30.48
Union density (survey data)	%	40.87	32.87	26.32	25.47	
Unadjusted bargaining coverage	%	100.00	100.00	100.00	100.00	100.00
Unadjusted bargaining coverage (survey data)	%					
Adjusted bargaining coverage	%	100.00	100.00	100.00	100.00	100.00
Adjusted bargaining coverage (survey data)	%					
Wage share	%	65.18	60.17	59.83	60.95	58.71

Table B1 (continued). Indicators for labour market institutions, G7 economies, trade cycles, 1981–2024

Country/Variable	Unit	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
Japan		**1981-1992**	**1993-2001**	**2002-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	1.70	1.70	1.61	1.37	
EPL (temporary workers)	Index	1.69	1.44	0.88	0.94	
Bargaining level	Index	1.00	1.00	1.00	1.00	
Union density	%	27.74	22.88	18.96	17.58	16.63
Union density (survey data)	%					
Unadjusted bargaining coverage	%	22.07	18.41	15.34	14.82	14.35
Unadjusted bargaining coverage (survey data)	%					
Adjusted bargaining coverage	%	24.15	19.92	16.56	15.93	15.40
Adjusted bargaining coverage (survey data)	%					
Wage share	%	69.91	66.94	62.72	61.68	63.88
UK		**1981-1990**	**1991-2001**	**2002-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	1.35	1.38	1.51	1.41	
EPL (temporary workers)	Index	0.25	0.25	0.36	0.38	
Bargaining level	Index	2.60	1.27	1.00	1.00	
Union density	%	45.56	33.17	27.43	24.62	21.93
Union density (survey data)	%	38.20	32.34	28.47	25.02	22.95
Unadjusted bargaining coverage	%					
Unadjusted bargaining coverage (survey data)	%					
Adjusted bargaining coverage	%	71.83	52.70			
Adjusted bargaining coverage (survey data)	%			49.95	43.45	39.63
Wage share	%	61.69	60.62	63.91	64.82	62.95

Table B1 (continued). Indicators for labour market institutions, G7 economies, trade cycles, 1981–2024

Country/Variable	Unit	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
US		**1982-1990**	**1991-2000**	**2001-2008**	**2009-2019**	**2020-2024**
EPL (regular workers)	Index	0.09	0.09	0.09	0.09	
EPL (temporary workers)	Index	0.25	0.25	0.25	0.25	
Bargaining level	Index	1.00	1.00	1.00	1.00	
Union density	%					
Union density (survey data)	%	17.58	14.76	12.63	11.18	10.30
Unadjusted bargaining coverage	%					
Unadjusted bargaining coverage (survey data)	%	20.04	16.50	13.89	12.40	11.55
Adjusted bargaining coverage	%					
Adjusted bargaining coverage (survey data)	%	20.04	16.50	13.89	12.40	11.55
Wage share	%	64.90	64.68	63.51	60.49	59.29

Notes: Own calculations based on OECD (2024) and OECD and AIAS (2025). Given number is the average for the trade cycle, missing values excluded. EPL is the index for employment protection legislation; for regular workers the EPR version 1 is used, for temporary workers EPT version 1; data available from 1985. Adjusted bargaining coverage is adjusted for the number of employees with the right to bargain.

C: Calculation of the labour market institution index

We calculate the index for labour market institutions (LMIi) as an average of the employment protection, the bargaining level, the union density and the bargaining coverage rate, all aspects weighted equally. For employment protection, we use the employment protection legislation index for regular workers (EPLr) and the employment protection legislation index for temporary workers (EPLt) by OECD (2024). These indices are measures for the strictness of dismissals of regular workers and the usage of temporary contracts. Both indices represent a scale from 0 to 6, with higher values indicating stricter regulation. In both cases, version 1 is used due to data availability issues. For the bargaining level, we use the bargaining level indicator (Level) by OECD and AIAS (2025). The measure indicates the predominant level at which bargaining takes place on a scale from 1 to 5, again with higher values indicating bargaining on a more centralised level. Union density is the portion of workers who are trade union members as a percentage of the total number of workers. We use the values reported officially (UD) and found in survey data (UDs) by OECD and AIAS (2025). For the bargaining coverage rate, we have four different variables measuring the percentage of workers covered by collective agreements between trade unions and employers, and their administrative extension. We use the bargaining coverage rate adjusted for workers with the right to bargain as reported officially (AdjCov) and in survey data (AdjCovs), and the same rate unadjusted for the workers with the right to bargain as reported officially (UnadjCov) and in survey data (UnadjCovs). Values stem again from the OECD and AIAS (2025) dataset.

All variables are normalised to a scale from 0 to 1 with 0 being the least regulated expression and 1 the most regulated expression respectively. With the transformed variables and the respective weights, the LMIi for economy *e* in cycle *c* is calculated as:

$$\text{LMIi}_{e,c} = \frac{1}{4}\left(\frac{\text{EPLr}_{e,c} + \text{EPLt}_{e,c}}{2} + \text{Level}_{e,c} + \frac{\text{UD}_{e,c} + \text{UDs}_{e,c}}{2} + \frac{\text{AdjCov}_{e,c} + \text{AdjCovs}_{e,c} + \text{UnadjCov}_{e,c} + \text{UnadjCovs}_{e,c}}{4}\right)$$

Observations with missing values are excluded from the calculation. In this case, the weight is adjusted.