Hochschule für
Wirtschaft und Recht Berlin
Berlin School of Economics and Law

Institute for International Political Economy Berlin

Productivity Growth and Class Struggle in a Growth Regime Framework

Author: Philip Blees

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A Proposal for a Varieties of Productivity Regimes Approach Applied to Germany and the US from 1991 to 2022

Philip Blees
Institute for International Political Economy (IPE) Berlin

Abstract
Scrutinizing post-Keynesian theory of endogenous technical progress and Régulation Theory, this paper examines productivity growth and its variation within capitalist economies. The aim is to identify how institutions steer productivity growth. Based on the vast literature demonstrating that institutions not only have a direct impact on the innovative environment but also affect productivity growth by changing distribution and demand, an analytical framework that distinguishes between these direct and indirect effects is derived. Applying this method to Germany and the US from 1991 to 2022, we find that Germany was characterized by a labor-led productivity regime, while the US exhibited a state-led productivity regime. This finding explains the more substantial decline in productivity growth in Germany – which was due to changes in the wage-labor nexus –, as compared to the US, where public investment stabilized productivity growth.

JEL codes: E11, O43, O47, P52

Keywords: Endogenous technical progress, growth regimes, institutions, Kaleckian models, Régulation Theory, Germany, US

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Contact: philip.blees@hwr-berlin.de

1. Introduction

The stagnation tendencies of capitalism have not spared labor productivity growth (Storm, 2022). Its growth rates are declining across OECD countries (Bergeaud et al., 2016; Goldin et al., 2024; Hartwig, 2014; Syverson, 2017). Productivity growth developed into a crucial topic in the decade after the global financial crisis (GFC) of 2007–8. It seems that the mature capitalist economies face this issue with different policy responses and that the US is winning the 'innovation race' at least in comparison to Europe (Eichengreen, 2024). Indeed, the US consistently show productivity growth on a higher level than, for example, Germany (OECD, 2024a).

This divergence raises the question of what drives productivity growth in the first place. While all economic theories address technical progress and recognize its crucial role, they differ strongly in is specific characterization. Early neoclassical theory, for instance, takes technical progress as exogenous (Solow, 1956) while later work claims to 'endogenize' it as inter-temporal optimization problem (Romer, 1990). From early on, post-Keynesian research has considered technical progress as outcome of growth dynamics (Oughton and Tobin, 2023). Classical theory adds the notion of distribution as a determinant (Kemp-Benedict, 2022).

Based on the latter, post-Keynesian theories of endogenous technical progress (Hein and Tarassow, 2010; Kaldor, 1966, 1961, 1957; Setterfield and Cornwall, 2002) and the institutional ideas of Régulation Theory (Aglietta, 2015; Boyer and Saillard, 2002a), we propose a strategy to analyze the institutional drivers of productivity growth, identifying channels through which it is affected by social relations. The contribution of this paper is to incorporate these channels in a growth regime framework and derive specific productivity regimes exploitable for comparative political economy (CPE) research. We apply this framework to Germany and the US, archetypes of coordinated and liberal market economies, between 1991 and 2022. Thus, the research question is twofold: First, how can productivity growth be implemented in the growth regime framework? Second, what productivity regimes did Germany and the US exhibit in the period from 1991 to 2022?

Post-Keynesian economics is open to connect its theory of demand and growth regimes with a political economy view. However, current growth regime research does not classify existing regimes in terms of productivity growth dynamics, although there are various theoretical findings on this topic. This is where Régulation Theory comes into play: It offers the concept of 'institutional forms' that define the structure of an economy and therefore affect also its productivity growth. Here, we use three of these 'institutional forms' – the wage-labor nexus, the forms of competition, and the forms of the state – to explicitly consider the interaction of institutions with the elements of the post-Keynesian model of endogenous technical progress.

In this paper, technical progress is used to denote the social development regarding technology and its implementation. We use technical progress as synonym for technical change, despite the slightly different connotations of the two terms. Meanwhile, technology and innovation refer to the actual invention of knowledge and methods. They are not necessarily implemented but rather form a range of possibilities. Productivity growth encompasses the actual increases in economic efficiency following technical progress measured as macroeconomic variable in terms of gross domestic product (GDP) per hour worked.

Clarification is needed for the term 'productivity regime'. Within post-Keynesian research (e.g., by Hein and Tarassow, 2010; or Setterfield and Cornwall, 2002), this term is employed to construct elements of the economic model related to productivity. Traditionally, it is merely a behavioral equation determining productivity growth. However, the productivity regime in this paper is associated with the socio-institutional context of productivity growth. Consequently, we discuss the demand and productivity component of the full model, when talking about the economic model, while the productivity regime denotes the institutional background that either facilitates or hampers productivity growth.

The remainder of the paper is structured as follows. Section 2 describes the development of productivity growth in Germany and the US. In section 3 we combine the theory of endogenous technical progress with the notion of institutional forms into a unified theoretical framework. Turning back to Germany and the US, section 4 applies the framework and classifies the countries' specific productivity regimes. Section 5 concludes.

2. Declining Productivity Growth in Germany and the US

Germany and the US are two common comparative case studies. Scholars scrutinize both countries as prototypes for coordinated market economies (CMEs) and liberal market economies (LMEs) in the tradition of the Varieties of Capitalism (VoC) approach by Hall and Soskice (2001). CMEs are characterized by a collaboration among capital, labor, and the state, whereas LMEs emphasize market competition and the flexibility of labor relations. Since German reunification in 1990 puts a historical limit to the observable period, we focus on the years from 1991 to 2022 as the most recent era exhibiting various economic crises – most prominently the GFC with the associated changes to countries' the political economy.

Figure 1 shows the productivity growth rates of Germany and the US for the given time frame in terms of GDP per hour worked. Averaged over the whole period, the US exhibited higher productivity growth (1.61%) than Germany (1.22%). Splitting the years under consideration

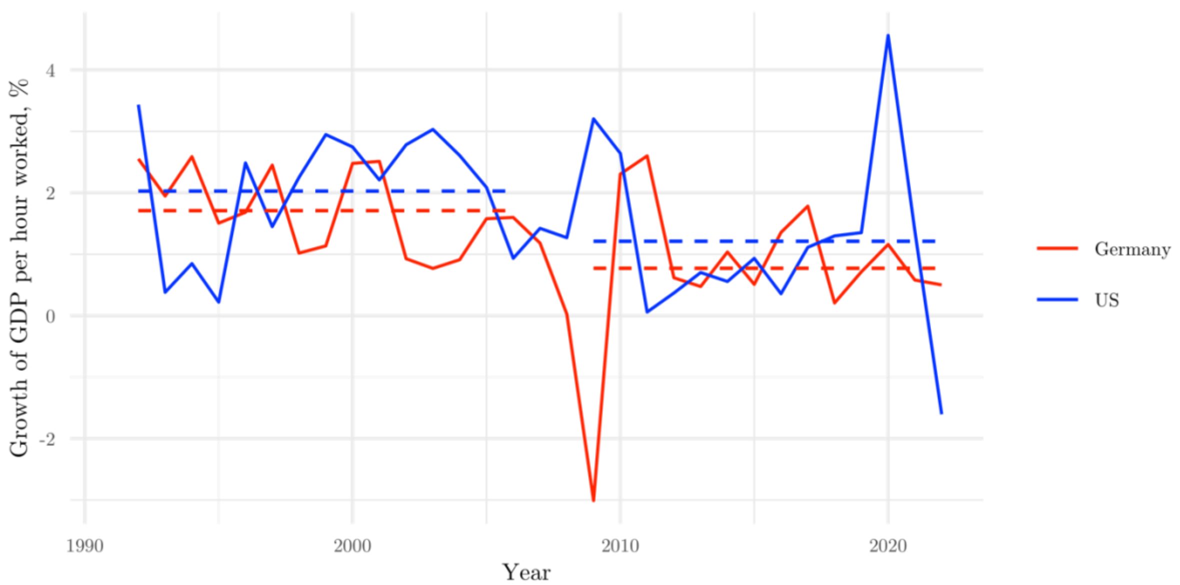

Figure 1: Productivity growth, Germany and the US, %, 1992–2022
Notes: Own calculation and depiction; data from OECD (2024). Dashed lines depict averages pre- and post-GFC. Pre-GFC: 1992–2006; post-GFC: 2009–2022.

into two sub-periods, it becomes obvious that in both economies, productivity growth rates were lower after the GFC than they had been before. Nevertheless, the decrease was stronger in Germany: Since the GFC, its productivity has been growing by 0.77% on average, while the US remained at an average of 1.22%. This cannot be traced back to the global trend of declining productivity growth alone but indicates differences in the political-economic development of the two economies that stipulate explanation.

In addition, the US outperformed Germany in output growth, as depicted in figure 2 showing output growth in terms of real GDP growth. Before the GFC, output growth was twice as high in the US (3.13%) as in Germany (1.39%). Even with a more pronounced decrease in the US after the GFC, it remained higher than in Germany.

Productivity and output growth are strongly connected not only through their statistical relationship as GDP is included in measures of productivity growth, but also through economic mechanisms affecting each other. Lower productivity growth restricts the growth of output while output growth also affects productivity growth. Thus, these two variables influence each other and contribute to secular stagnation tendencies (Storm, 2022). This downward spiral seems to have been more pronounced in Germany than the US. We now set out to propose a theoretical framework that explains this variation.

3. Demand, Distribution, Institutions, and Productivity Growth

Understanding productivity growth as outcome of economic dynamics, post-Keynesian theory explains its macroeconomic determinants. On this foundation we build an open economy model with the state as socio-institutional, not macroeconomic actor in section 3.1. We extend its underlying stance towards institutions using Régulation Theory in section 3.2.

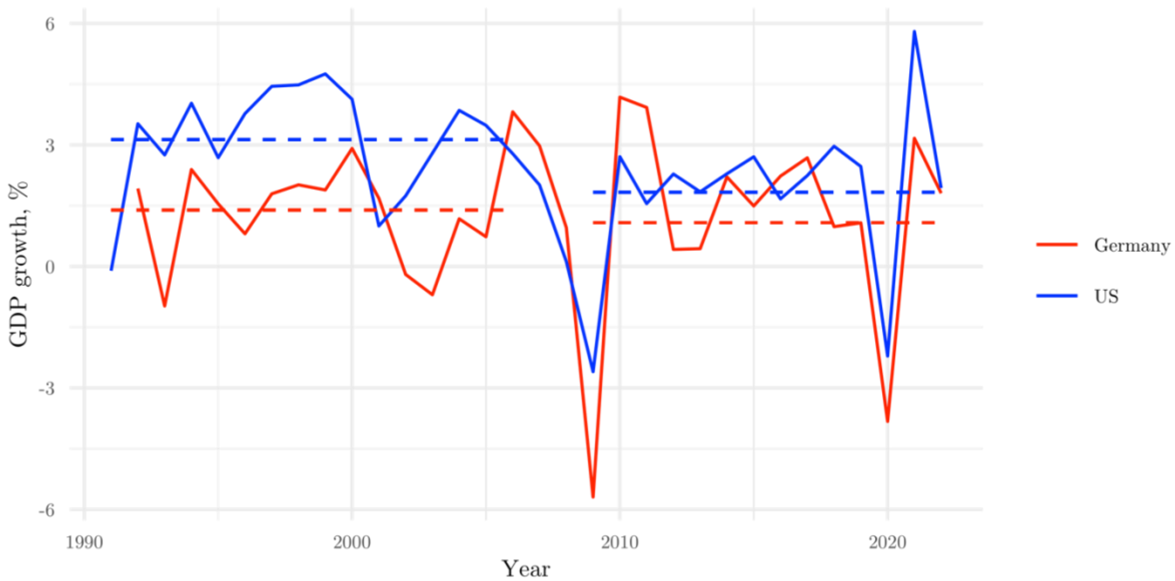

Figure 2: Output growth, Germany and the US, %, 1991–2022
Notes: Own calculation and depiction; data from European Commission (2023). Dashed lines depict averages pre- and post-GFC. Pre-GFC: 1991–2006; post-GFC: 2009-2022.

3.1 A Post-Keynesian Model of Endogenous Technical Progress

Following the fundamental post-Keynesian insight, effective demand determines output, growth and technical progress[1]. Thus, not only short-run but also long-run equilibria are subject to the principle of effective demand. Respective dynamics can be characterized as circular process where "technical progress is both the cause and the result of economic growth" (Rowthorn, 1981, p. 26). Neo-Kaldorian approaches scrutinize these mechanisms to analyze growth processes and integrate a demand effect on productivity growth in the model.

We follow the procedure introduced by Setterfield and Cornwall (2002) as applied by Hein and Tarassow (2010)[2] based on the Bhaduri and Marglin (1990) model. First, we generate a demand component of the model with exogenous productivity growth, then we provide the productivity component with exogenous demand growth, and finally we look at the interaction of the two components, generating the overall growth model with exogenous distribution[3] and endogenous demand growth, capital stock growth, and productivity growth. The model furthermore incorporates the notion of wage-pushed technical progress.

We assume Harrod-neutral technical progress, i.e., technical progress is labor-saving and capital-embodied. That is, it is linked with a decreasing labor–output-ratio and increasing labor productivity ($y = Y/L$). As the capital-labor ratio increases simultaneously with labor productivity, the capital–potential output ratio ($v = K/\mathrm{Y^p}$) remains constant. Furthermore, it is assumed that our economy relies on imported inputs for production, with the resulting output competing internationally. The movement of labor and capital is not considered. The prices of the imported inputs and the competing foreign final outputs are assumed to be exogenous. The nominal exchange rate, which is the price of the domestic currency in terms of foreign currency, is governed by monetary policy and international financial markets and is regarded as exogenous as well.

3.1.1 The Demand Component

We start with the usual basis of a Kaleckian model for an open economy. A goods market equilibrium implies that planned saving (S) equals net investment (pI) plus net exports (NX):

$$S = pI + NX \tag{1}$$

Normalizing this by the nominal capital stock (pK), shows that the saving rate (σ) equals the accumulation rate (g) and the net export rate (b):

[1] Demand stimulants of productivity growth can take various forms. In the proposal by Kaldor (1985), exports are a trigger of cumulative causation. However, they are only one component of the income-independent part of demand. More generally, Nah and Lavoie (2019) integrate the idea of a productivity component in a Kaleckian model with an autonomous consumption element but without a public sector. They show that positive changes in the growth rate of autonomous consumption increase the rate of accumulation and the growth rate of productivity in the medium and the long run. Deleidi et al. (2023) argue that changes in government expenditure as part of autonomous demand produce even greater impact on productivity growth than exports. We leave the kind of demand stimulant for further research and maintain the effect of demand regardless of its source.

[2] See Hein (2014, Ch. 8) as well.

[3] As discussed in Hein and Tarassow (2010), there is the potential for technical progress to exert feedback effects on the markup, i.e., distribution through productivity growth. These effects are not examined here to maintain focus.

$$\sigma = g + b \tag{2}$$

Saving can be differentiated in the saving out of profits (S_Π) and out of wages (S_W). The propensity to save out of profits (s_Π) is higher than out of wages (s_W). The profit share connects profits with domestic income ($h = \Pi/(W+\Pi) = \Pi/PY$). This measure of functional income distribution is determined by mark up pricing on unit variable costs under incomplete competition and by the ratio of (imported) unit material costs to unit labor costs according to Kalecki (1954, Ch.2). Finally, defining capacity utilization as output to potential output ($u = Y/Y^p$), one obtains for the saving rate:

$$\sigma = \frac{S_\Pi + S_W}{pK} = \frac{s_\Pi \Pi + s_W(Y-\Pi)}{pK} = [s_W + (s_\Pi - s_W)h]\frac{u}{v}, \qquad 0 \le s_W < s_\Pi \le 1 \tag{3}$$

In the tradition of the Bhaduri and Marglin (1990) model, the investment function contains the profit share in addition to a parameter for animal spirits (α) and the capacity utilization rate as an indicator of expected demand. Because technical progress is capital-embodied, it will stimulate investment. β, τ and ω are the parameters for the strength of the respective effects on investment. For now, we assume productivity growth ($\hat{y}$) to be exogenous. Thus, the accumulation rate is:

$$g = \alpha + \beta u + \tau h + \omega \hat{y}, \qquad \beta, \tau, \omega > 0 \tag{4}$$

Assuming the Marshall-Lerner condition, the net export rate depends positively on international competitiveness. Thus, increases in the real exchange rate (e^r) raise net exports. Furthermore, a faster increase in domestic demand relative to foreign demand negatively impacts net exports. ψ and ϕ are the parameters for the effect of the exchange rate and demand on the net export rate. Using capacity utilization for domestic demand dynamics and assuming a positive connection between the profit share and international competitiveness, we receive the following equation for the net exports rate:

$$b = \psi e^r(h) - \phi u, \qquad \psi, \phi > 0 \tag{5}$$

Ultimately, the stability condition for the equilibrium is a higher responsiveness of saving to capacity utilization than of investment and net exports together:

$$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} - \frac{\partial b}{\partial u} > 0 \Longrightarrow [s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi > 0 \tag{6}$$

The equilibrium of the goods market ($*$) in terms of capacity utilization and capital accumulation, which we use as the demand component, is:

$$u^* = \frac{\alpha + \tau h + \omega \hat{y} + \psi e^r(h)}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi} \tag{7a}$$

$$g^* = \frac{\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} + \phi\right\}(\alpha + \tau h + \omega \hat{y}) + \beta \psi e^r(h)}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi} \tag{7b}$$

This demand component can be either wage-led, if the positive effect of a rising wage share on consumption outweighs its negative effect on investment and net exports, or profit-led, if the latter effects dominate. Before coming back to this fundamental insight of post-Kaleckian models later, we define the productivity component of our model.

3.1.2 The Productivity Component

From their outset, Kaldorian growth theories have promoted different approaches to include technical progress in the analysis of macroeconomic growth processes: While Kaldor (1961, 1957) states a positive relationship between capital growth and productivity growth in a technical progress function (TPF), Kaldor (1966) implements Verdoorn's law describing a positive effect of output growth – driven by demand – in manufacturing on productivity growth due to increasing returns to scale, i.e., learning-by-doing and the division of labor (McCombie, 2016; Verdoorn, 2002).

Based on a classical view, distributional conflict affects technical progress as well (Kemp-Benedict, 2022; Tavani and Zamparelli, 2018). The notion of wage-pushed technical progress, which can already be found in Marx (1975, Ch. 15) and was later picked up by Hicks (1963), pivots on the importance of profits and profitability for capitalists. Rising costs pressure capitalists and lead to the adoption of cost-reducing methods. In the context of wages, rising labor costs induce the use of labor-saving methods, resulting in macroeconomic labor productivity growth. Following these arguments, some post-Keynesians acknowledge this effect of functional distribution on technical progress (Cassetti, 2003; Hartwig, 2014; Hein and Tarassow, 2010). In addition to the profit variable in the investment function, they include the wage or profit share in equations for productivity growth[4]. Distribution is exogenous and determined by institutions.

Productivity growth depends positively on an autonomous process of innovation (η) as well as on capacity utilization as indicator for demand growth due to the Verdoorn relationship (ρ) and negatively on the profit share because of the Marx-Hicks effect (θ) explained above. Similarly, ϵ captures the positive connection between capital stock growth and productivity growth in Kaldor's TPF. We formally define the productivity component respectively for capacity utilization and capital accumulation as:

$$\hat{y} = \eta + \rho u - \theta h, \qquad \eta, \rho, \theta > 0 \tag{8a}$$

$$\hat{y} = \eta + \epsilon g - \theta h, \qquad \eta, \epsilon, \theta > 0 \tag{8b}$$

As we assume the respective demand variable to be exogenous for now, the productivity component of the model is distinctively wage-led. Higher profit shares decrease productivity growth.

3.1.3 The Overall Model

Inserting the equations for the demand and productivity component into each other, leads to the overall equilibrium solutions for capacity utilization, capital accumulation and productivity growth:

[4] Naastepad (2006) uses an exogenous real wage for this purpose. Then, distribution is endogenous with endogenous productivity growth. However, we stick to the profit share and exogenous distribution due to reasons mentioned by Hein and Tarassow (2010).

$$u^{**} = \frac{\alpha + (\tau - \theta\omega)h + \psi e^r(h) + \omega\eta}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho} \tag{9a}$$

$$g^{**} = \alpha + \tau h + \beta\left\{\frac{\alpha + (\tau - \theta\omega)h + \psi e^r(h) + \omega\eta}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}\right\}$$

$$+\omega\left\{\frac{(\eta - \theta h)\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi\right\} + \rho[\alpha + \tau h + \psi e^r(h)]}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}\right\} \tag{9b}$$

$$\hat{y}^{**} = \frac{(\eta - \theta h)\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi\right\} + \rho[\alpha + \tau h + \psi e^r(h)]}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho} \tag{9c}$$

This step finally endogenizes capacity utilization, capital accumulation and productivity growth. Graphically, this model can be depicted as in figure 3.

The appendix provides the effects of changes in distribution on these variables in equilibrium. The effect of changing distribution is twofold: First, with exogenous productivity growth the demand component is determined by the effects of its components like shown in equations 7a

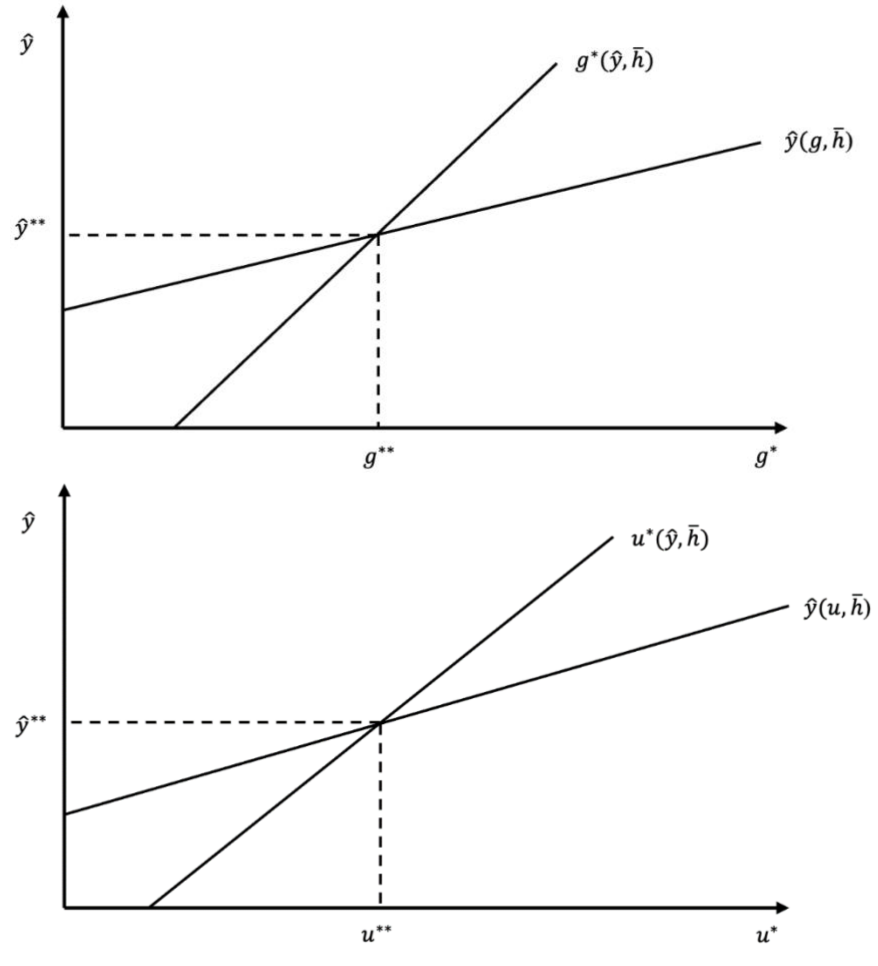

Figure 3: Long-run equilibrium of the demand and the productivity component, capacity utilization and capital accumulation
Notes: Own depiction based on Hein (2014, Ch. 8).

and 7b. Depending on the strength of the effect of changing the profit share on investment, net exports and consumption, the demand component is, again, either wage- or profit-led. Second, with exogenous demand growth changes in productivity growth become obvious analyzing equations 8a and 8b. The productivity component is distinctively wage-led because of the wage channel. Therefore, for a wage-led demand component the overall model must be contractive in case of a rising profit share. However, Hein and Tarassow (2010) show that there can exist a contractive, intermediate and expansive overall model for profit-led demand components.

3.2 Identifying Institutions in the Model

Even when not addressing the topic explicitly, post-Keynesian research acknowledges the crucial role of institutions. However, there is not yet a unified framework for jointly analyzing the direct and indirect effects of institutions on productivity growth. Régulation Theory offers a valuable foundation for such an analysis. The approach has already been compared to post-Keynesian theory (for example by Hein et al., 2015). The theory's 'institutional forms' presented in 3.2.1 serve as a structural basis that we enrich with previous research on institutions and innovation to connect it with the post-Keynesian model described above in section 3.2.1.

3.2.1 Institutional Forms in Régulation Theory

Régulation Theory, building on the work of Aglietta (2015), focuses on the social foundation of production. Its central argument is that the social sphere must be regulated to align with the prevailing mode of production. Often reduced to the analysis of periods of capitalism, this focus on distinguishable historic episodes is not the sole object of Régulation Theory. An analysis of the diversity of regimes is also possible (Amable, 2023). Varying institutional arrangements result in different growth paths of economies, i.e. different kinds of regimes (Juillard, 2002). With its focus on demand and the reference to post-Keynesian thought, it is well suited to conceptualize the interaction of distribution, demand and, ultimately, technical progress.

According to Régulation Theory, growth regimes can be identified through their technology, production organization, and institutions (Amable, 2002). Analyzing the institutional context is crucial to understand how technical progress is interconnected with production processes and markets (Petit, 1999). Régulation Theory refers to this institutional background as a whole as the 'mode of regulation', which involves all individual and collective behaviors that reproduce its social relations and support the accumulation regime by guaranteeing its alignment with social relations (Amable, 2023). Social relations, in this context, are institutional forms that extend beyond the narrow definition of state institutions to include broader social institutions. These institutional forms comprise the monetary form, the wage-labor nexus, the forms of competition, the international form and the forms of the state (Amable, 2023; Boyer and Saillard, 2002b; Juillard, 2002).

The most relevant institutional form is the wage-labor nexus, which is mainly concerned with industrial relations. There is a strong connection between the institutional governance of technology and the governance of labor (Leborgne and Lipietz, 1988). Hence, the relationship between capitalists and workers, as well as how they jointly organize production and resolve conflict, is crucial. Boyer (1988) provides five elements of the wage-labor nexus: First, the type of means of production used and the extent of control over workers; second, the technical and social organization of labor, including its impact on skills; third, the degree of security in the employment relationship; fourth, the factors shaping wages and social security, i.e. thy type of labor markets and welfare policies; and fifth, the standard of living for wage earners.

Forms of the state are fundamental to analyses grounded in Régulation Theory. However, the exact definition and role of the multifaceted state remains controversial (Delorme, 2002). Focusing on the economic analysis of state action rather than an examination of the state itself[5], the forms of the state encompasses a set of established social compromises shaping public expenditure (Amable, 2023). Along these lines, Juillard and Boyer (1992) present compelling arguments suggesting that public investment can exert a positive influence on productivity growth by improving production conditions, as exemplified by investment in infrastructure. Furthermore, the state in Régulation Theory and the underlying institutionalized compromises are analyzed as welfare state, showing high interdependence with the wage-labor nexus trough redistribution measures (André, 2002).

Lastly, innovation creates possibilities for firms to increase profits, such that forms of competition are crucial (Boyer, 1988). Primarily, competition is examined through a Schumpeterian lens, encapsulated by the term 'creative destruction'. In the Régulation context, Juillard and Boyer (1992) stress the relevance of inter-capitalist competition over demand shares and the related distribution of technology. As markets are not perfect, technology is not equally distributed and technical diffusion takes time. We use these three institutional forms – the wage-labor nexus, the forms of competition and of the state – to construct our framework.

3.2.2 An Institutional Framework

There have been various attempts to include institutions in the post-Keynesian theory of productivity growth. One pragmatic approach to this problem is to add an institutional variable to the productivity growth equation mentioned above (e.g., Storm and Naastepad, 2012, Ch. 4). This includes institutions directly. However, as practical for estimations this may be[6], adding one variable does not do justice to the complexity of the influences the institutional forms can have on technical progress. In our post-Keynesian model of endogenous technical progress, many variables are subject to the institutional environment. First and foremost, institutions affect distributional issues, i.e., the profit share. Furthermore, the state has capabilities to affect economic outcomes to a considerable extent, e.g. via demand management and public investment improving supply conditions. While the state as macroeconomic entity is left out by Hein and Tarassow (2010) and in other models, its effect as socio-institutional actor can be analyzed in this model. Changes in the constant of the respective equation signify the effects independent of capacity utilization, capital accumulation, and income distribution. Hence, the constant of the productivity component can be reinterpreted as an autonomous innovation process affected among other factors by the state. Thus, all variables – capacity utilization, the profit share, and the constants of the demand and productivity component – are open to institutional effects. Instead of simply adding one institutional variable, we must therefore examine the interconnection of all variables with economies' institutions. We do so by building a framework around the three relevant institutional forms and specifying them with two

[5] For a discussion of these distinct interpretations of the state, see Théret (2002).
[6] However, there could also be multicollinearity problems of institutional and wage or demand indicators.

indicators each. Table 1 and 2 – the former for wage-led, the latter for profit-led demand – summarize this framework and structure the discussion of indicators in the following.

Institutional Forms and a Wage-led Demand Component

Turning firstly to the wage-labor nexus, Vergeer and Kleinknecht (e.g., Kleinknecht, 2020, 2015; Kleinknecht et al., 2014; Vergeer and Kleinknecht, 2014, 2010) as well as Storm and Naastepad (e.g., Storm, 2022; Storm and Naastepad, 2012) explain the stagnant productivity growth of recent decades with a switch from demand-side to supply-side economic policies. Supply-side labor market reforms that seek to increase flexibility harm productivity growth, while stricter labor market regulation benefits productivity growth by enhancing the innovative environment through human capital development. That is why table 1 depicts a positive effect of labor market regulation on autonomous innovation in the productivity component. Moreover, as regulation increases the power of workers in the labor market, it is likely to decrease the mark-up and, therefore, the profit share (Kalecki, 1954). Thus, we also have an indirect effect of labor market regulation on the productivity component through the wage-push channel in our framework. The demand component is expansive due to its wage-led character and redistribution towards wages. Similar arguments can be made for an increase in workers' bargaining power, except that we do not see its direct influence on the innovative environment, that is, the constant of the productivity component. For both indicators – labor market regulation and bargaining power –, the overall regime is expansive in capacity utilization, capital accumulation, and productivity growth.

Second, we use public investment and social welfare as two indicators for state forms. The state can affect the demand component by public investment as part of government expenditure, i.e., implementing demand management. Furthermore, public investment raises the productivity component's constant, as the state executes its technology policy and governmental R&D via public investment (Hein, 2023, Ch. 7.10)[7]. Social welfare, the second indicator for the form of the state, works indirectly. Higher social welfare increases bargaining power of workers and, thus, exerts wage pressure affecting productivity growth through the smaller profit share. Furthermore, larger benefits increase demand. Thus, the Marx-Hicks effect is at play and, at least in a wage-led regime, also the Verdoorn effect. Ultimately, the long-run overall regime is expansive in all outcomes for public investment and social welfare.

Lastly examining competition, market power and intellectual monopoly are the two indicators applied here. Intellectual monopoly leads to the protection of monopoly rents rather than to investment in innovation (Durand, 2020; Rikap, 2023, 2021). As Rikap (2021, Ch. 3) points out, intellectual property rights are the main tool of companies to privatize public knowledge. Alongside many other legal constructs, patents are the central element in this context and strongly connected to firms' innovation processes. In the context of financialization (Auvray et al., 2021), rising numbers of patents do not signal an 'inventive spirit' but rather a privatization of knowledge, and an increase in the relevance of intangible assets. Patent concentration is the most meaningful indicator of monopoly tendencies (Rikap, 2021, Ch. 2). On the other hand, Schumpeter contends that monopolistic tendencies are positively associated with innovation,

[7] These effects are in line with the 'entrepreneurial state' literature that understands the state as a crucial agent to push for innovation breakthroughs needed for economic challenges (Deleidi and Mazzucato, 2019; Mazzucato, 2018, 2011).

Table 1: Theoretical effects of the institutional forms on the partial regimes, wage-led demand

Effect of	Wage-labor nexus		Forms of the state		Forms of competition	
	Labor market regulation	Bargaining power	Public investment	Social welfare	Intellectual monopoly	Market power
Effect on						
Demand regime (wage-led)						
Profit share	+	+	/	+	-	-
Autonomous demand	/	/	/	+	/	/
Investment	-	-	+	/	+	+
Consumption	+	+	/	+	-	-
Net exports	-	-	/	-	+	/
Σ	+	+	+	+	-	-
Productivity regime						
Profit share	+	+	/	+	-	-
Autonomous innovation	+	/	+	/	-	+
Σ	+	+	+	+	-	+
Overall regime						
Capacity utilization	+	+	+	+	-	?
Capital accumulation	+	+	+	+	-	?
Productivity growth	+	+	+	+	-	+

Notes: Own depiction; a plus represents a positive effect on the respective regime through the respective variable, a minus a negative effect, a slash indicates no effect, a question mark an undetermined one.

arguing that entrepreneurs only innovate if they have the incentive of monopolistic rents (Schumpeter, 2020, Ch. 8). Therefore, we conceptualize the contradicting indicators as follows: Intellectual monopoly increases the profit share and hence has a negative effect on the productivity component. Further, it decreases the autonomous innovation process as firm of existing knowledge, the division of innovation into smaller elements to make copying more prioritize rent-seeking. The wage-led demand component, which is affected negatively by the profit share rise, contributes indirectly to declining productivity growth via the Verdoorn relationship. Overall, the economy is affected negatively in all outcome variables. Contrary to this, expectations of greater market power in the future increases the incentive to innovate and thus autonomous innovation. However, as for intellectual monopoly, the effect through the profit share is negative. To be in line with the Schumpeterian argument and obtain increases in productivity growth, one must assume that the effects on the autonomous innovation incentive exceeds the negative effects. Nevertheless, the expansive productivity component is still at odds with the contractive demand component, leaving us with an undetermined overall effect on capacity utilization and capital accumulation. This is in line with Hein (2012) asserting that under financialization the productivity component and the overall regime can be expansive or contractive, depending on the direction and strength of the effect of rising shareholder power on the partial regimes.

Institutional Forms and A Profit-led Demand Component

Assuming a profit-led demand component blurs the picture. The expansive effect of a rising profit share in the profit-led demand component contrasts with the distinctively wage-led character of the productivity component, such that it is not evident ex ante which effect is dominant. Hence, the overall regime is mostly undetermined as shown in table 2. In line with Hein (2014, Ch. 8), depending on the respective strength of the effects, it can be expansive, intermediate or, with a profit-led demand component, even contractive.

The only indicator whose overall effect becomes clearer with a profit-led demand component is market power. Here, the overall regime turns from being undetermined to expansive. This is mainly due to the switch of the demand component itself: Through higher monopoly rents, the rising profit share has positive demand effects as investment increases more strongly than consumption decreases. Leading to feedback effects through the demand channel, this adds even more to the already expansive productivity component in the Schumpeterian sense. One further exception is public investment, which retains its positive influence on all demand components and thus productivity growth through the Verdoorn relationship. Even under a profit-led demand component, stimulating the economy with public expenditure has a positive effect as it mainly acts through autonomous innovation and demand and not through altering the profit share.

Table 2: Theoretical effects of the institutional forms on the partial regimes, profit-led demand

Effect of	Wage-labor nexus		Forms of the state		Forms of competition	
	Labor market regulation	Bargaining power	Public investment	Social welfare	Intellectual monopoly	Market power
Effect on						
Demand regime (profit-led)						
Profit share	-	-	/	-	+	+
Autonomous demand	/	/	/	+	/	/
Investment	-	-	+	/	+	+
Consumption	+	+	/	+	-	-
Net exports	-	-	/	-	+	/
Σ	-	-	+	-	+	+
Productivity regime						
Profit share	+	+	/	+	-	-
Autonomous innovation	+	/	+	/	-	+
Σ	+	+	+	+	-	+
Overall regime						
Capacity utilization	?	?	+	?	?	+
Capital accumulation	?	?	+	?	?	+
Productivity growth	?	?	+	?	?	+

Notes: Own depiction; a plus represents a positive effect on the respective regime through the respective variable, a minus a negative effect, a slash indicates no effect, a question mark an undetermined one.

4. Varieties of Productivity Regimes in Germany and the US

Incrementally, we will now analyze the macroeconomic (section 4.1) and institutional indicators (section 4.2) identified in the theoretical synthesis. Subsequently, we will seek appropriate data and conduct a descriptive analysis to characterize the institutional structures in Germany and the US. These two types of indicators will allow us to derive the two economies' productivity regimes and ultimately assess their overall regime change in section 4.3.

As is commonly done in growth regime research (e.g., Hein, 2023, Ch. 8), we divide the analysis into a pre- (1991-2006) and a post-GFC (2009-2022) period. The appendix collects all the sources, descriptions and calculation of the variables. In case an indicator is not a rate, index or pure number, it is normalized by GDP, not by the nominal capital stock as in the theoretical model.

4.1 Macroeconomic Indicators

The post-Keynesian model presented above is built around three endogenous variables, namely capacity utilization, capital accumulation and productivity growth. The latter is mainly affected through changes in output growth and distribution, i.e., the profit share. Table 3 presents figures for these macroeconomic indicators.

The medium- to long-run trend of functional income distribution reveals a redistribution towards profits in both Germany and the US, whereas the increase of the profit share is more pronounced in the latter. Table 3 shows that the average profit share increased by 0.75 percentage points in Germany compared to 3.52 percentage points in the US between the pre- and post-GFC period.

Based on critiques of conventional capacity utilization measurements (Heimberger and Kapeller, 2017; Nikiforos, 2021), we show survey data on utilization besides data based on output gap estimations to analyze companies' capacity. The survey data reflects long-run utilization as observed by producers themselves[8]. The change in the rate of utilization serves as an indicator of an economy's demand dynamics, which allows for an examination beyond the different levels of capacity utilization in Germany – on average 83.63% in the whole observed period – and the US – on average 77.08% (OECD, 2024b).

Table 3 suggests higher average changes in the rates of capacity utilization in the US. In both periods, the US economy had higher annual changes of the non-conventional utilization rate. Quite the opposite is true for capital accumulation measured by the growth of net capital stock: Both economies saw a decline in their capital accumulation rate post-GFC – the US slightly more than Germany. However, the US experienced this decline from a higher level of capital accumulation, maintaining on average almost twice the rate over the whole period. Generally, the US exhibited a more robust economic development regarding these demand-determined factors of output growth in the post- GFC period than Germany.

Ultimately, Germany experienced lower output growth due to weakened demand dynamics, manifesting in lower changes of capacity utilization and accumulation rates. Meanwhile, the

[8] In the following, we refer to the utilization rate calculated with an output gap approach as 'conventional' and to the rate based on survey data as 'non-conventional'.

Table 3: Averages of macroeconomic indicators; Germany and the US; before and after the GFC

	Germany			US		
	Pre-GFC	Post-GFC	Change	Pre-GFC	Post-GFC	Change
Output growth (%)	1.39	1.08		3.13	1.83	
Productivity growth (%)	1.71	0.77		2.03	1.21	
Profit share (%)	41.64	42.39	0.75	39.98	43.50	3.52
Change in capacity utilizations (%)						
– Conventional calculation	-0.23	-0.06		0.23	0.05	
– Non-conventional calculation	0.01	0.10		0.05	0.55	
Capital accumulation rate (%)	1.71	0.74		2.86	1.83	

Notes: Own calculations based on OECD (2024c, 2024d), European Commission (2023), and OECD (2024a). Overall: 1991–2022; pre-GFC: 1991–2006; post-GFC: 2009–2022; change: difference between the pre- and post-GFC period. Rates of change calculated from 1992 onwards. Conventional data for capacity utilization refers to output gap estimations, while non-conventional data to survey data in manufacturing.

US demonstrated higher output growth connected to higher growth rates in capacity utilization and accumulation rates. The profit share increased in both economies.

4.2 Institutional Indicators

The next step in determining an economy's productivity regime is to analyze the indicators that serve as proxy for the three institutional forms – the wage-labor nexus, the forms of state and competition. These are exogenous to the model. Table 4 presents data for the variables that numerically represent the indicators associated with the institutional forms.

4.2.1 Wage-Labor Nexus

We use the OECD's Employment Protection Legislation (EPL) index as an indicator of labor market regulation (OECD, 2021)[9]. The EPL index is split into one index for the regulation of regular contracts (EPL_r) and one for the use of temporary workers (EPL_t). Both indices are presented in figure 4. As legal regulation does not change rapidly, it does not surprise that the indices for the US remained unchanged throughout the observed time frame. Both EPL_r and the EPL_t were consistently at a very low level. Similarly, the index for regular contracts in Germany shows very little temporal variation. In contrast, the EPL_t experienced a significant decline from 1995 to 2004. This reflects the substantial labor market deregulation carried out under the 'Agenda 2010,' which was designed to enhance flexibility (Herzog-Stein et al., 2010). Thus, the average index between the pre- and post-GFC period declined. Despite these changes, both indices for Germany are still on a higher level than the ones of the US indicating stricter, but deteriorating labor market regulation in Germany.

Simultaneous to the wage share, bargaining power decreased (Guschanski and Onaran, 2022). We use union density as a measure for pre-bargaining power, while the coverage rate of union-bargained wages indicates post-bargaining power. With more members, i.e., higher union

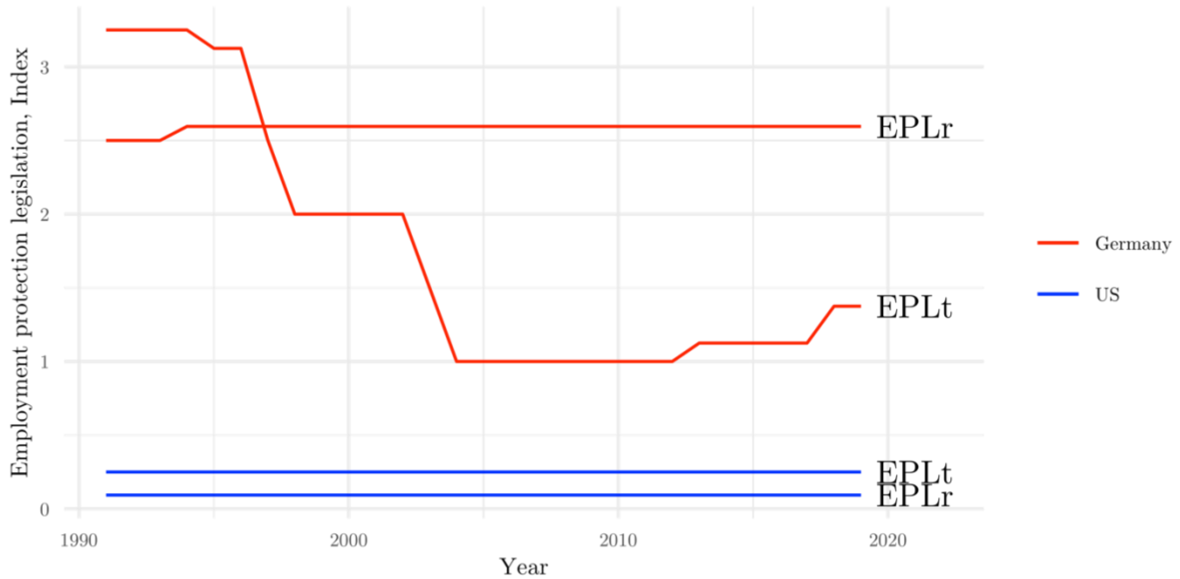

Figure 4: Employment Protection Legislation, Germany and the US, 1991–2019
Source: Own depiction; data from OECD (2021).

[9] For a detailed look into the methodology of these indices, see OECD (2020, Ch. 3).

Table 4: Averages and changes of institutional indicators; Germany and the US; overall, before and after the GFC

	Germany				US			
	Overall	Pre-GFC	Post-GFC	Change	Overall	Pre-GFC	Post-GFC	Change
EPL_t (Index)	1.75	2.27	1.12	-1.14	0.25	0.25	0.25	0.00
Bargaining coverage (% of workers)	64.19	79.14	57.59	-12.55	14.15	15.57	12.38	-3.19
Change in patent applications (%)	1.11	4.87	0.25		1.86	4.36	3.25	
Market concentration (%)	16.73	18.01	15.22	-2.78	39.62	36.00	42.33	6.33
Public investment (% of GDP)	2.38	2.47	2.34	-0.13	3.66	3.81	3.45	-0.37
Social welfare (% of GDP)	12.02	11.36	12.90	1.54	6.16	6.08	6.22	0.14

Notes: Own calculations based on OECD (2024c, 2024d), European Commission (2023), and OECD (2024a). Overall: 1991–2022; pre-GFC: 1991–2006; post-GFC: 2009–2022; change: difference between the pre- and post-GFC period. Rates of change calculated from 1992 onwards. Conventional data for capacity utilization refers to output gap estimations, while non-conventional data to survey data in manufacturing.

density, unions can bargain harder by building up more pressure on employers. How many workers profit from the bargaining process, i.e., the coverage rate of union wages, indicates the ability of trade unions to assert themselves by other means than the conventional strike. This is especially important in the context of Germany, where unions' institutional power extends beyond the bargaining process itself. Thus, bargaining coverage – i.e., the rate of workers that earn a union wage – adds an essential facet of workers' power.

Table 5 compiles data on both measures. Germany and the US show a clear downward trend in union density and coverage. This trend is most pronounced in the German union density rate, which almost halved between 1991 and 2019. The coverage rate also declined significantly, from 80.8% in 1995 to 54% in 2018. However, both rates are still considerably higher in Germany than in the US.

A noteworthy observation is the difference in union density and coverage in Germany as previously mentioned. This implies an institutional framework facilitating some stability for labor by extending union wages across entire sectors, rather than limiting them solely to union members and firms directly involved in the bargaining process. In contrast, union density and coverage remain closely aligned in the US, ranging between 10% and 20% with a downward trend. While bargaining coverage is consistently at a significantly higher level in Germany, it has also experienced a steeper decline as the US.

Ultimately, Germany still has a more regulated labor market. However, this system seems to deteriorate. The German wage-labor nexus undergoes substantial change while the US system remains stable in its liberal approach.

4.2.2 Forms of the State

Turning to the state, we first consider public investment, which among other things encompasses the direct and indirect innovation action by the state such as industrial policy, infrastructure investment or funding of R&D. Second, social expenditure is added as an aspect of economic state action.

Innovative public investment can either be approximated by governmental gross fixed capital formation (GFCF) or by R&D expenditure. While the latter measure offers direct insights into state intervention in technical progress, it focuses narrowly on research projects, thereby overlooking the broader impact of state activity on productivity growth. With the revision of the systems of national accounts, governmental GFCF now recognizes the relevance of R&D in capital formation. The result of R&D activities, i.e., intellectual property products, are now included in GFCF and, therefore, accepted as part of public investment that directly influences productivity growth (United Nations, 2009, p. 206). Moreover, public investment, as measured by GFCF, also captures the indirect effects of state activity like building infrastructure as basis of efficient production or demand creation. Although it includes all acquired assets, it serves as a good proxy for the state's effect on productivity growth.

Table 5: Indicators for bargaining power, Germany and the US, 1991–2020

	Union density (%)		Coverage rate (%)	
Year	Germany	US	Germany	US
1991	36.0	17.3		18.1
1992	33.9			17.7
1993	31.8	16.9		17.6
1994	30.4			17.5
1995	29.2	16.2	80.8	16.7
1996	27.8		75.7	16.2
1997	27.0	15.6	74.9	15.6
1998	25.9		73.6	15.4
1999	25.3	15.0	70.6	15.3
2000	24.6		67.8	14.9
2001	23.7	14.6	68.8	14.7
2002	23.5		67.8	14.5
2003	23.0	14.1	67.6	14.3
2004	22.2		65.8	13.8
2005	21.5	13.6	64.9	13.7
2006	20.6		63.4	13.1
2007	19.8		61.7	13.3
2008	19.0	12.9	61.3	13.7
2009	18.8		61.7	13.6
2010	18.9	13.2	59.8	13.1
2011	18.4		58.9	13.0
2012	18.3		58.3	12.5
2013	18.0		57.6	12.4
2014	17.7	12.1	57.8	12.3
2015	17.6		56.8	12.3
2016	17.0	11.5	56.0	12.0
2017	16.7		55.0	11.9
2018	16.6		54.0	11.7
2019	16.3			11.6
2020				12.1

Note: ‘Coverage rate’ refers to the adjusted bargaining coverage rate derived from surveys.
Source: OECD and AIAS (2023).

Table 6 compares the data on public investment already used above with R&D measures. Gross domestic expenditure on R&D (GERD) financed by the government quantifies state R&D expenditure. The tables shows that the share of R&D expenditure was similar in Germany and the US. We can only recognize differences between the economies with a focus on GFCF data. That is why we focus on this measure for productivity-enhancing public investment.

Table 6: Comparison of average data on public investment and R&D expenditure by government; Germany and the US; overall, before and after the GFC

	Overall	Pre-GFC	Post-GFC	Change
Germany				
Public investment (% of GDP)	2.38	2.47	2.34	−0.13
GERD financed by government (% of GDP)	0.80	0.78	0.85	0.08
US				
Public investment (% of GDP)	3.66	3.81	3.45	−0.37
GERD financed by government (% of GDP)	0.77	0.81	0.73	−0.07

Notes: Own calculations based on European Commission (2023) and OECD (2024c). GERD: Gross domestic expenditure on R&D. Overall: 1991–2022; pre-GFC: 1991–2006; post-GFC: 2009–2022; change: difference between the pre- and post-GFC period. Data on 2022 missing for German GERD financed by government.

Table 4 contains the medium- to long-run figures on public investment. Both Germany and the US saw a small decline in public investment as a share of GDP between the two periods. However, the share of public investment was about 1.5 times higher in the US than in Germany in both periods.

For social expenditure table 4 reveals the opposite picture compared to public investment. The figures for both Germany and the US increase from the pre- to the post-GFC period, with Germany maintaining a share of social expenditure that is twice as high as that of the US.

In sum, while its orientation towards redistributive state policy persists, Germany falls behind in terms of public investment. In contrast, the US pursue a policy of higher public investment and lower social expenditure.

4.2.3 Forms of Competition

We use patents as an indicator of monopoly tendencies and data on top 100 companies as an indicator of market power. Calculating a distinct indicator of intellectual monopoly is beyond the scope of this paper. Therefore, we use the change rate of patents filed to the IP5 family[10] by inventors with German or US residence. Table 4 shows that the patent dynamics initially start at a slightly higher level in Germany compared to the US during the pre-GFC period. However, the difference in the post-GFC period is striking. While the US experienced a decline in the rate of annual change of patent applications from 4.36% in the first to 3.25% in the second period, patent growth in Germany has nearly come to a standstill after the GFC. This indicates that intellectual monopoly tendencies are more persistent in the US.

Finding suitable data for the market power is more difficult. There are various objections against the measurements of market power: Markets are hard to define; competition can be high even in concentrated markets; and the concept of power is quite vague. Hence, market power is determined mostly indirectly. For example, Weche and Wambach (2021) measure mark-ups. However, the mark-up in Kaleckian theory is not solely dependent on the competition between firms, but also dependent on other factors like the bargaining power of workers (Hein, 2023,

[10] The IP5 family is the association of the five largest intellectual property offices, namely the patent offices of the US, Europe, Japan, Korea, and China.

Ch. 3). Thus, it depends upon aspects of the forms of competition and the wage-labor nexus. Using mark-ups to measure market power does not do justice to the framework presented here with the differentiation between the two institutional forms. To ensure a distinct separation, the expectations of a higher market share can be utilized to examine the Schumpeterian argument that investments in innovation require an incentive. It is the expectation because investment in innovation is forward-looking, and firms invest based on anticipation of their future situation. However, our analysis will focus on the observed averages of market power data across two distinct periods, as opposed to direct empirical material on firms' expectations. It is postulated that firms foresee an increase in market power in contexts characterized by rising market shares.

Popular measures for market concentration are the Herfindahl–Hirschman index or concentration rates (e.g., Grullon et al., 2019). To circumvent problems like diverging sector and firm categorization, we scrutinize data on the top 100 companies in Germany and the US. Hereby, we avoid the problem of assigning firm to one market and can focus on the market power of the largest market actors regardless of sectors. This solves the problem that big firms can be active in various sectors (Bajgar et al., 2023). Usually, the summed share in total value added of all top 100 companies is used as an indicator of corporate concentration and the resulting political and economic power (Buchwald et al., 2021).

The average market share of the top 100 German companies based on data by the Monopolkommission (2022) declined between the pre- and the post-GFC period. This points towards a development in Germany that moves its economy away from favoring big players towards a more competition-based model. This is often referred to as the descent of the 'Deutschland AG' – a network of powerful companies characterizing German corporate governance (see e.g., Streeck and Höpner, 2003).

Unfortunately, no measure of market concentration similar to the German top 100 data is readily available in the US. We therefore build an alike indicator that is based on the well-known Fortune 500 list (Fortune, 2024). Taking the first US 100 companies listed there, market concentration is measured as share of their summed revenue in nominal GDP. While this approach addresses the data issues, it also introduces challenges, primarily due to differences in the calculation methods between the German top 100 variable and the one developed for the US. While the Monopolkommission (2022) uses data on domestic value added of the largest 100 German companies regardless of their stock market listing, Fortune (2024) only identifies revenue data of publicly listed US companies that we supplement with nominal GDP data. Therefore, the level of the two variables is not comparable as they measure different concepts. We can only analyze the changes in market concentration. As a further problem, Fortune (2024) only lists public companies. Given the strong focus on stock markets in the US, it is unlikely that private companies would appear in this list. Furthermore, in 2014, merely 13 of the top 100 companies in Germany were entirely private, which signifies only a minimal distortion. Hence, we can retain the Fortune-based indicator.

The sole crucial aspect where the measures deviate is that the US data contains global revenues of companies while the German top 100 is based on domestic value added, such that international cash flows could distort the US data. Overall, the data show a post-GFC increase in market concentration in the US: As depicted in table 4, the market share of the top 100 US companies increased by 6.33 percentage points between the two analyzed periods, while the share decreased in Germany by 2.78 percentage points.

Ultimately, we see signs for stronger intellectual monopoly tendencies and higher market concentration in the US. The opposite is true for Germany. After the GFC, increases in patent applications nearly came to a hold and market concentration decreased. At the same time, productivity growth is declining in both economies. If we were to consider this ceteris paribus, the arguments of the intellectual monopoly literature would apply more strongly to the US, where the negative effects of rent seeking seem to outweigh the potential benefits of future profits through patents on innovation. In Germany, declining market concentration reduces incentives to innovate, affecting productivity growth negatively, to such an extent that the diminishing role of intellectual monopoly cannot counter this effect.

4.3 Classification of the Productivity Regimes

Scholars categorize Germany's demand as wage-led (for an overview of the findings, see Hein, 2014, p. 302). The US' demand is more controversial. While some studies find a profit-led regime (for example, Barbosa-Filho and Taylor, 2006; Basu and Gautham, 2020; Carvalho and Rezai, 2016; Storm and Naastepad, 2012, Ch. 5), Blecker (2016) argues that these findings are due to the focus on short-term effects. In the long run, the US' demand is more likely wage-led. Since this study focuses on the long run, we follow this explanation. Accordingly, we expect the theoretical effects depicted in table 1 for both Germany and the US.

In the German case, the descriptive analysis suggests that the wage-labor nexus is crucial for understanding the economy's decline in productivity growth. The data above indicates that Germany has undergone significant changes in this institutional form, especially during the 2000s, leading to a deterioration of key figures between the two sub-periods. Embedding these numbers in a broader picture, the Agenda 2010 labor market reforms can be seen as a regime change from a Régulation perspective. Germany has been searching for a new mode of regulation. This shift has led to profound changes in labor markets, workers' bargaining power, and the overall growth regime, characterized by wage moderation and export orientation. These changes have substantially weakened Germany's productivity component through the Marx-Hicks effect, resulting in a sharp decline in growth rates at the overall regime level. This is in line with the arguments of Storm and Naastepad (2015): In the past, Germany developed a model of cooperative capitalism, emphasizing quality over price competitiveness. While some aspects of this model persist and enable effective crisis responses, a clear shift away from these policies is evident. A declining wage share and labor market liberalization strike at the core of the traditional German economic model.

Meanwhile, the US productivity regime appears less sensitive to changes in the wage-labor nexus. The labor market is already highly deregulated. Instead, the figures suggest that public investment plays a crucial role in shaping the US productivity regime. State intervention is primarily driven by political objectives, favoring US corporate networks and their innovative capacities (Wade, 2014). Nevertheless, various studies find a negative effect of a declining wages share on productivity growth in the US as well (e.g., Hein and Tarassow, 2010). It is likely that falling wage shares had a similar effect as in Germany. However, differences in institutional structures between the two economies may explain why this trend appears less pronounced in the US. The higher levels of public investment before and after the GFC have helped sustain relatively higher productivity growth rates in the US. Thus, while the wage-labor nexus is central to Germany's productivity regime, it plays a less dominant role in the US. The state is crucial.

We can classify Germany as *labor-led productivity regime*, heavily reliant on the wage-labor nexus, whereas the US follows a *state-led productivity regime* with an active governmental role. Both regimes encompass Keynesian elements of economic policy – Germany through redistribution and the US through public investment – which support their development to some extent. However, their broader approach to economic growth aligns with the 'neoliberal' turn, which has had negative consequences for productivity growth.

The forms of competition are excluded from the classification of the productivity regimes in the two countries. Descriptive figures on competition do not show a clear causal relationship with productivity growth. We see contrary effects between some forms of competition being an innovation incentive and others leading to rent-seeking behavior. Therefore, we leave the comprehensive inclusion of this institutional form open for future research. However, we can relate our results to previous research. The descriptive figures on competition measures suggest that the intellectual monopoly tendencies are more pronounced in the US where market concentration appears to be on the rise while it diminishes in Germany. Concurrently, productivity growth decreases. The observation of a common outcome despite divergent developments in the two economies indicates the potential existence of diverse innovation models, like elaborated on by Kleinknecht et al. (2014). Schumpeter mark I and mark II models differ in their requirements to knowledge production: Mark I models need generally available knowledge and relate to dynamic competition and the well-known 'creative destruction'; mark II models rely on accumulated firm-specific knowledge and therefore monopolistic competition. The US exemplifies the former, while Germany the latter. The prevalence of these models in the two economies explains that they react similarly to divergent changes in market competition. In the US, the model dependent on competition deteriorates due to monopolistic tendencies, and the German monopolistic model deteriorates due to increased competition.

We can now incorporate these productivity components – especially regarding wage relations and the state – into the full model. Figure 5 illustrates the overall effects in Germany and the US, starting from a common reference point that reflects the economic situation before the analyzed period. It is important to acknowledge that notable differences between the two economies were present even prior to this period.[11] The figure is interpreted in terms of the relative development commencing from the time preceding the analyzed period to the pre-GFC period, and subsequently between the two periods. The focus is not on the absolute levels of the respective variables.

The increasing profit share in Germany and the US has created an environment that is detrimental to wage-led demand. These effects were mitigated through the implementation of mercantilist strategies in Germany and debt-driven consumption in the United States (Hein, 2019). Consequently, we still see an expansion of the demand component between the

[11] Productivity growth in the period 1973-1991 was on average 2.91% in Germany and 1.35% in the US (OECD, 2024a).

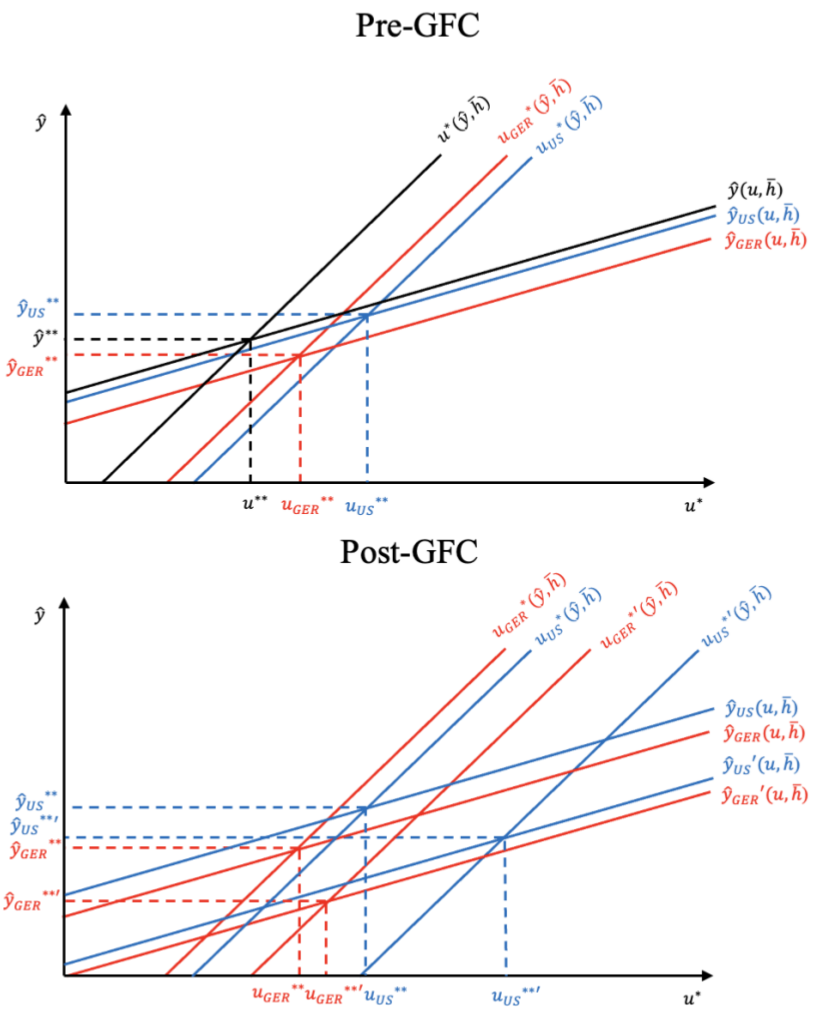

Figure 5 Stylized long-run effects on capital accumulation and productivity growth; Germany and the US

Notes: $\hat{y}$: productivity growth, g: capital accumulation, h: profit share, x^*: goods market equilibrium of x, x^{**}: equilibrium of demand and productivity component of x, $\bar{x}$: constant of x; x': post-GFC period. Black elements represent the common starting point, red elements the German development, blue ones that of the US. Country-specific economic deviation from the stylized common starting point before the analyzed period.

Source: Own depiction based on Hein (2014, Ch. 8).

subperiods in both economies despite the challenging climate for demand. The data above shows this. Germany's goods market equilibrium in terms of its utilization rate lacks behind the one of the US. In both periods, figure 5 depicts a German demand component in terms of capacity utilization that grows less than that of the US, particularly in the post-GFC period. Meanwhile, the productivity components of Germany and the US decline. The demand effect counteracts this trend via the Verdoorn effect resulting in a moderated decline in productivity growth. This phenomenon is more pronounced in the US, where stronger growth in capacity utilization and, consequently, output add to productivity growth during the pre-GFC period. Productivity growth is even higher than before. In turn, demand effects are not strong enough anymore in the post-GFC period, leading to a downturn of productivity growth in the US as well. Ultimately, productivity growth at model equilibrium is consistently greater in the US than in Germany, and a similar trend is observed concerning the goods market equilibrium in terms of capacity utilization.

Characterizing the demand component in terms of the rate of capital accumulation does not alter the description. This is demonstrated in the appendix. An expansive demand component remains evident in both economies during the pre- and post-GFC periods, with the US on a higher level. The capital stock experiences greater growth in the pre-GFC period compared to the post-GFC period in both Germany and the US. Similarly, there is a mitigated trend of declining productivity growth akin to that of the model in terms of capacity utilization.

In conclusion, the expansive demand components with existing, yet diminishing growth rates are no longer sufficient to offset the contractionary productivity components. This elucidates the simultaneous trend of declining productivity growth alongside the weak growth of the goods market equilibrium. The Verdoorn coefficient is probably the most robust effect shown for various economies including Germany and the US (see e.g., Hein, 2014, Ch. 8.3). The US exhibit consistently higher output growth than Germany. This explains part of its higher productivity growth. This assertion does not contradict the institutional perspective proposed herein; rather, they complement one another. As demonstrated above, all the institutional variables exert influence through the demand component as well.

5. Conclusion

To explore the inclusion of productivity regimes into the growth regime framework, we drew on the post-Keynesian model of endogenous technical progress and refined it with the institutional notions of Régulation Theory. We have shown that institutions affect productivity growth through various channels, most importantly through altering distribution and demand. Moreover, institutions directly impact the innovative environment. Building on these prior findings, we designed a framework allowing for the differentiation between direct and indirect effects.

In applying this framework to Germany and the US in the period between 1991 and 2022, we demonstrated that the framework produces insights valuable for post-Keynesianism and CPE. We classified the productivity regime of Germany as labor-led and the one of the US as state-led. This distinction can explain why, faced with the same global climate of secular stagnation, German productivity growth declined more strongly than in the US: While Germany pursued labor market deregulation since 2000, the US mitigated stagnation through public investment.

Finally, the cases of Germany and the US underscore that economic policy makers must recognize the institutional dimension of productivity growth. As the supply side is shaped by demand, distribution, and institutions in the long run, policies involving labor market deregulation and austerity measures can produce persistent stagnation traps: They weaken demand, redistribute income towards profits, erode the institutional foundations of innovation, and ultimately undermine productivity growth.

Several limitations should be noted. Sectoral change from manufacturing to services remains insufficiently discussed in this paper. There is an absence of arguments on concepts such as Baumol's disease (Baumol, 1967; Baumol and Bowen, 1966) or similar theories. Specifically, scholars have noted that the Verdoorn effect predominantly pertains to manufacturing, which is not addressed in this paper. Moreover, there are no claims regarding the character of productivity growth in sectors such as finance, despite their significance, particularly in the US but also in Germany. This critique can be extended to highlight a deficiency in theoretical foundation of the framework used. We assume labor-saving technical progress here. A comprehensive theory of productivity regimes, however, must engage with the theory of productivity itself. This could potentially illuminate various forms of technical progress beyond the Harrod-neutral assumption.

Future research should build on the existing work in the field of innovation and combine it to a robust theory of productivity regimes. Empirically, the strategy presented in this paper represents merely an initial step towards a more nuanced analysis that includes causal inference. Our strategy here inevitably runs into problems identifying causal relations as we use three institutional forms to explain two outcome variables.

References

Aglietta, M., 2015. A Theory of Capitalist Regulation: The US Experience, Radical Thinkers. Verso, London.

Amable, B., 2023. Nothing New Under the Sun: The So-called ‘Growth Model Perspective.’ European Journal of Economics and Economic Policies: Intervention 20, 444–460. https://doi.org/10.4337/ejeep.2023.0098

Amable, B., 2002. Régulation Theory and Technical Change, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 161–167.

André, C., 2002. The Welfare State and Institutional Compromises, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 94–100.

Auvray, T., Durand, C., Rabinovich, J., Rikap, C., 2021. Corporate Financialization’s Conservation and Transformation: From Mark I to Mark II. Review of Evolutionary Political Economy 2, 431–457. https://doi.org/10.1007/s43253-021-00045-4

Bajgar, M., Berlingieri, G., Calligaris, S., Criscuolo, C., Timmis, J., 2023. Industry Concentration in Europe and North America. Industrial and Corporate Change 1–18. https://doi.org/10.1093/icc/dtac059

Barbosa-Filho, N.H., Taylor, L., 2006. Distributive and Demand Cycles in the US Economy—A Structuralist Goodwin Model. Metroeconomica 57, 389–411. https://doi.org/10.1111/j.1467-999X.2006.00250.x

Basu, D., Gautham, L., 2020. What is the Impact of an Exogenous Shock to the Wage Share?: VAR Results for the US Economy, 1973–2018, in: Conflict, Demand and Economic Development. Routledge India.

Baumol, W.J., 1967. Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. The American Economic Review 57, 415–426.

Baumol, W.J., Bowen, W.G., 1966. Performing Arts: The Economic Dilemma: A Study of Problems Common to Theater, Opera, Music, and Dance. The Twentieth Century Fund New York, New York.

Bergeaud, A., Cette, G., Lecat, R., 2016. Productivity Trends in Advanced Countries between 1890 and 2012. Review of Income and Wealth 62, 420–444. https://doi.org/10.1111/roiw.12185

Bhaduri, A., Marglin, S., 1990. Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies. Cambridge Journal of Economics 14, 375–393. https://doi.org/10.1093/oxfordjournals.cje.a035141

Blecker, R.A., 2016. Wage-led versus Profit-led Demand Regimes: The Long and the Short of It. Review of Keynesian Economics 4, 373–390. https://doi.org/10.4337/roke.2016.04.02

Boyer, R., 1988. Technical Change and the Theory of Regulation, in: Dosi, G. (Ed.), Technical Change and Economic Theory, IFIAS Research Series. Pinter, London New York, N.Y., pp. 67–94.

Boyer, R., Saillard, Y. (Eds.), 2002a. Regulation Theory: The State of the Art. Routledge, London ; New York.

Boyer, R., Saillard, Y., 2002b. A Summary of Régulation Theory, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 36–44.

Buchwald, A., Hotten, R., Rothbauer, J., Weche, J.P., 2021. The Top 100 Companies Panel Database: Five Decades of Aggregate Concentration Surveys in Germany. Jahrbücher für Nationalökonomie und Statistik 241, 787–800. https://doi.org/10.1515/jbnst-2020-0003

Carvalho, L., Rezai, A., 2016. Personal Income Inequality and Aggregate Demand. CAMECO 40, 491–505. https://doi.org/10.1093/cje/beu085
Cassetti, M., 2003. Bargaining Power, Effective Demand and Technical Progress: A Kaleckian Model of Growth. Cambridge Journal of Economics 27, 449–464. https://doi.org/10.1093/cje/27.3.449
Deleidi, M., Fontanari, C., Gahn, S.J., 2023. Autonomous Demand and Technical Change: Exploring the Kaldor–Verdoorn Law on a Global Level. Economia Politica 40, 57–80. https://doi.org/10.1007/s40888-023-00294-y
Deleidi, M., Mazzucato, M., 2019. Putting Austerity to Bed: Technical Progress, Aggregate Demand and the Supermultiplier. Review of Political Economy 31, 315–335. https://doi.org/10.1080/09538259.2019.1687146
Delorme, R., 2002. The State as Relational, Integrated and Complex, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 115–121.
Durand, C., 2020. Techno-féodalisme: Critique de l'Économie Numérique. Éditions La Découverte, Paris.
Eichengreen, B., 2024. Why Is Europe Losing the Productivity Race? | by Barry Eichengreen [WWW Document]. Project Syndicate. URL https://www.project-syndicate.org/commentary/why-european-productivity-growth-lags-us-by-barry-eichengreen-2024-04 (accessed 4.11.24).
European Commission, 2023. Annual Macro-economic Database (AMECO).
Fortune, 2024. Fortune 500.
Goldin, I., Koutroumpis, P., Lafond, F., Winkler, J., 2024. Why is Productivity Slowing Down? Journal of Economic Literature 62, 196–268.
Grullon, G., Larkin, Y., Michaely, R., 2019. Are US Industries Becoming More Concentrated? Review of Finance 23, 697–743. https://doi.org/10.1093/rof/rfz007
Guschanski, A., Onaran, Ö., 2022. The Decline in the Wage Share: Falling Bargaining Power of Labour or Technological Progress? Industry-level Evidence from the OECD. Socio-Economic Review 20, 1091–1124. https://doi.org/10.1093/ser/mwaa031
Hall, P.A., Soskice, D.W. (Eds.), 2001. Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford University Press, Oxford [England] ; New York.
Hartwig, J., 2014. Testing the Bhaduri–Marglin Model with OECD Panel Data. International Review of Applied Economics 28, 419–435. https://doi.org/10.1080/02692171.2014.896881
Heimberger, P., Kapeller, J., 2017. The Performativity of Potential Output: Pro-cyclicality and Path Dependency in Coordinating European Fiscal Policies. Review of International Political Economy 24, 904–928. https://doi.org/10.1080/09692290.2017.1363797
Hein, E., 2023. Macroeconomics after Kalecki and Keynes: Post-Keynesian Foundations. Edward Elgar Publishing, Cheltenham, UK Northampton, MA, USA.
Hein, E., 2019. Financialisation and Tendencies Towards Stagnation: The Role of Macroeconomic Regime Changes in the Course of and After the Financial and Economic Crisis 2007–09. Cambridge Journal of Economics 43, 975–999. https://doi.org/10.1093/cje/bez022
Hein, E., 2014. Distribution and Growth after Keynes: A Post-Keynesian Guide. Edward Elgar Publishing. https://doi.org/10.4337/9781783477296
Hein, E., 2012. "Financialization," Distribution, Capital Accumulation, and Productivity Growth in a Post-Kaleckian Model. Journal of Post Keynesian Economics 34, 475–496. https://doi.org/10.2753/PKE0160-3477340305
Hein, E., Dodig, N., Budyldina, N., 2015. The Transition Towards Finance-dominated Capitalism: French Regulation School, Social Structures of Accumulation and Post-Keynesian Approaches Compared, in: Hein, E., Detzer, D., Dodig, N. (Eds.), The

Demise of Finance-Dominated Capitalism. Edward Elgar Publishing. https://doi.org/10.4337/9781784715076.00007
Hein, E., Tarassow, A., 2010. Distribution, Aggregate Demand and Productivity Growth: Theory and Empirical Results for Six OECD Countries Based on a Post-Kaleckian Model. Cambridge Journal of Economics 34, 727–754. https://doi.org/10.1093/cje/bep066
Herzog-Stein, A., Lindner, F., Sturn, S., van Treeck, T., 2010. From a Source of Weakness to a Tower of Strength?, IMK Report. IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.
Hicks, J.R., 1963. The Theory of Wages. Palgrave Macmillan UK, London.
Juillard, M., 2002. Accumulation Regimes, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 153–160.
Juillard, M., Boyer, R., 1992. The New Endogeneous Growth Theory Versus a Productivity Regime. CEPREMAP Paper.
Kaldor, N., 1985. Economics without Equilibrium. M.E. Sharpe, Inc., Armonk, New York.
Kaldor, N., 1966. Causes of Growth and Stagnation in the World Economy. Cambridge University Press, Cambridge.
Kaldor, N., 1961. Capital Accumulation and Economic Growth, in: Lutz, F.A., Hague, D.C. (Eds.), The Theory of Capital. Palgrave Macmillan UK, London, pp. 177–222.
Kaldor, N., 1957. A Model of Economic Growth. The Economic Journal 67, 591–624.
Kalecki, M., 1954. Theory of Economic Dynamics - An Essay on Cyclical and Long-Run Changes in Capitalist Economy. Routledge, London/New York.
Kemp-Benedict, E., 2022. A Classical-evolutionary Model of Technological Change. Journal of Evolutionary Economics 32, 1303–1343. https://doi.org/10.1007/s00191-022-00792-5
Kleinknecht, A., 2020. The (Negative) Impact of Supply-side Labour Market Reforms on Productivity: An Overview of the Evidence. Cambridge Journal of Economics 44, 445–464. https://doi.org/10.1093/cje/bez068
Kleinknecht, A., 2015. How 'Structural Reforms' of Labour Markets Harm Innovation. Social Europe Research Essays 6.
Kleinknecht, A., Van Schaik, F.N., Zhou, H., 2014. Is Flexible Labour Good for Innovation? Evidence from Firm-level Data. Cambridge Journal of Economics 38, 1207–1219. https://doi.org/10.1093/cje/bet077
Leborgne, D., Lipietz, A., 1988. New Technologies, New Modes of Regulation: Some Spatial Implications. Environment and Planning D: Society and Space 6, 263–280. https://doi.org/10.1068/d060263
Marx, K., 1975. Capital - A Critique of Political Economy Volume I: The Process of Production of Capital. Progress Publishers, Moscow.
Mazzucato, M., 2018. Mission-oriented Innovation Policies: Challenges and Opportunities. Industrial and Corporate Change 27, 803–815. https://doi.org/10.1093/icc/dty034
Mazzucato, M., 2011. The Entrepreneurial State. Soundings 49, 131–142. https://doi.org/10.3898/136266211798411183
McCombie, J.S.L., 2016. Verdoorn's Law, in: The New Palgrave Dictionary of Economics. Palgrave Macmillan UK, London, pp. 1–4. https://doi.org/10.1057/978-1-349-95121-5_1493-1
Monopolkommission, 2022. Top 100 Panel.
Naastepad, C.W.M., 2006. Technology, Demand and Distribution: A Cumulative Growth Model with an Application to the Dutch Productivity Growth Slowdown. Cambridge Journal of Economics 30, 403–434. https://doi.org/10.1093/cje/bei063
Nah, W.J., Lavoie, M., 2019. Convergence in a Neo-Kaleckian Model with Endogenous Technical Progress and Autonomous Demand Growth. Review of Keynesian

Economics 7, 275–291.
Nikiforos, M., 2021. Notes on the Accumulation and Utilization of Capital: Some Empirical Issues. Metroeconomica 72, 679–695. https://doi.org/10.1111/meca.12339
OECD, 2024a. OECD Productivity Statistics.
OECD, 2024b. Business Tendency Surveys.
OECD, 2024c. Main Science and Technology Indicators.
OECD, 2024d. National Accounts at a Glance.
OECD, 2023. Patent Database.
OECD, 2021. Employment Protection.
OECD, 2020. OECD Employment Outlook 2020: Worker Security and the COVID-19 Crisis, OECD Employment Outlook. OECD. https://doi.org/10.1787/1686c758-en
OECD, AIAS, 2023. Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS).
Oughton, C., Tobin, D., 2023. Joan Robinson: Early Endogenous Growth Theorist. Cambridge Journal of Economics 47, 943–964. https://doi.org/10.1093/cje/bead032
Petit, P., 1999. Structural Forms and Growth Regimes of the Post-Fordist Era. Review of Social Economy 57, 220–243. https://doi.org/10.1080/00346769900000037
Rikap, C., 2023. Capitalism as Usual? Implications of Digital Intellectual Monopolies. New Left Review 139, 145–160.
Rikap, C., 2021. Capitalism, Power and Innovation: Intellectual Monopoly Capitalism Uncovered, Routledge studies in the economics of innovation. Routledge, London.
Romer, P.M., 1990. Endogenous Technological Change. Journal of Political Economy 98, 71–102.
Rowthorn, R.E., 1981. Demand, Real Wages and Economic Growth. Thames Papers in Political Economy 1–39.
Schumpeter, J.A., 2020. Kapitalismus, Sozialismus und Demokratie: Mit einer Einführung von Heinz D. Kurz. utb GmbH.
Setterfield, M., Cornwall, J., 2002. A Neo-Kaldorian Perspective on the Rise and Decline of the Golden Age, in: Setterfield, M. (Ed.), The Economics of Demand-Led Growth. Edward Elgar Publishing, pp. 67–86.
Solow, R.M., 1956. A Contribution to the Theory of Economic Growth. The Quarterly Journal of Economics 70, 65. https://doi.org/10.2307/1884513
Storm, S., 2022. Chapter Three - The Secular Stagnation of Productivity Growth, in: Wray, L.R., Dantas, F. (Eds.), Handbook of Economic Stagnation. Academic Press, pp. 37–58.
Storm, S., Naastepad, C.W.M., 2015. Crisis and Recovery in the German Economy: The Real Lessons. Structural Change and Economic Dynamics 32, 11–24. https://doi.org/10.1016/j.strueco.2015.01.001
Storm, S., Naastepad, C.W.M., 2012. Macroeconomics beyond the NAIRU. Harvard University Press, Cambridge, Mass.
Streeck, W., Höpner, M., 2003. Alle Macht dem Markt?: Fallstudien zur Abwicklung der Deutschland AG. Campus Verlag.
Syverson, C., 2017. Challenges to Mismeasurement Explanations for the US Productivity Slowdown. Journal of Economic Perspectives 31, 165–186.
Tavani, D., Zamparelli, L., 2018. Endogenous Technical Change in Alternative Theories of Growth and Distribution, in: Veneziani, R., Zamparelli, L. (Eds.), Analytical Political Economy. John Wiley & Sons, Ltd, pp. 139–174.
Théret, B., 2002. The State, Public Finance and Régulation, in: Boyer, R., Saillard, Y. (Eds.), Regulation Theory: The State of the Art. Routledge, London ; New York, pp. 122–128.
United Nations (Ed.), 2009. System of National Accounts 2008, Rev. 5. ed, Studies in Methods. United Nations, New York.
Verdoorn, P.J., 2002. Factors that Determine the Growth of Labour Productivity, in:

McCombie, J.S.L., Pugno, M., Soro, B. (Eds.), Thirlwall, A.P. (Tran.), Productivity Growth and Economic Performance. pp. 28–36.
Vergeer, R., Kleinknecht, A., 2014. Do Labour Market Reforms Reduce Labour Productivity Growth? A Panel Data Analysis of 20 OECD Countries (1960-2004). International Labour Review 153, 365–393. https://doi.org/10.1111/j.1564-913X.2014.00209.x
Vergeer, R., Kleinknecht, A., 2010. The Impact of Labor Market Deregulation on Productivity: A Panel Data Analysis of 19 OECD Countries (1960-2004). Journal of Post Keynesian Economics 33, 371–408. https://doi.org/10.2753/PKE0160-3477330208
Wade, R.H., 2014. Return of Industrial Policy?, in: Arestis, P., Sawyer, M. (Eds.), Economic Policies of the New Thinking in Economics. Routledge, pp. 76–92.
Weche, J.P., Wambach, A., 2021. The Fall and Rise of Market Power in Europe. Jahrbücher für Nationalökonomie und Statistik 241, 555–575. https://doi.org/10.1515/jbnst-2020-0047

Appendix

A: Derivatives of the Overall Long-Run Equilibrium

Following Hein (2014, Ch. 8), changes in the profit share have the following effect on the respective variable ceteris paribus.

Capacity utilization:

$$\frac{\partial u^{**}}{\partial h} = \frac{\tau - \theta\omega - (s_\Pi - s_W)\frac{u}{v} + \psi\frac{\partial e^r}{\partial h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}$$

An increasing profit share affects capacity utilization positively through investment and net exports, and negatively through consumption and productivity growth.

Capital accumulation:

$$\frac{\partial g^{**}}{\partial h} = \frac{(\tau - \theta\omega)\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} + \phi\right\} - (\beta + \omega\rho)(s_\Pi - s_W)\frac{u}{v} + (\beta + \omega)\psi\frac{\delta e^r}{\delta h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}$$

Again, redistribution towards profits increases capital accumulation through investment and net exports and decreases it via consumption and productivity growth. In the case of capital accumulation, feedback effects of demand and productivity growth must be considered.

Productivity growth:

$$\frac{\partial \hat{y}^{**}}{\partial h} = \frac{\rho\left[\tau - (s_\Pi - s_W)\frac{u}{v} + \psi\frac{\partial e^r}{\partial h}\right] - \theta\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi\right\}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}$$

The direct effect of a profit share increase on productivity growth is distinctively negative represented by the second term of the numerator. The overall direction of the effect of changes in the profit share depends on the demand component. If it is wage-led, the effect of the goods market activity is negative in case of a rising profits share and the productivity effect is uniquely negative. For a profit-led demand component different effects can arise.

B: Data Sources

Name	Unit	Description/Calculation	Source
Macroeconomic variables			
Output	Billion 2015$	Real GDP in US dollars, PPP converted and chain linked volume with base year 2015	OECD (2024d)
Output per capita	2015$	GDP per person, PPP converted and chain linked volume with base year 2015	OECD (2024d)
Productivity growth	%	Annual difference of constant GDP per hour worked divided by GDP per hour worked	OECD (2024a)
Profit share	%	100 minus the adjusted wage share in current market prices	AMECO
Capacity utilization	%	GDP in constant prices divided by potential GDP	AMECO
Capacity utilization, survey	%	Seasonally adjusted rate of capacity utilization in manufacturing according to business surveys. Quarterly and monthly data aggregated by average.	OECD (2024b)
Capital accumulation rate	%	Growth rate of net capital stock in national currency	AMECO
Indicators			
Union density	%	Proportion of employees who are members of a trade union among all employees	ICTWSS
Adjusted bargaining coverage (AdjCov)	%	Proportion of employees covered by collective agreements in force among employees with the right to bargain as derived from survey data	ICTWSS
Employment Protection Legislation, regular (EPL_r)	Index	EPL_r index evaluates regulation of workers' dismissal with regular contracts, covers individual and collective dismissals. Version 1 used	OECD (2021)
Employment Protection Legislation, temporary (EPL_t)	Index	EPL_t index evaluates regulation on dismissals and the use of temporary contracts. Version 1 used	OECD (2021)
Patents	%	Change rate of number of patent applications to the IP5 patent families, inventor's country of residence, priority date	OECD (2023)

Market concentration, Germany	%	Market share regarding value added of the largest 100 German companies. For regressions, missing values are added by taking the average of previous and following value	MK TOP
Market concentration, US	%	Market share calculated with share of revenues of largest 100 US companies in relation to nominal GDP	Fortune (2024) & AMECO
Public investment (PubI)	%	Governmental gross fixed capital formation as percent of GDP	AMECO
Social expenditure (SocEx)	%	Social transfers in kind as percent of GDP	AMECO

Notes: AMECO is European Commission (2023), ICTWSS is OECD and AIAS (2023), and MK TOP is Monopolkommission (2022).

C: Illustration of Overall Regime Change for Capital Accumulation

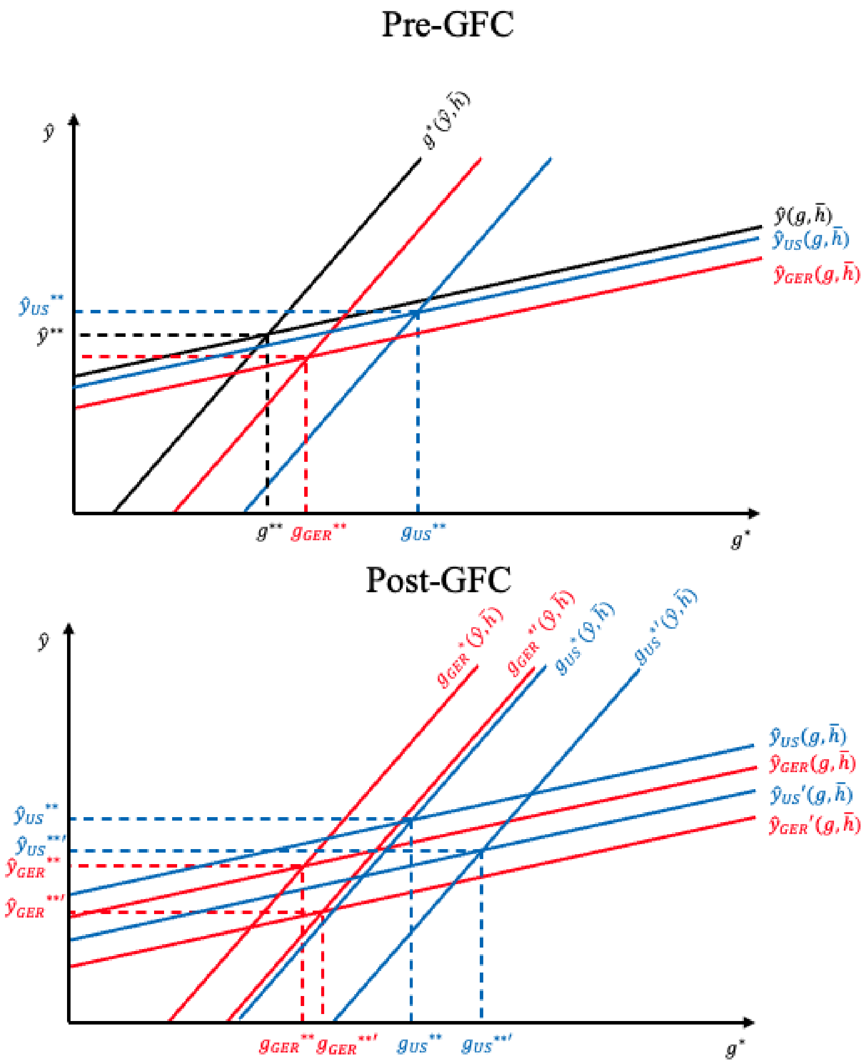

Figure 6 Stylized long-run effects on capital accumulation and productivity growth; Germany and the US

Notes: $\hat{y}$: productivity growth, g: capital accumulation, h: profit share, x^*: goods market equilibrium of x, x^{**}: equilibrium of demand and productivity component of x, $\bar{x}$: constant of x; x': post-GFC period. Black elements represent the common starting point, red elements the German development, blue ones that of the US. Country-specific economic deviation from the stylized common starting point before the analyzed period.

Source: Own depiction based on Hein (2014, Ch. 8).

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