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

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DISTRIBUTION AND GROWTH AFTER KEYNES

A Post-Keynesian Guide

(Edward Elgar 2014)

CHAPTER 8

'EXTENDING KALECKIAN MODELS II: TECHNICAL PROGRESS'

Content

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8.1 INTRODUCTION

- Integration of endogenously generated productivity growth into Bhaduri/Marglin model

- Productivity growth in Kaleckian models:

➢ Rowthorn (1981), Taylor (1991, pp. 225-228), Lavoie (1992, pp. 316-327; 2014, Chapter 6.9), You (1994), Cassetti (2003), Dutt (2003; 2006a; 2010b; 2010c), Raghavendra (2006), Hein/Tarassow (2010), Naastepad/Storm (2010), Sasaki (2011), Schütz (2012), and Storm/Naastepad (2012; 2013)

- Model/procedure (Setterfield/Cornwall 2002, Naastepad 2006, Hartwig 2013)
  - Demand regime
  - Productivity regime
  - Overall regime

➢ distribution as exogenous variable: partial model for a private open economy with endogenous productivity growth

8.2 THE THEORETICAL MODEL

Procedure (Setterfield/Cornwall 2002)

1. Demand regime: based on Bhaduri/Marglin (1990), Blecker (1989) (see Chapter 7); productivity growth is exogenous
2. Productivity regime: based on Rowthorn (1981), Dutt (2003), Cassetti (2003), determination of productivity growth taking GDP or capital stock growth as exogenous
3. Overall regime: interaction of demand and productivity regime, effects of a change in the profit share

Assumptions:

- Distribution is exogenous

- Technical progress is labour saving and capital-embodied

➢ Harrod-neutral technical progress: $K/Y^p = v$ is constant

- Prices of imported inputs, competing international final goods and exchange rates are given

8.2.1 The demand and accumulation regime

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(8.1) $$S = pI + pX - ep_f M = pI + NX$$

S: planned saving, p: domestic price, I: investment, X: exports, M: imports, p_f: foreign price e: nominal exchange rate, NX: net exports

(8.2) $$\sigma = g + b$$

σ: saving rate: g: accumulation rate, b: net export rate

(8.3) $$\sigma = \frac{S_\Pi + S_W}{pK} = \frac{s_\Pi \Pi + s_W (Y - \Pi)}{pK}$$

$$= \left[s_W + (s_\Pi - s_W)h\right]\frac{u}{v}, \quad 0 \leq s_W < s_\Pi \leq 1.$$

S_Π: saving out of profits, S_W: saving out of wages, K: capital stock, s_Π: propensity to save out of profits, s_W: propensity to save out of wages, Y: output, Π: profits, h: profit share, u: rate of capacity utilization, v: capital-potential output ratio

(8.4) $$g = \alpha + \beta u + \tau h + \omega \hat{y}, \qquad \beta, \tau, \omega > 0$$

$\hat{y}$: productivity growth

(8.5) $$b = \psi e^r(h) - \phi u, \qquad \psi, \phi > 0$$

(8.6) $$e^r = e^r(h), \qquad \frac{\partial e^r}{\partial h} \geq 0$$

e^r: real exchange rate

(8.7) $$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} - \frac{\partial b}{\partial u} > 0 \quad \Rightarrow \quad \left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi > 0.$$

Equilibrium

$$(8.8)\quad u^{*} = \frac{\alpha + \tau h + \omega \hat{y} + \psi e^{r}(h)}{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi}$$

$$(8.9)\quad g^{*} = \frac{\left\{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} + \phi\right\}(\alpha + \tau h + \omega \hat{y}) + \beta\psi e^{r}(h)}{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi}$$

(8.8a) $$\frac{\partial u^*}{\partial h} = \frac{\tau - (s_\Pi - s_W)\frac{u}{v} + \psi \frac{\partial e^r}{\partial h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi}$$

(8.9b) $$\frac{\partial g^*}{\partial h} = \frac{\tau\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} + \phi\right\} - \beta(s_\Pi - s_W)\frac{u}{v} + \beta\psi \frac{\partial e^r}{\partial h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi}$$

8.2.2 The productivity regime

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(8.10) $\hat{y} = \eta + \rho u - \theta h, \qquad \eta, \rho, \theta > 0$

or:

(8.11) $\hat{y} = \eta + \varepsilon g - \theta h, \qquad \eta, \varepsilon, \theta > 0$

ρ: Verdoorn's law (Verdoorn 1949, Kaldor 1966)

ε: Kaldor's technical progress function (Kaldor 1957, 1961)

θ: wage-push effect (Marx 1867, Hicks 1932)

(8.10a, 8.11a) $\frac{\partial \hat{y}}{\partial h} = -\theta < 0$

8.2.3 The overall long-run regime and the effect of a change in distribution

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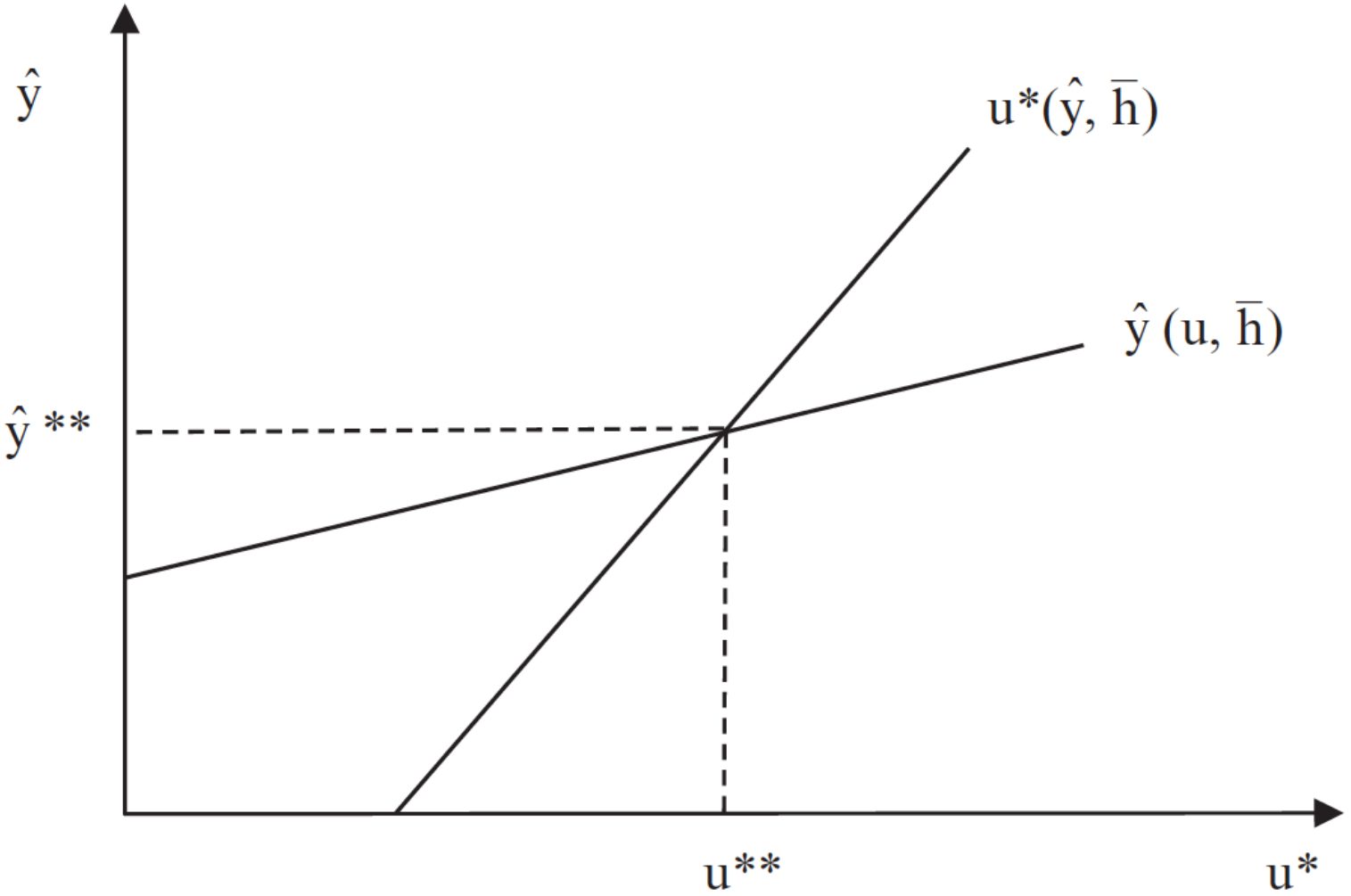
$$(8.12) \qquad u^{**} = \frac{\alpha + (\tau - \theta\omega)h + \psi e^{r}(h) + \omega\eta}{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi - \omega\rho}$$

$$(8.13) \qquad \hat{y}^{**} = \frac{(\eta - \theta h)\left\{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi\right\} + \rho\left[\alpha + \tau h + \psi e^{r}(h)\right]}{\left[s_W + (s_\Pi - s_W)h\right]\frac{1}{v} - \beta + \phi - \omega\rho}$$

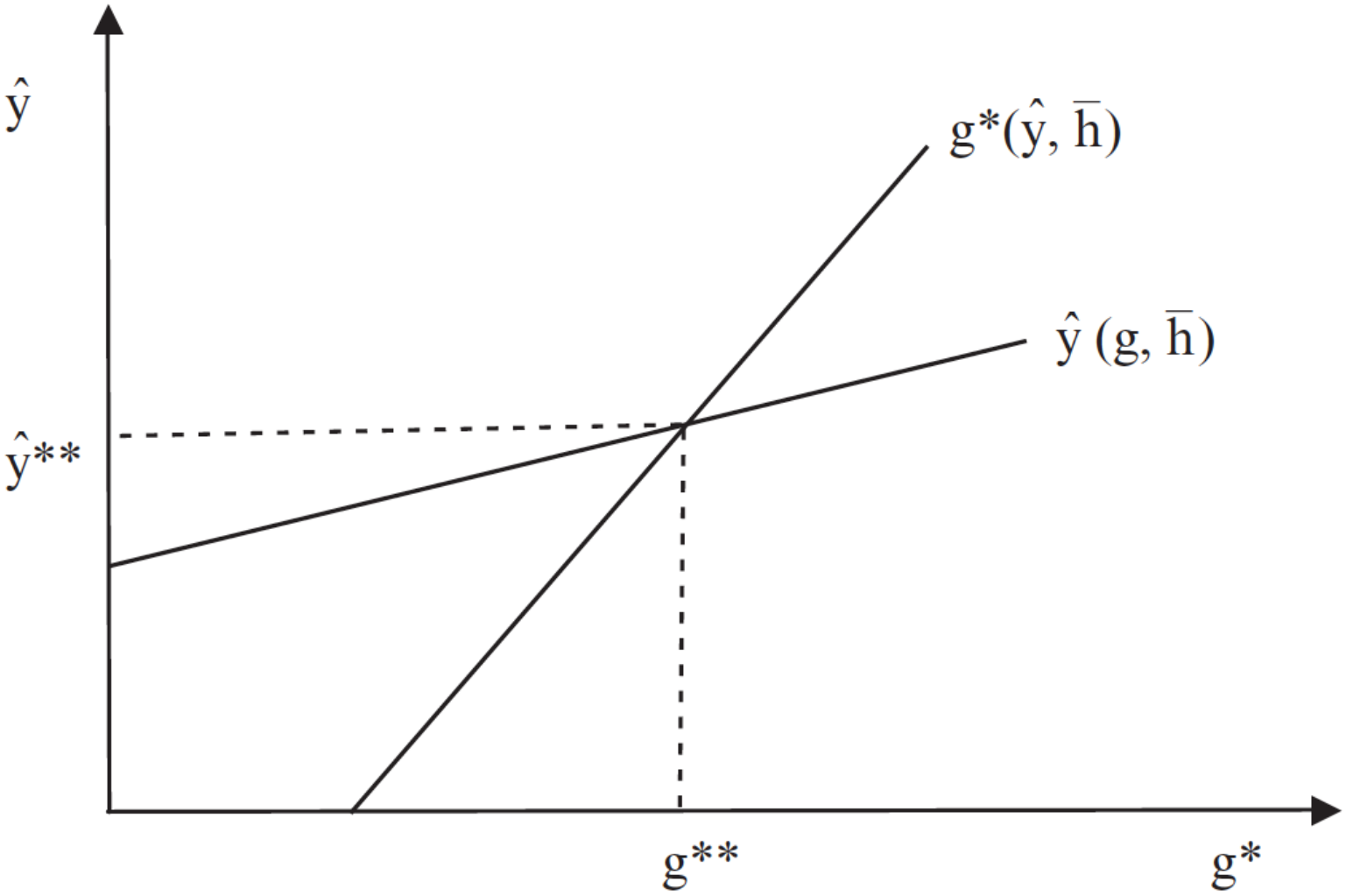
(8.14)
$$g^{**} = \alpha + \tau h + \beta\left\{\frac{\alpha + (\tau - \theta\omega)h + \psi e^{r}(h) + \omega\eta}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}\right\} + \omega\left\langle\frac{(\eta - \theta h)\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi\right\} + \rho[\alpha + \tau h + \psi e^{r}(h)]}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \omega\rho}\right\rangle$$

Figure 8.1 Long-run growth equilibrium with endogenous productivity growth

a) Capacity utilization and productivity growth



b) Capital accumulation and productivity growth



Existence and stability condition

(8.15) $$\left[s_W + \left(s_\Pi - s_W\right)h\right]\frac{1}{v} - \beta + \phi - \omega\rho > 0$$

(8.16) $$\left(1 - \omega\varepsilon\right)\left\{\left[s_W + \left(s_\Pi - s_W\right)h\right]\frac{1}{v} + \phi\right\} - \beta > 0$$

Effects of a change in the profit share

(8.12a) $$\frac{\partial u^{**}}{\partial h} = \frac{\tau - \theta\omega - (s_\Pi - s_W)\frac{u}{v} + \psi\frac{\partial e^r}{\partial h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \rho\omega}$$

(8.14a) $$\frac{\partial g^{**}}{\partial h} = \frac{(\tau - \theta\omega)\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} + \phi\right\} - (\beta + \omega\rho)(s_\Pi - s_W)\frac{u}{v} + (\beta + \omega)\psi\frac{\partial e^r}{\partial h}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \rho\omega}$$

(8.13a) $$\frac{\partial \hat{y}^{**}}{\partial h} = \frac{\rho\left[\tau - (s_\Pi - s_W)\frac{u}{v} + \psi\frac{\partial e^r}{\partial h}\right] - \theta\left\{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi\right\}}{[s_W + (s_\Pi - s_W)h]\frac{1}{v} - \beta + \phi - \rho\omega}$$

Figure 8.2 Increasing profit share and wage-led demand regime

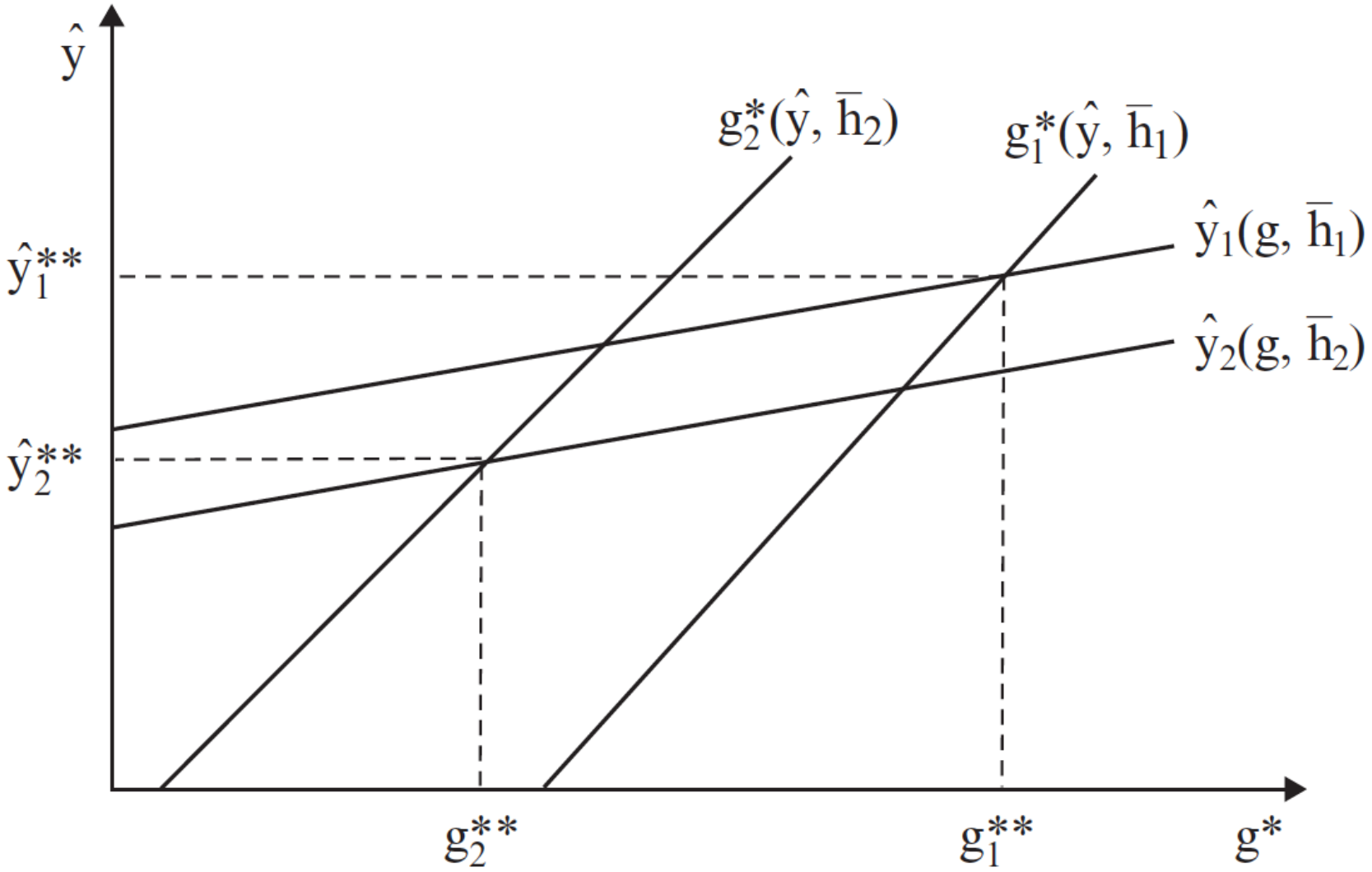
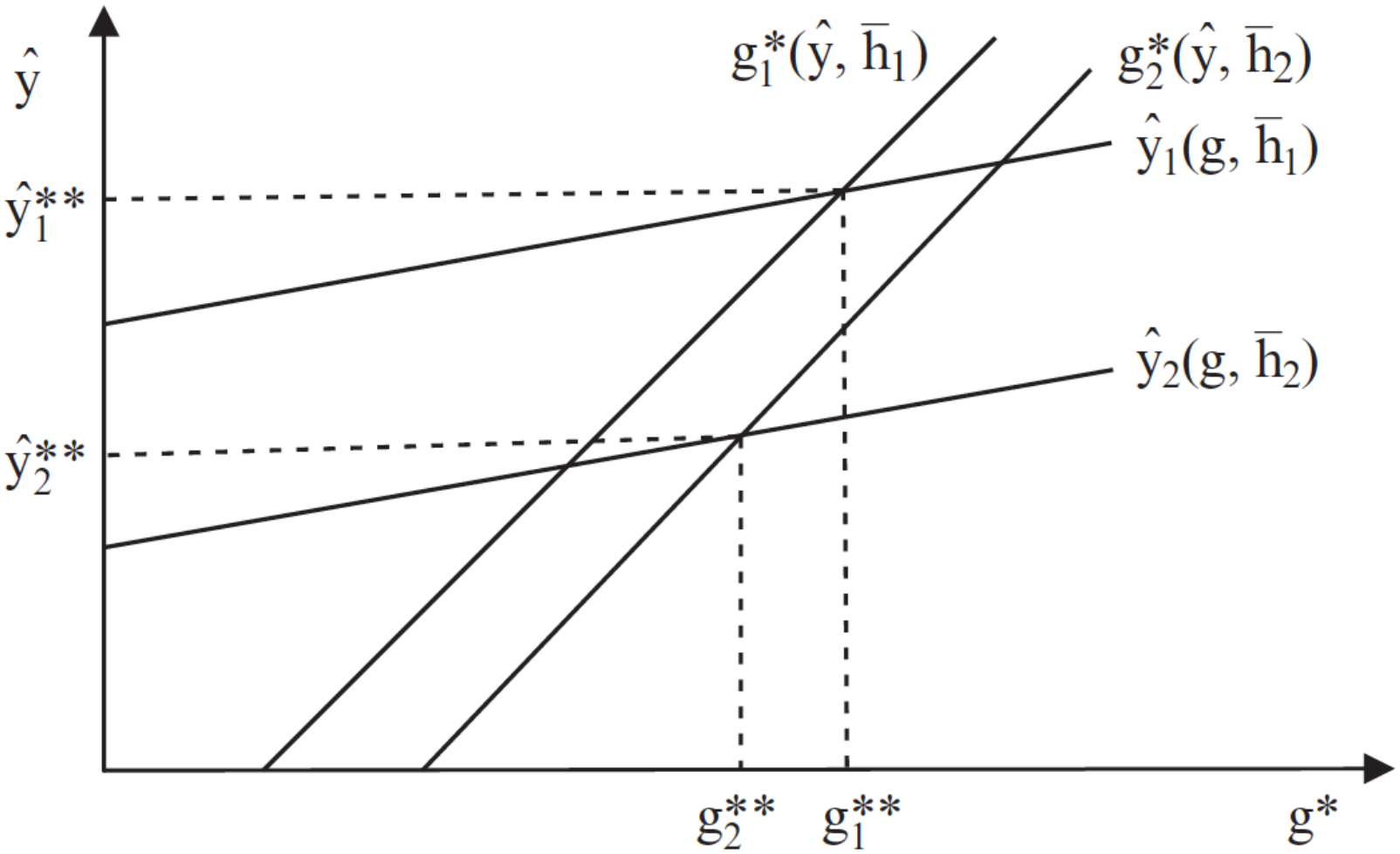
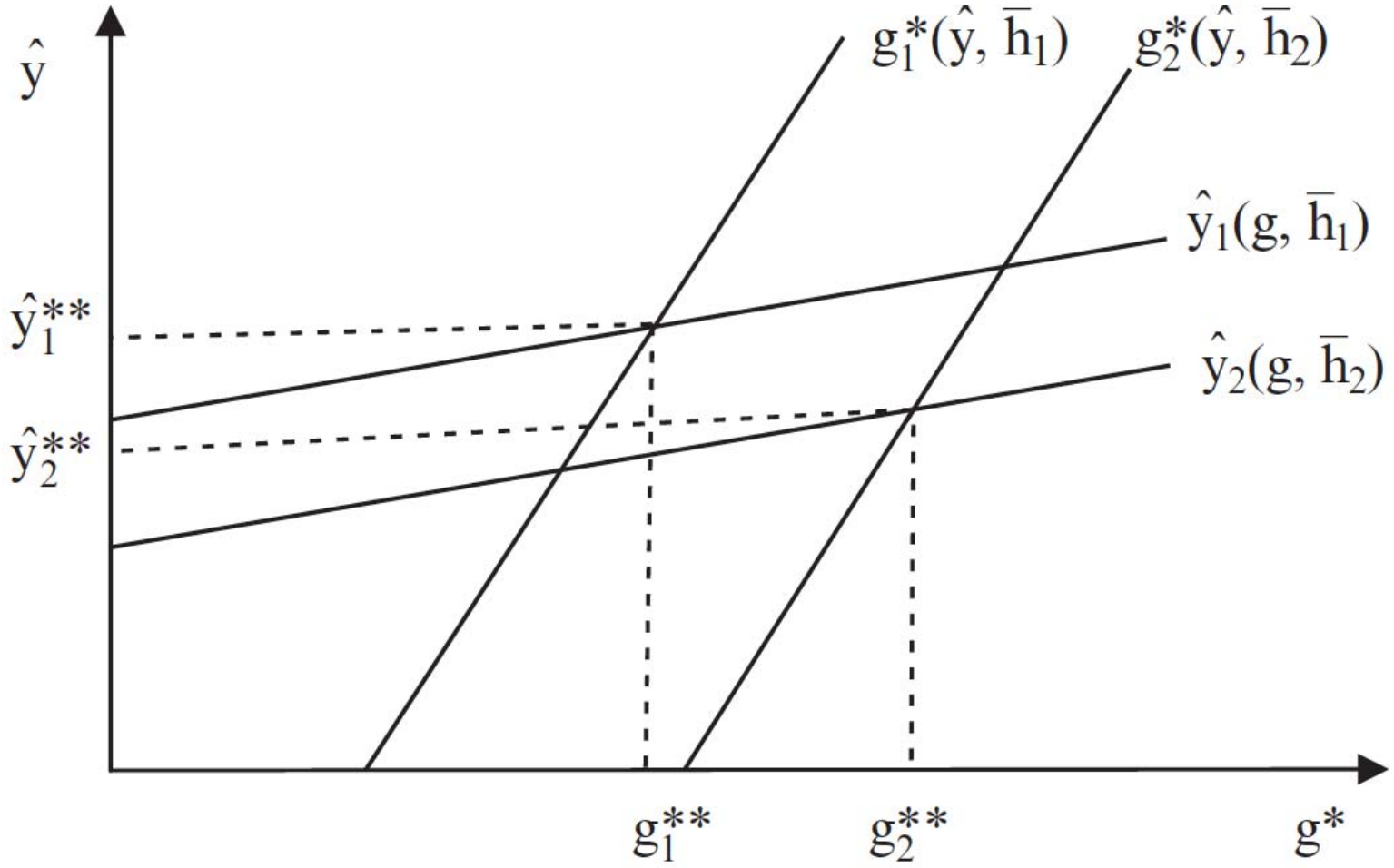


Figure 8.3 Increasing profit share and profit-led demand regime

a) Contractive overall regime



b) Intermediate overall regime



c) Expansive overall regime

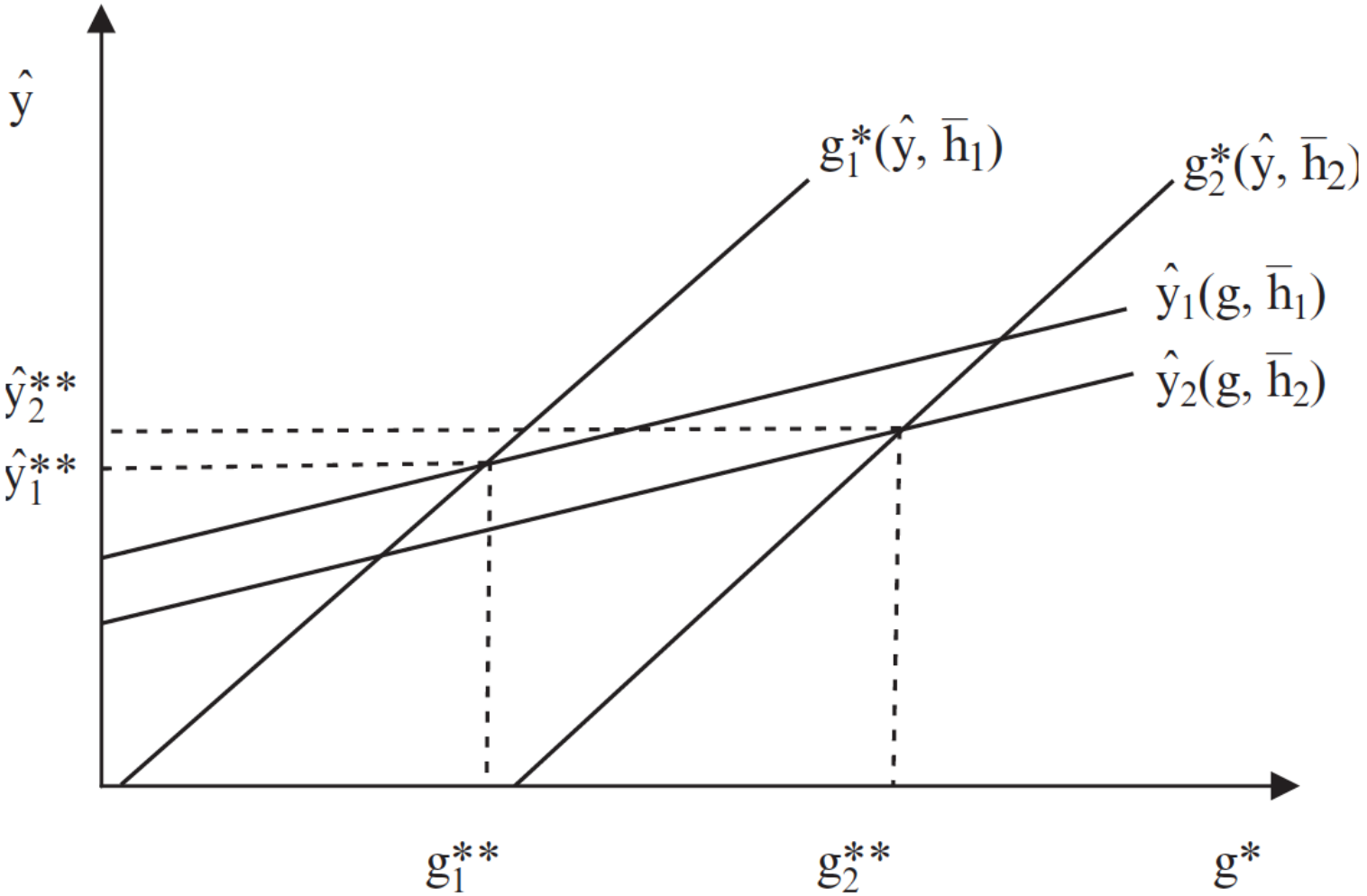


Table 8.1 Overall effects of a change in the profit share on the long-run equilibrium

	Wage-led demand regime: $(\partial u^* / \partial h) < 0, (\partial g^* / \partial h) < 0$		Profit-led demand regime: $(\partial u^* / \partial h) > 0, (\partial g^* / \partial h) > 0$	
$\partial u^{**} / \partial h$	–	–	+	+
$\partial g^{**} / \partial h$	–	–	+	+
$\partial \hat{y}^{**} / \partial h$	–	–	–	+
Overall regime with increasing profit share	contractive	contractive	inter-mediate	expansive

8.3 EMPIRICAL RESULTS

Table 8.2 Estimates of the impact of (investment) demand growth on productivity growth

	Austria	France	Germany	Nether-lands	Switzer-land	Nordic countries	UK	USA	Japan	OECD countries
McCombie/Pugno/Soro (2002b)										0.3–0.6
Schnur (1990)			0.54–0.6							
Uni (1990)								0.44–0.75	0.66–0.88	
Jasperneite/Allinger (1998)			0.64–0.67							
Cornwall/Cornwall (2002b)										0.5
Leon-Ledesma (2002)										0.64–0.67
Knell (2004)		0.43				0.40–0.76	0.53	0.43		
Naastepad (2006)				0.63						
Angeriz/McCombie/ Roberts (2008)										0.50–0.67
Crespi/Pianta (2008)										0.27–0.38
Hein/Tarassow (2010)	0.33	0.54	0.43	0.45			0.23	0.11		
Alexiadis/Tsagdis (2010)										0.43–0.49
Vergeer/Kleinknecht (2010/11)										0.24–0.37
Storm/Nastepaad (2011)						0.31				0.39–0.46
Hartwig (2013)					0.67					

Notes: McCombie/Pugno/Soro (2002b): average of 80 empirical studies; Cornwall/Cornwall (2002b): based on data for 16 OECD countries (1960-89); Leon-Ledesma (2002): for 18 OECD countries (1965-94); Angeriz/McCombie/Roberts (2008): for European regions (1986-2002); Crespi/Pianta (2008): data cover 22 manufacturing and 10 service industries in France, Germany, the Netherlands, Portugal and the UK (1994-2000); Alexiadis/Tsagdis (2010): based on data (1977-2005) for 109 EU-12 regions; Vergeer/Kleinknecht (2010/11): panel data results based on annual data for 19 OECD countries (1960-2004); and Storm/Nastepaad (2011): OLS estimates using 5-year average data for 20 OECD countries (1984-2004)

Source: Storm/Naastepad (2013, p. 106), own extensions

Table 8.3 Estimates of the impact of real wage growth on productivity growth

	Austria	France	Germany	Nether-lands	Switzer-land	Nordic countries	UK	USA	OECD countries
Rowthorn (1999)		0.11-0.24	0.33-0.87	0.24-0.44		0.10-0.54	0.25-0.60	0.13-0.28	0.24-0.30
Nymoen/Rødseth (2003)						0.50			
Naastepad (2006)				0.52					
Carter (2007)									0.60
Hein/Tarassow (2010)	0.67	0.31	0.32	0.33			0.25	0.36	
Storm/Naastepad (2011)									0.29
Vergeer/Kleinknecht (2010/11)									0.31-0.39
Hartwig (2013)					0.32				

Note: Rowthorn (1999): data are from his Table 2, panel (b); Nymoen/Rødseth (2003): for the four Nordic countries (1965-94); Carter (2007): based on data for 15 OECD countries (1980-96); Vergeer/Kleinknecht (2010/11): panel data results based on annual data for 19 OECD countries (1960-2004); and Storm/Naastepad (2011): OLS estimates using 5-year average data for 20 OECD countries (1984-2004)

Source: Storm/Naastepad (2013, p. 107), own extensions.

Hein/Tarassow (2010):

- Long-run coefficients: Verdoorn-effects and wage-push effects are confirmed for all countries
- Verdoorn coefficients are lower than in other studies – because of lagged effects, too, not only contemporaneous.

Table 8.4 Determinants of productivity growth in Austria, France, Germany, the Netherlands, the UK and the US, 1960 – 2007

		A	B
		$\frac{\partial \hat{y}}{\partial \hat{Y}}$	$\frac{\partial \hat{y}}{\partial h}$
Austria	1960 – 1983	0.32	0.67
	1984 – 2007	0.44	-0.68
France	1960 – 1982	0.7	0.15
	1983 – 2007	0.36	-
Germany	1960 – 1984	0.86	0.32
	1985 – 2007	0.27	-0.87
Netherlands	1960 – 1983	0.66	0.29
	1984 – 2007	0.27	-0.33
UK	1960 – 2007	0.61	-0.46
US	1960 – 2007	0.39	-0.63

Austria, France, Germany, Netherlands:

- Verdoorn effect remains significant in both periods.
- Negative effect of the profit share only in the second period for Germany, the Netherlands and Austria, not for France.
- In the first period, profit share has a positive effect on productivity growth.
- This change in the sign of the coefficient remains to be explained: non-linearity in the relationship?
- Lima (2004): Profit share does not only affect the incentive to innovate negatively, but also the funds to innovate positively.

8.4 CONCLUSIONS

- In those wage-led demand economies in which a statistically significant negative direct effect of the profit share on productivity growth is found, as for Germany, the UK and the US, the dampening effects of a rising profit share on the demand and the productivity regime reinforce each other and an overall contractive effect of a rising profit share emerges.

- In countries with a profit-led demand regime, however, as in Austria for example, the expansive effects of an increasing profit share on aggregate demand go along with a partially depressing effect on productivity growth, which however may be compensated for by the expansive effect via GDP growth and the Verdoorn effect. Therefore, the character of the overall regime in these countries (contractive, intermediate or expansive) would have to be determined in more detailed empirical analysis.

- For those economies with a wage-led demand regime, clear-cut results for economic policies: Redistribution at the expense of labour is not only harmful for aggregate demand and economic activity in the short run. It has also depressing effects on capital accumulation and productivity growth, and hence on potential growth and the 'natural rate of growth' in these countries in the long run.