

10. Employment Growth and the Speed of Industrial Innovation

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Technical progress is a major source of economic and social well-being. Its benefits are not, however, spread evenly among industries, regions, and occupations as frequently the structural adjustment accompanying technical progress imposes substantial costs in terms of income and wealth. This is true in particular for major dislocations of jobs, which entail far-reaching shifts of employment opportunities for a substantial part of the working population (cf. OECD, 1985; for West Germany, Matzner and Wagner, 1990).

Quite apart from the moral problem of striking a just balance between overall productivity growth and the selective incidence of adjustment costs, there is the difficulty identifying the quantitative dimensions of the trade-off (for a recent exercise cf. Blazejczak, 1989).

It is this issue to which this chapter hopes to make a contribution. More specifically it addresses two questions: *First*, how do policy measures which increase the share of resources devoted to technical advance affect the distribution of employment opportunities among workers offering their labour services? *Second*, how does the impact of growing funds (deployed for the purpose of technical advance) interact with other public policy instruments?

Both questions are dealt with at the macro-level. The empirical test case is West Germany, not least because it contributes substantial resources to overall technical progress in the OECD area.

1. INVESTMENT IN TECHNICAL PROGRESS

There are several measures for the effort an economy makes to enhance its standard of technical competence. Spending on R&D is one among several variables indicating the amount of resources devoted to technical advance both at the firm and at the national level.

To the extent that R&D is determined by economic considerations, it has been suggested that it ought to be treated as a specific form of investment (For competing indicators cf. Dosi, 1988 and for the investment approach cf. Schmookler, 1971).

Such a view is expressed in an equation which makes spending on R&D (IRD) a function of output (Y) and relative factor prices. Note that the first argument, the 'accelerator', can be interpreted as an indicator of the expected profit rate, if the latter depends on the ratio of capacity utilisation. Taking interest rate r as the price of finance, w as the real wage rate and transforming into logs yields:

$$\begin{aligned} \ln \text{IRD}_t = & a + b(\ln Y_t - \ln Y_{t-1}) \\ & + c(\ln r_{t-1} - \ln w_{t-1}) \\ & + d[b(\ln Y_{t-1} - \ln Y_{t-2}) \\ & + c(\ln r_{t-2} - \ln w_{t-2})] \end{aligned}$$

There are competing theoretical arguments on the signs the parameters are expected to take. If IRD conforms to regular investment in equipment then b and c should be positive. However, if one subscribes to Schumpeter's view on 'innovation', then $b < 0$ and $c > 0$ seems more appropriate. For $b < 0$ captures the notion that firms look out for innovation opportunities during slumps; they increase their efforts to achieve technical advance in order to create new products and gain access to so far untapped markets (For a treatment of R & D as 'regular' investment, cf. Frühstück and Wagner, 1989 and for a Schumpeterian view Kleinknecht, 1984.)

The estimates of the function for IRD lend support to a Schumpeterian configuration for West Germany during the period 1970-1988:

$$\begin{aligned} \ln \text{IRD}_t = & 7.0225 - 0.998 (\ln Y_t - \ln Y_{t-1}) \\ & (28.73) \quad (2.42) \\ & - 0.217 (\ln r_{t-1} - \ln w_{t-1}) \\ & \quad (12.30) \\ & + [0.998(\ln Y_{t-1} - Y_{t-2}) \\ & \quad - 0.217(\ln r_{t-2} - \ln w_{t-2})] \end{aligned}$$

This result is subject to the restriction that $d = 1$. This assumption can be justified by the argument that firms take a long-term view on investment in R&D; they attach the same weight to recent as to current experiences (cf. Dosi, 1988).

The sensitivity of investment in R&D with respect to relative factor prices entails that rising interest rates exert a depressing influence on innovation activities. This is a point to which we will return later.

2. DEMAND FOR LABOUR AS A FUNCTION OF INNOVATION

In order to evaluate the impact of R&D on employment, IRD is aggregated into a 'stock of knowledge'. This stock (KRD) is built up by investment (IRD). The stock of know-how enters the production function along with the regular stock of capital (adjusted for the degree of utilisation) and labour:

$$\ln Y_t = a \ln(cu_t \cdot K_t) + b \text{KRD}_t + c L_t.$$

Estimating this equation under the restriction $a + c = 1$ generates the following results:

$$\begin{aligned} a &= 0.285 (14.25) \\ b &= 0.191 (14.25) \\ c &= 0.715 (9.59) \end{aligned}$$

This functional form (together with the parameter restriction) assigns a specific role to R&D as a factor of production; the stock of know-how creates increasing returns to scale. A recent industry-specific estimate for West Germany has been presented by Blazejczak, Erber and Horn (1990).

Inverting the production function leads to a demand for labour equation in which KRD serves as a substitute to labour services. Stepping up the accumulation of know-how causes an increase in labour productivity; the demand for labour falls off.

The labour-saving bias of enhanced technical know-how does not, however, translate fully into cuts in employment. There are several compensating mechanisms among which the trade balance deserves special attention. Whenever labour productivity increases, our estimated price equation indicates that domestic prices tend to fall, shifting the terms of trade in favour of exports. (Evidence for West Germany is provided by the Meta Study, documented in Schettkat and Wagner, 1990.)

3. WAGES AND PRICES

Price formation in West Germany is dominated by markets in which firms follow a mark-up price-setting policy. Prices thus depend on wage costs and the prices of imported commodities and services. Moreover, firms

take labour productivity into account when determining the magnitude of the mark up. An OLS-estimation of equation 20 (see Table 10.2) yields parameters which are correctly signed and are within reasonable orders of magnitude. Changes in output prices are quite sensitive to changes in wage growth. An increase in labour productivity exerts a moderating pressure on inflation.

Wage formation in West Germany depends crucially on its collective bargaining context. Generally, agreements are reached in which the pace of wage increases is made contingent on price rises and labour productivity growth. An excess supply of labour (i.e. unemployment) restrains union demands for wage rises. The specific national parameter values for equation 21 (OLS-estimate) (see Table 10.2) match the expectations of standard labour market theory.

4. THE CURRENT ACCOUNTS AND MONEY MARKETS

The stock of know-how affects the current account through various channels, notably through its influence on the terms of trade. Furthermore there is an impact on non-price competitiveness. The more know-how is embodied in commodities and services exported, the larger is the share the exporting country gains in world trade.¹

This is captured in the following export equation:

$$\ln \text{EXP}_t = a \ln \text{TTX}_t + b \ln Y_t + c \text{KRD}_t.$$

Exports depend on world output and terms of trade and technical know-how. On theoretical grounds one would expect $a < 0$, $b > 0$, $c > 0$. This is indeed the case for West Germany over the period 1970-1988 (For similar results cf. Blazejczak, Erber and Horn, 1990. For a sceptical view on the 'productivity-export performance' link cf. Marin, 1988.)

Disequilibria in the trade balance induce movements on capital markets. The capital account depends on differences between domestic and foreign interest rates and on expected variations of the exchange rate. The US long-term interest rate was used as indicator for the 'external' rate of interest; it carries a significant parameter with the correct sign. Expectations of the exchange rate are formed in the simplest possible way, i.e. last years change is assumed to continue. This parameter has the correct sign, but, perhaps due to the oversimplified expectation hypothesis, is insignificant.²

In order to refine the working properties it is necessary to model an intervention rule for the central bank. This is a difficult task, not least because observed changes in reserves always include some intervention already undertaken. This forces the model-builder to estimate the parameters of the intervention rule together with the parameters of the other behavioural equations of the foreign exchange market. Hence one would expect poor significance as is the case with our intervention rule. The first of the two parameters reflects 'leaning against the wind behaviour' of the central bank, the second parameter expresses the bank's concern about the level of its foreign exchange reserves. Both estimated parameter values fall within the range delineated by Driskill and McCafferty (1985) as being reasonable.³

The foreign exchange market is linked to the money market. There, the domestic interest rate is endogeneously determined, allowing for temporary deviations from international interest rates which explain the direction of international capital flows. The interest rate which clears the money market, the 'target rate', serves as centre of gravitation for the actual rate. Sudden jumps of more than 25 per cent per period up or a fall below a level of 5.5 per cent are excluded in our model in accordance with restrictions imposed by institutional arrangements (cf. Hanappi, 1989).

The underlying money demand function is of the conventional type, showing significant influence by GDP and the interest rate. Money supply is assumed to react solely on a change of the stock of foreign exchange. The last assumption is clearly a short cut intended to prevent the model from being overloaded with questions of monetary policy rules. The estimates of this equation carry correct signs and are significant.

Putting the trade balance, capital account and domestic money markets together, it is interesting to note how investment in R&D creates need for adjustment. *Ceteris paribus* an increase of KRD causes a favourable shift of the trade balance, inducing an inflow of capital, which lowers interest rates, stimulating further investment in R&D. This positive feedback loop is checked by an acceleration of GDP growth precipitating a deterioration of the trade balance triggering off rises in the rate of interest which limit further investment in R&D. The net effect of these two countervailing forces depends on the parameter values of the model.

5. THE MODEL TANDEM-M

The equations representing investment in know-how, the production function and the interactions between the current account and capital markets are parts of a larger model developed by the authors (Tandem-M). Apart from some of the features already discussed, Tandem-M is a fairly standard macro-economic model of an open economy being similar in structure to the model developed by the DIW, one of West Germany's leading economic research institutes. (A detailed account of Tandem-M is given in Frühstück, Hanappi and Wagner, 1990. The DIW-Langfristmodell is described in Blazejczak, 1986.)

The basic building blocks of the models are the goods market (Y, C, IR, EXP, IMP, G), the labour market (LS, LD, U), the foreign exchange market (FE, CAA, FEP) and the money market (MS, MD, r). Tandem-M treats foreign growth, import and export prices, foreign interest rates, domestic labour supply, and domestic utilisation as exogenously given. All other variables are determined endogenously.

The interaction between goods and labour markets, on the one hand, and foreign exchange and money markets, on the other hand, allow for an interesting dynamic behaviour of Tandem-M. This is made use of in the following simulation exercises which should help to evaluate the employment impact of different scenarios of innovation promotion policies in West Germany.

Regarding the dynamic properties of Tandem-M it might be useful to mention that a simplified core model (Tandem-T, cf. Frühstück, Hanappi and Wagner, 1990) exhibits the following properties. Though dynamic stability cannot be determined in general, it is possible to identify ranges of parameter values which guarantee stable behaviour of the system. The simulation version of Tandem (M8906) operates under binding lower limits for the nominal rate of interest (liquidity trap) and for the US dollar/DM exchange rate. The rate of interest cannot fall below 5.5 per cent (which is supposed to be the long-term historical floor of interest rates in West Germany), whereas the US dollar/DM rate is assumed to stay above the 1.5 ratio.

Given these constraints, Tandem-M generates trajectories staying within reasonable limits up to the year 2010, which serves as terminal point for our exercise. There is, however, a persistent disequilibrium in the current account. The German surplus rises from about 3 per cent of GDP in the year 1988 to about 5.5 per cent in 2010. This trend certainly will cause worries among German trading partners, which might create

exogenous pressures for a downward adjustment of the current account surplus of West Germany.

Table 10.1 List of Variables of Tandem-M

Endogenous:

C.....	private consumption
CAA.....	capital account
CUA.....	current account
EXCH.....	exchange rate
EXP	exports
FE	foreign exchange (stock)
FEP.....	foreign exchange market policy intervention
G.....	government expenditure
IMP.....	imports
IR.....	investment (regular)
IRD.....	investment in research and development
K.....	capital stock
KRD.....	capital stock in R&D (technical knowledge)
L.....	employment
M^D	money demand
M^S	money supply
P.....	GDP deflator
r	interest rate
r^T	target interest rate
TTM.....	terms of trade for imports
TTX.....	terms of trade for exports
U.....	unemployed persons
w.....	wage rate
Y.....	national income

Exogenous:

cu.....	capacity utilisation
L^S	labour supply
P^M	import price index
P^X	export price index
r^*	interest rate of the world
Y^*	GDP of export partners

Table 10.2 Tandem-M Equations

Goods market

Equilibrium condition:

$$[0] \quad Y_t = C_t + IR_t + IRD_t + G_t + EXP_t - IMP_t$$

Behavioural equations and technical relations:

$$[1] \quad \ln Y_t = a_{1,1} \ln (cu_t K_t) + a_{1,2} \ln KRD_t + a_{1,3} \ln L_t$$

$$[2] \quad \ln C_t = a_{2,1} + a_{2,2} \ln Y_t$$

$$[3] \quad \ln IR_t = a_{3,1} + a_{3,2} (\ln Y_t - \ln Y_{t-1}) - a_{3,3} (\ln r_{t-1} - \ln w_{t-1})$$

$$[4] \quad \ln IRD_{Dt} = a_{4,1} + a_{4,2} (\ln Y_t - \ln Y_{t-1}) + a_{4,3} (\ln r_{t-1} - \ln w_{t-1}) + a_{4,4} (a_{4,2} (\ln Y_{t-1} - \ln Y_{t-2}) + a_{4,3} (\ln r_{t-2} - \ln w_{t-2}))$$

$$[5] \quad \ln EXP_t = a_{5,1} \ln TTX_t + a_{5,2} \ln Y_t + a_{5,3} KRD_t$$

$$[6] \quad \ln IMP_t = a_{6,1} \ln TTM_t + a_{6,2} \ln Y_t$$

$$[7] \quad \ln G_t = a_{7,1} \ln Y_{t-1}$$

$$[8] \quad K_t = K_{t-1} + IR_t - a_{8,1} K_{t-1}$$

Definitions:

$$[9] \quad KRD_t = KRD_{t-1} + IRD_t$$

$$[10] \quad TTX_t = P_t / (P_t^X \cdot EXCH_t)$$

$$[11] \quad TTM_t = P_t / (P_t^M \cdot EXCH_t)$$

Labour market

Disequilibrium:

$$[12] \quad U_t = L_t^S - L_t^D$$

Behavioural equations and technical relations:

$$[1.1] \quad \ln L_t^D = (\ln Y_t - a_{1,1} \ln (cu_t K_t) - a_{1,2} \ln KRD_t) / a_{1,3}$$

Foreign exchange market

Disequilibrium:

$$[13] \quad FE_t - FE_{t-1} = CUA_t + CAA_t + FEP_t$$

Behavioural equations:

$$[14] \quad CAA_t = a_{14,1} (r_t - r_t^*) + a_{14,2} (EXCH_t - EXCH_{t-1}) / EXCH_{t-1}$$

$$[15] \quad FEP_t = a_{15,1} EXCH_t + a_{15,2} FE_{t-1}$$

Definition:

$$[16] \quad CUA_t = EXP_t - IMP_t$$

Money market

Equilibrium:

$$[17] \quad M_t^S = M_t^D$$

Behavioural equations:

$$[18] \quad \ln M_t^D = a_{18,1} \ln Y_t + a_{18,2} \ln r_t$$

$$[19] \quad \ln M_t^S = a_{19,1} \ln FE_t$$

Wages and prices

Behavioural equations:

$$[20] \quad \ln P_t = \ln P_{t-1} + a_{20,1} \ln P_t^M + a_{20,2} (\ln w_t - \ln w_{t-1}) + a_{20,3} ((\ln Y_{t-1} - \ln L_{t-1}) - (\ln Y_{t-2} - \ln L_{t-2}))$$

$$[21] \quad \ln w_t = \ln w_{t-1} + a_{21,1} (\ln L_t - \ln L_t^S) + a_{21,2} (\ln P_{t-1} - \ln P_{t-2}) + a_{21,3} ((\ln Y_{t-1} - \ln L_{t-1}) - (\ln Y_{t-2} - \ln L_{t-2}))$$

Figure 10.1 Main Circuits in Tandem-M

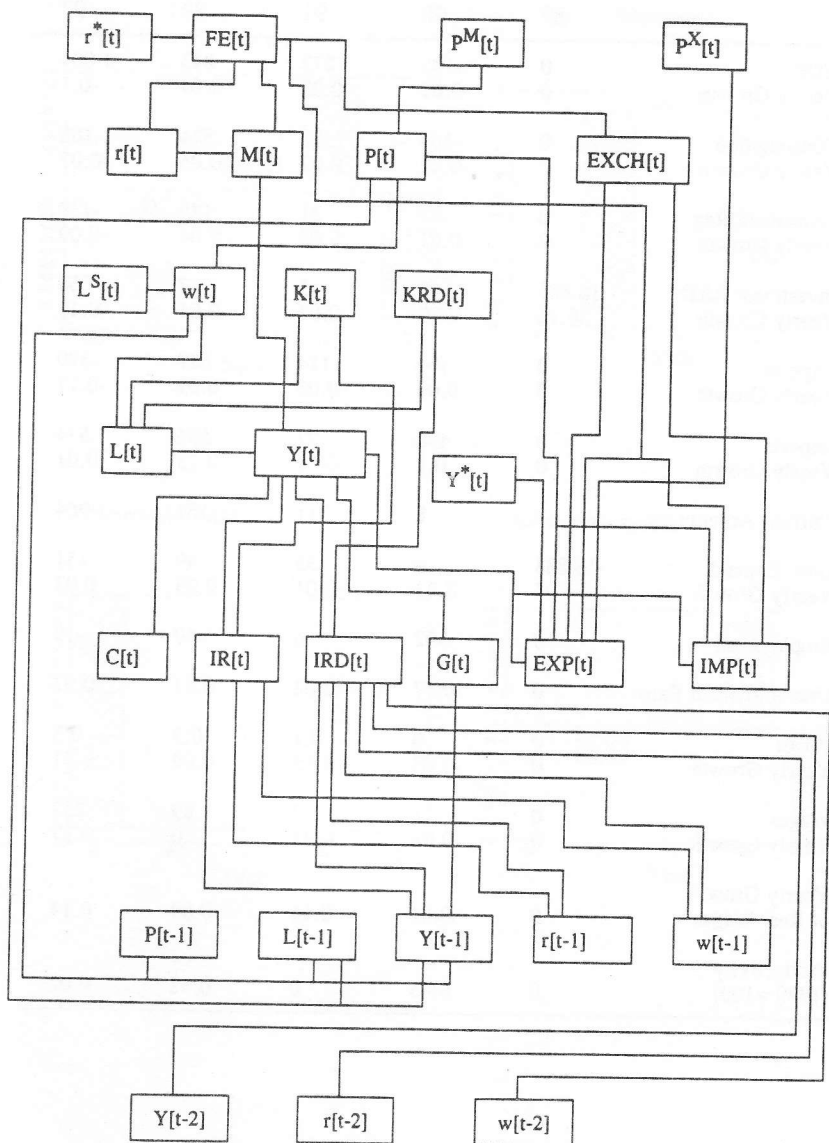
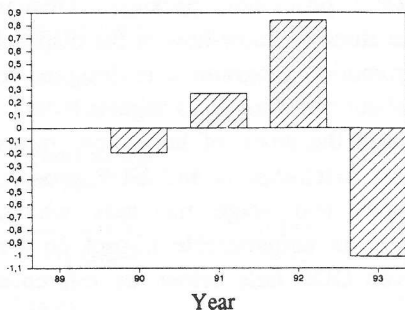


Table 10.3 Scenario 1 (Difference to Base Run)

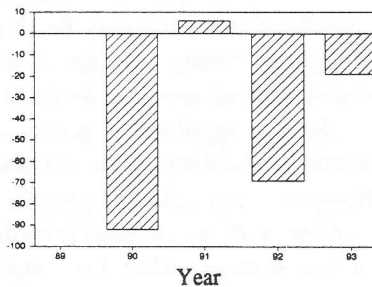
	89	90	91	92	93
GDP	0	-195	272	843	-1 004
Yearly Growth	0	-0.02	0.03	0.04	-0.1
Consumption	0	-166	-23	524	-108
Yearly Growth	0	-0.02	0.02	0.06	-0.07
Investment Reg.	0	-45	21	125	-138
Yearly Growth	0	-0.01	0.02	0.04	-0.09
Investment R&D	16 883	7	-2	-7	56
Yearly Growth	38.15	-27.9	-0.02	-0.01	0.15
Exports	0	506	114	687	-390
Yearly Growth	0	0.09	-0.06	0.09	-0.17
Imports	0	498	-197	536	574
Yearly Growth	0	0.1	-0.13	0.13	0.01
Current Account	0	8	311	151	-964
Gov. Expend.	-16 883	0	-35	49	151
Yearly Growth	-4.96	5.23	-0.01	0.03	0.03
Employment	0	-92	6	-69	-19
Unemployment Rate	0	0.37	-0.02	0.27	0.07
Prices	0	0	0.1	0.3	0.5
Yearly Growth	0	-0.03	0.13	0.09	0.21
Wages	0	-12	89	89	232
Yearly Growth	0	-0.03	0.27	0	0.37
Yearly Growth of Real Wages	0	-0.01	0.14	-0.09	0.14
Productivity (1980=100)	0	0.45	0	0.42	0.02

Figure 10.2 Scenario 1

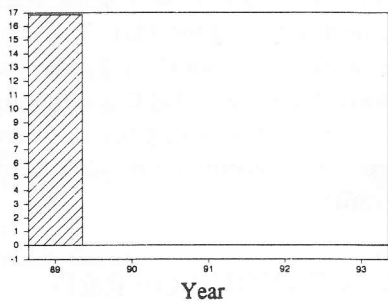
GDP



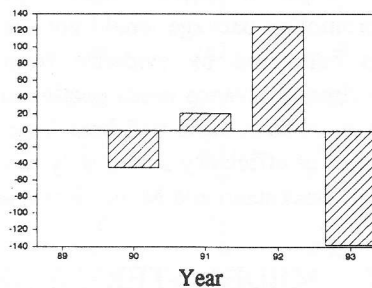
Employment



Investment R&D



Investment (regular)



6. THE SHORT-TERM R&D PROMOTION PACKAGE

The first simulation exercise starts from a scenario in which the Department of Science and Technology allocates a one-off sum of public money for a specific industrial R&D promotion package. This is considered as a temporary boost to the stock of know-how at the disposal of German firms. The size of the promotion programme is designed to step up current spending on R&D by about one-third of its regular level.

Such a speed-up of accumulation in the stock of know-how raises labour productivity. This stimulates, at first, exports and GDP growth. However, productivity growth induces real wage increases which, together with accelerated growth, have an unfavourable impact on the current account. After four years, even GDP falls below the reference level.

The dynamic behaviour of Tandem-M suggests that such a shock treatment of R&D activities raises the level of inequality (taking the rate of unemployment as a measure for the inequality of opportunity for employment). Those who manage to keep their jobs receive higher wages while more people join the ranks of the unemployed.

From a macro-economic point of view such a short-term R&D promotion package would not seem to be a terribly good idea. This view is buttressed by evidence from the micro-level which suggests that technical advance needs continuous efforts. Stepping up R&D activities on a short-term basis will bear little fruit. Rather than raising the long-term level of efficiency it will only spur corporate competition for public funds (cf. Beckmann and Meyer-Krahmer, 1986).

7. MEDIUM-TERM SHIFTS IN FAVOUR OF R&D

The second scenario depicts the consequences of a permanent increase of public funds available for industrial investment in R&D. It is assumed that this additional provision of public money is balanced by cuts in other expenditure items, thus leaving total government spending unaffected during the first year. The underlying rule states that the additional public promotion package for R&D should be equal to 1 per cent of GDP in the previous year (For a more complex design of such a scenario cf. Blazejczak, 1986.)

Table 10.4 Scenario 2 (Difference to Base Run)

	89	90	91	92	93
GDP	0	-195	271	-635	2 589
Yearly Growth	0	-0.02	0.03	-0.05	0.19
Consumption	0	-166	533	-2 945	1 604
Yearly Growth	0	-0.02	0.07	-0.35	0.46
Investment Reg.	0	-45	167	-800	556
Yearly Growth	0	-0.01	0.07	-0.35	0.48
Investment R&D	16 883	17 050	17 254	17 270	17 392
Yearly Growth	38.15	-0.35	0.85	0.55	-0.1
Exports	0	506	502	1 662	1 614
Yearly Growth	0	0.09	0	0.19	-0.02
Imports	0	498	871	-1 269	1 053
Yearly Growth	0	0.1	0.07	-0.39	0.42
Current Account	0	8	-369	2 931	561
Gov. Expend.	-16 883	-17 043	-17 314	-17 092	-17 524
Yearly Growth	-4.96	-0.01	-0.02	0.03	-0.05
Employment	0	-92	-86	-182	-130
Unemployment Rate	0	0.37	0.34	0.71	0.51
Prices	0	0	0.1	0.1	0.2
Yearly Growth	0	-0.03	0.11	0	0.11
Wages	0	-12	76	76	176
Yearly Growth	0	-0.03	0.23	0	0.25
Yearly Growth of Real Wages	0	-0.01	0.13	0	0.13
Productivity (1980=100)	0	0.45	0.43	0.9	0.78

Figure 10.3 Scenario 2

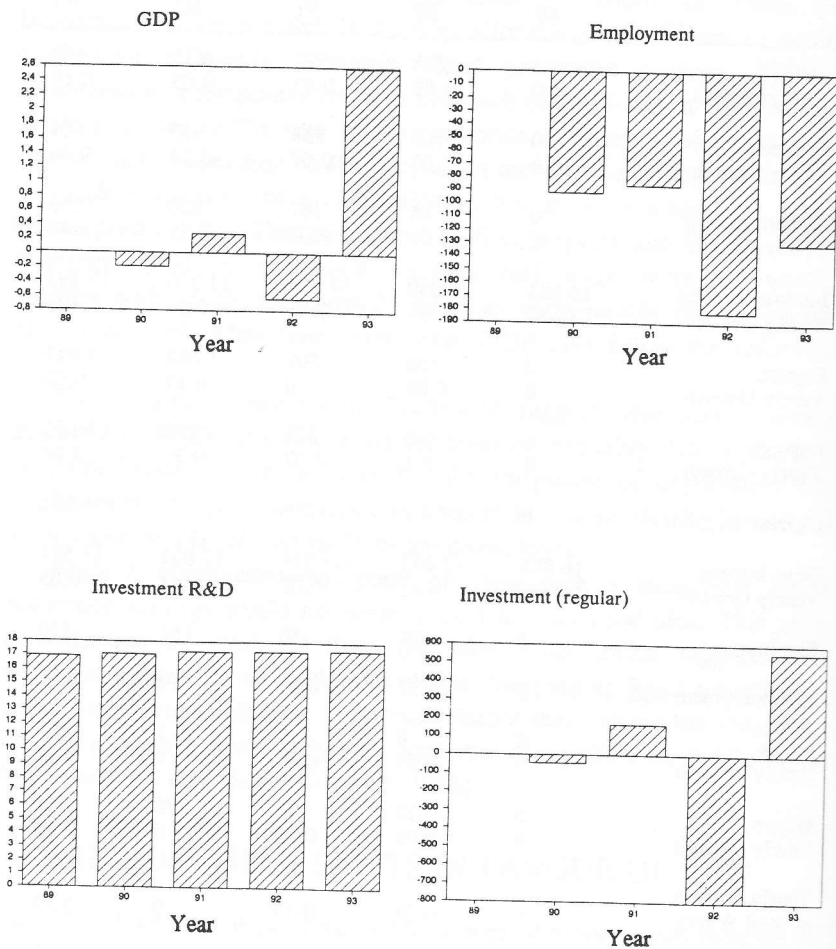
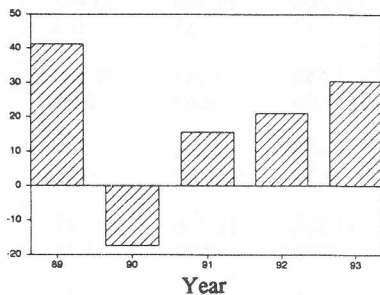


Table 10.5 Scenario 3 (Difference to Base Run)

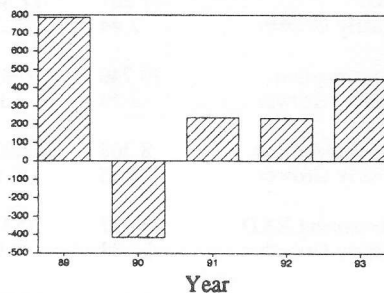
	89	90	91	92	93
GDP	41 201	-17 385	15 608	21 145	30 448
Yearly Growth	2.44	-3.39	1.92	0.31	0.5
Consumption	30 740	-6 837	3 548	9 743	19 200
Yearly Growth	3.19	-3.8	1.06	0.63	0.91
Investment Reg.	8 308	-12 030	402	-2 342	-79
Yearly Growth	2.85	-6.97	4.39	-0.99	0.81
Investment R&D	15 637	15370	13 372	12 756	14 787
Yearly Growth	35.33	-1.03	-2.76	-0.62	3.32
Exports	-1 110	-10 060	350	645	252
Yearly Growth	-0.19	-1.49	1.76	0.05	-0.06
Imports	15 798	14 772	2 402	5 967	11 068
Yearly Growth	2.98	-0.26	-2.24	0.62	0.86
Current Account	-16 908	-24 831	-2 052	-5 321	-10 816
Gov. Expend.	3 426	10 941	338	6 308	7 357
Yearly Growth	1.01	2.16	-3.01	1.71	0.27
Employment	787	-415	236	234	450
Unemployment Rate	-3.12	1.64	-0.92	-0.91	-1.74
Prices	0.4	0.2	0.9	1.2	1.6
Yearly Growth	0.26	-0.15	0.56	0.19	0.39
Wages	103	-66	410	410	652
Yearly Growth	0.28	-0.45	1.27	0	0.58
Interest Rate	1.7	2.12	1.27	0.76	0.46
Yearly Growth of Real Wages	0.02	-0.31	0.69	-0.19	0.18
Productivity (1980=100)	-1.08	0.93	-0.09	0.24	0.1

Figure 10.4 Scenario 3

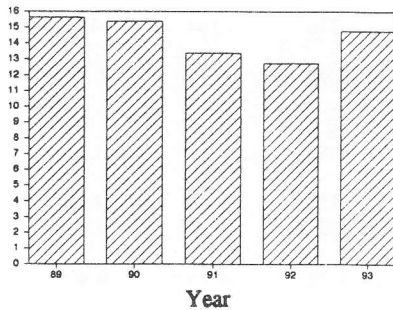
GDP



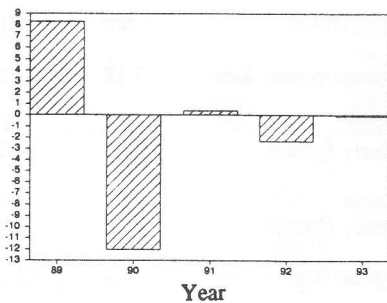
Employment



Investment R&D



Investment (regular)



Such a strategy would raise labour productivity considerably. Exports could run substantially above their level in the base run, pushing the current account into an even more favourable position. Unions will benefit from the extra rises in real wage rates, which accompany the speed up of GDP growth.

There is a price to be paid for such benefits. Employment falls off on this track of accelerated innovation; unemployment rises relative to the base run. In this sense the moving into a faster lane of know-how accumulation amounts to a scenario favourable to social élites. It is part of a path toward a 'two-tiers society'.

On a technical level it seems interesting to note that the shifts in the trade balance and the current accounts do not trigger off noticeable adjustments in the rate of interest. The neutralisation of the notional expansionary fiscal stimulus of increased investment in R&D via cuts in other public expenditure items is sufficient to avoid major reactions on money markets. This keeps investment in equipment on its regular path (apart from the deviation caused by dynamic adjustment).

8. INNOVATION-LED EMPLOYMENT GROWTH

The third scenario illustrates the proposition that a socially balanced innovation strategy might want to redistribute the gains from enhanced know-how. This is brought about by combining an expansionary fiscal stance with additional funds for R&D. Rather than neutralising the demand push of growing investment in R&D (as is the case under scenario 2), the government just tops up its regular budget with the extra R&D promotion package. Under such circumstances the notional gains in productivity are consumed by an expansion of employment. Thus there are hardly any additional rises in real wages.

This scenario seems to be quite attractive from the point of view of a trade-off between equity and efficiency. Growth of GDP is stronger than under scenario 2 and at the same time there is a reduction of the rate of unemployment by about 1.5 percentage points (over a period of 4 years). The speed-up of inflation is rather moderate.

In contrast to scenario 2, there is a noticeable feedback through the current account and interest rates. The current account deteriorates (relative to the base run) causing a rise of the rate of interest via the money markets. The initial response of interest rates is quite remarkable; after one year the interest rate is already about 2 percentage points higher than in the base run. This has a short-term dampening effect on regular

investment and GDP. After two more years this depressive impact levels out.

Such an innovation-led growth programme amounts to a 'two handed approach towards European recovery' (cf. Blanchard, Dornbusch and Layard, 1986). The supply-side is taken care of through additional funds for R&D, whereas the demand side conditions are met by increased public spending and growing income spent on consumption.

9. CONCLUDING REMARKS

The simulation exercises with Tandem-M suggest that West Germany could avail itself of the opportunity of a programme of 'innovation-led employment growth'. To achieve the goals set it would not have 'to beggar its neighbours' or dispense with its independent (and rather restrictively inclined) monetary authorities. In fact such a policy would serve as a stimulus for most trading partners, since imports would grow while the trade balance surplus would shrink.

Such a strategy has to be based on a firm commitment: temporary stimuli will not do. On the contrary, a short-term acceleration in the accumulation of know-how entails adjustment costs with little permanent benefits. However, continuity in provision of extra public funds for R&D is not sufficient either, because it raises the level of inequality; an even larger share of German labour supply would remain under-utilised, while the employed would enjoy higher real wage rates (compared to the base projection).

The scenario of 'innovation-led employment growth' asks only for a once and for all increase of the share of public spending in GDP by 1 per cent. There is no further relative growth in public spending. At the same time, the rate of unemployment would drop visibly. The successful implementation of such a programme would also require an institutional reform (as suggested in Chapter 11, below); it might even amount to a transition to a new growth regime (cf. Boyer, 1988).

NOTES

- 1 'The paper suggests that trade may be caused by technical changes and developments that influence some industries and not others; because particular technical changes originate in one country, "comparative cost differences" may induce trade in particular goods during the lapse of time taken for the rest of the world to imitate one country's innovation. It is claimed that for various theoretical reasons such a model may be better suited to explain substantial parts of world trade than some alternative models, but the main aim is to add to rather than replace the range of explanations available' (cf. Posner, 1961, p. 323).

- 2 'The movement of international capital depends on investment opportunities as reflected in interest rates and on anticipated changes in the exchange rate' (cf. Dernburg, 1989, p. 107).
- 3 'Of course, a wide variety of intervention rules conceivably could be relevant, but we focus on a linear rule that reflects concern for both exchange rate variance and reserve stock variance. Specifically we assume that the change in the stock of foreign assets held by the central bank is negatively related to the current exchange rate and to their foreign asset holdings last period, ...' (cf. Driskill and McCafferty, 1985, p. 85).

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Beyond Keynesianism

The Socio-Economics of Production and Full Employment

Edited by
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and
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