

## Development of public sector investment, and its financing

Investment plays a special role within public expenditure. From a budgetary point of view, it differs from consumption spending in that – at least in part – it increases the stock of government assets. From a macroeconomic perspective, specific growth-promoting effects are ascribed to it. Owing to its direct impact on the economic process and its flexibility, capital formation by the public sector is also often regarded as a suitable tool of an anti-cyclical fiscal policy. For both budgetary and macroeconomic reasons, it is often concluded that the debt-financing of public sector investment is acceptable or even desirable. The following article traces the development of public sector investment<sup>1</sup> since the beginning of this decade and, in particular, examines its financing aspects. The article shows, specifically, that by no means all public sector investment increases the future growth potential and that financing it through borrowing can lead to substantial future burdens.

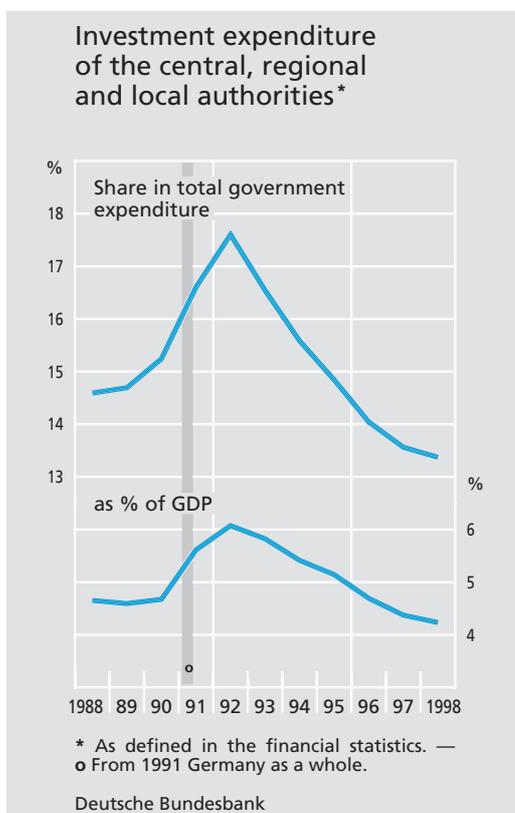
### Development of investment expenditure by the central, regional and local authorities

After the weight of public sector investment had tended to decline in the eighties, it then rose appreciably for a time following German

*Overall  
development*

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<sup>1</sup> Unless otherwise stated, excluding the investment of the social security funds, which is only of minor importance.



unification. In eastern Germany (now referred to as the new Länder) there was an enormous need for public investment, above all in the transportation infrastructure, urban renewal and municipal utilities. In addition, much of the publicly owned housing stock and educational buildings required fundamental renovation. As a result, public sector investment, as defined in the financial statistics (for a detailed definition of public sector investment see the box on page 31), increased very steeply from just over DM 100 billion in 1989 to almost DM 190 billion in 1992. It should be pointed out, however, that a considerable part of this extra spending was neutralised by the sharp rise in construction prices, which itself was partly attributable to government activities. Once the most pressing pent-up demand had been met, however, public sec-

tor investment declined again from 1993. In 1998 its share of both general government expenditure and gross domestic product (GDP) in Germany was below the corresponding levels in 1989 (see chart).

Within public sector investment, the emphasis has shifted from direct capital formation by the central, regional and local authorities to the acquisition of financial assets and measures aimed at encouraging private sector capital formation. Whereas in 1989 expenditure on tangible fixed assets had accounted for as much as 60 % of total public sector investment, this figure fell to 54 % in 1998. The increased importance of indirect investment (i.e. investment not leading to public sector capital formation) relates mainly to the massive promotion of private sector capital formation in the new Länder, especially in the first few years after unification. Besides expanding investment grants, the Federal Government and the ERP Special Fund, in particular, stepped up their lending programmes significantly.<sup>2</sup> There has also been a substantial increase in spending on the acquisition of participating interests, although this was offset, especially in recent years, by a far higher volume of privatisations undertaken principally by the Federal Government, so

*Breakdown  
by type of  
investment*

<sup>2</sup> Furthermore, government promotion of private sector capital formation in the new Länder also took the form of tax breaks and separate loan programmes launched by publicly owned promotional banks, notably the Reconstruction Loan Corporation (*Kreditanstalt für Wiederaufbau – KfW*) and the German Equalisation Bank (*Deutsche Ausgleichsbank*). However, these measures are not contained in the figures for public sector investment. See Deutsche Bundesbank, Progress in the adjustment process in eastern Germany and the contribution of economic promotion measures, Monthly Report, July 1995, pages 37 ff.

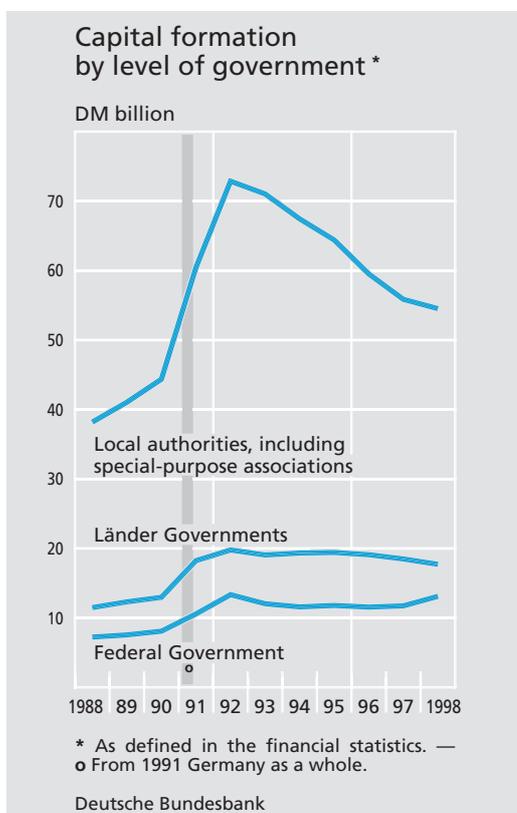
## The different definitions of public sector investment in the financial statistics and in the national accounts

The financial statistics and the national accounts represent two different measuring concepts. Whereas the financial statistics record the transactions entered in the government budget accounts – and hence indicate *inter alia* the extent to which the budget plans have been implemented – the national accounts include public finance as part of the process of generating total output. Owing to these different approaches, government receipts and expenditure are defined in different ways. This applies not least to investment.

In the sectoral breakdown the two concepts differ from one another, in particular, in the treatment of publicly owned enterprises. These figure in the financial statistics if all receipts and expenditure are contained in the budgets of the central, regional and local authorities. By contrast, in the national accounts publicly owned enterprises are allocated to the enterprise sector. The definition of investment used in the financial statistics is very broad. In formal terms it comprises the main groups 7 (construction measures) and 8 (other capital spending and investment promotion measures) of the system of classification by object pursuant to section 10 of the Budget Principles Act. This includes non-military capital formation (construction measures and the purchase of real estate and movable goods, provided that they exceed a threshold value laid down in the respective applicable budgetary law and that they are available over the longer term), investment grants and the acquisition of financial assets (purchase of participating interests and securities, granting of loans, calls on warranty commitments). Depreciation is generally not recorded as part of the financial statistics, which are geared to payment flows, as the consumption of fixed capi-

tal does not entail any actual disbursements of funds. Besides the restructuring and extension of existing plant, repairs are also classified as investment provided that they exceed certain threshold values. The time of entry of the figures is determined by the time at which the transaction is booked in the budget, which largely corresponds to the date of disbursement.

In the national accounts the concept of investment (“gross fixed capital formation”) comprises only expenditure on tangible fixed assets, comprising construction measures and net purchases of land and machinery. The consumption of fixed capital is shown – except in the case of underground and road construction. For the latter a certain percentage of construction expenditure is included in other operating expenditure as repair costs. Investment grants are classified in the national accounts as capital transfers. The acquisition of financial assets is treated not as expenditure that affects the fiscal deficit but rather as financial transactions, that is an exchange between different government financial assets. In the national accounts the time of recording depends on the production principle: machinery and equipment plus buildings are shown as capital formation in line with the state of production progress even if they have not yet been paid for during the period in question. Use of the national accounts seems advantageous, especially for macroeconomic analyses as well as longer-run studies and for international comparisons, as these data series have been recorded over an extended period without any major conceptual changes and are internationally comparable to a large extent.



that, on balance, the stock of publicly owned participating interests declined substantially.

*Capital formation by level of government*

The decline in expenditure on capital formation – the “core area” of public sector investment – was thus particularly pronounced from 1993 onwards. The main factor responsible was the decrease in capital formation by the local authorities, which in 1998 had fallen by one-quarter compared with the level of 1992. Despite this sharp decline, at DM 55 billion, the local authorities still accounted for almost two-thirds of all public sector capital formation. This means that they are the most important level of government as far as the development of the public infrastructure is concerned.<sup>3</sup> Capital formation by the Länder Governments fell by one-tenth to DM 18 billion. By contrast, the Federal Government last

year regained the level of capital formation of 1992 (just under DM 14 billion) following temporary slight reductions; a major role in this capital formation was played by construction measures connected with the relocation of the seat of government to Berlin (see chart).

One rather “technical” reason for the decline in capital formation is the increased tendency that has been evident in recent years for local authorities to release facilities from their core budgets. These institutions were previously operated as public enterprises whose accounts form an integral part of the accounts of other public entities – especially in the utilities sector. Following their transformation into autonomously operating enterprises still owned by the local authorities or even more radical forms of outsourcing, these institutions, which have high capital formation requirements, no longer appear in the public sector budgets. The portion of the decline attributable to this factor therefore does not imply a neglect of the infrastructure but is merely the result of the recording limits of the financial statistics.<sup>4</sup> However, such outsourcing only explains a fairly small part of the decline of almost 5 % per year in capital formation since 1992.

*Causes of the decline: restructuring and ...*

<sup>3</sup> The weight of the local authorities is lessened considerably, however, if the yardstick used is the financing of these tasks. Thus if the capital transfers from other levels of government are deducted from the total investment (including the acquisition of financial assets and investment promotion measures) of a given level of government, the Federal Government is the main financier of public sector investment. Judged by this criterion, the local authorities rank even lower than the Länder Governments.

<sup>4</sup> The private sector financing models for public sector capital formation that have recently been developed (leasing etc.) may have a similar effect.

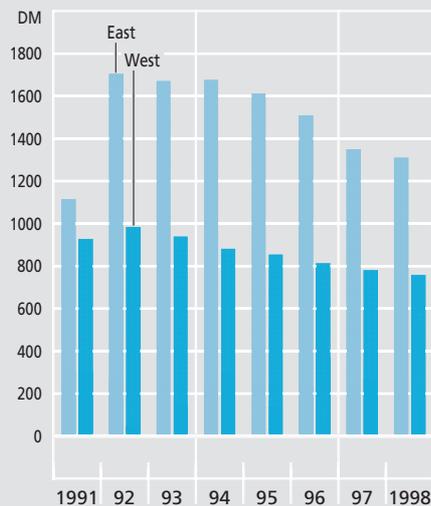
... tight  
situation of  
municipal  
finance

The tight budgetary situation of the local authorities had a bigger impact. Not least the reduced grants they received from the Länder Governments and the trend towards a growing expenditure burden – caused to some extent by the labour market situation – led to a decline in the current account surplus of the municipal budgets, which (after redemptions) is available to the local authorities for financing investment. Thus the local authorities were obliged to respond to this by curbing their capital formation just for reasons of budgetary law. This spending policy was alleviated by the fact that the infrastructure in many west German local authorities has now reached quite a high level, so that new capital spending appears necessary only to a limited degree. This does not mean to say, however, that a protracted decline in the weight of capital formation would be macroeconomically sustainable. In the long term there is a danger of damage by fiscal consolidation if the public infrastructure needed by industry grows obsolete because of neglected capital formation. According to surveys carried out by the *Deutsches Institut für Urbanistik*, the need for replacement investments during the nineties probably amounts to around two-thirds of total municipal capital formation requirements.<sup>5</sup>

Differences  
between old  
and new  
Länder

A decline in expenditure on tangible fixed assets from 1993 can be seen in both the old (i. e. western) and the new Länder. Following initial difficulties in 1991, the *per capita* capital formation of the east German Länder Governments and their local authorities rose sharply in 1992. It exceeded the west German level by more than 70 %. In the years 1993

*Per capita* capital formation  
in the west  
and east German Länder\*



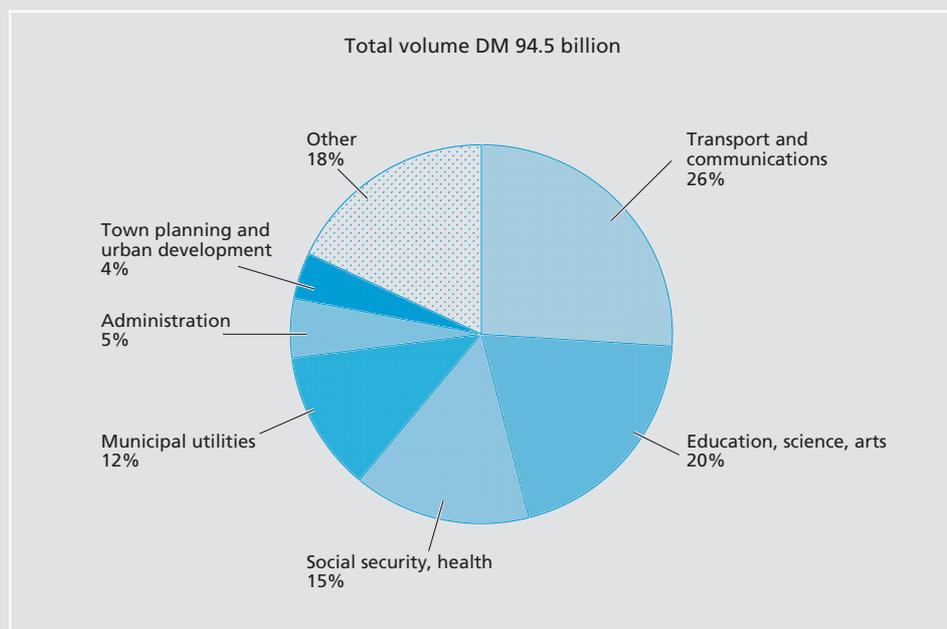
\* As defined in the financial statistics. The figures comprise the capital formation of the Länder Governments and local authorities, excluding special-purpose associations. The west German Länder include Berlin.

Deutsche Bundesbank

and 1994 capital formation in the west declined at a faster rate, with the result that the investment lead of the east German Länder widened to over 90 %. Once the most pressing infrastructural requirements had been met (and some capital formation projects had turned out to be oversized), *per capita* capital formation then fell more sharply in eastern Germany in the subsequent years. Nevertheless, the “investment intensity” in the eastern part of the country remained far higher than in the west, so that the desired process of catching-up in the new Länder persisted (see chart).

<sup>5</sup> See Reidenbach, Michael et al., *Der kommunale Investitionsbedarf in den neunziger Jahren*, Difu-Beiträge zur Stadtforschung, Berlin 1992, page 274 f.

### Breakdown of capital formation by purpose in 1996\*



\* As defined in the financial statistics, including capital formation of the social security funds.

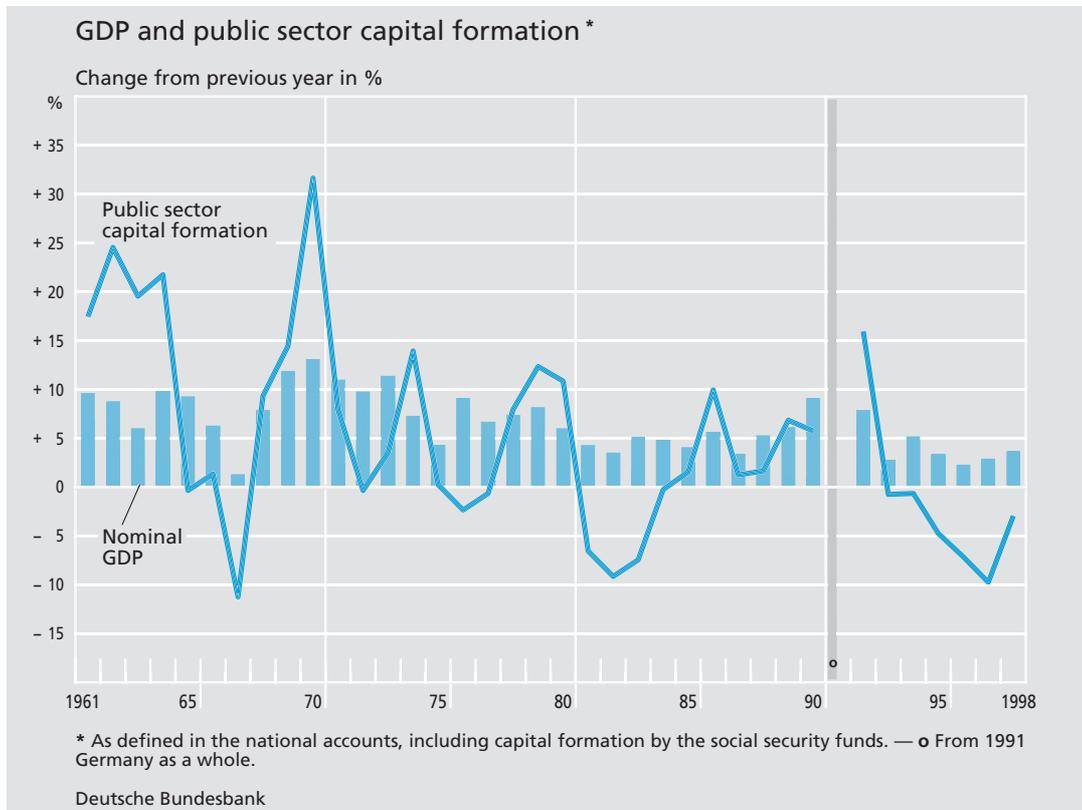
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#### Breakdown of capital formation by purpose

A breakdown of capital formation (including that of the social security funds) by purpose shows that transport and communication – which notably includes public road construction – is by far the largest single item of capital formation. In 1996 (the latest year for which figures are available) it accounted for 26 % of total expenditure (compared with almost 29 % ten years earlier).<sup>6</sup> Education, science and the arts likewise had a large share in public sector capital formation, at 20 %. Schools and colleges played a major role in this. The importance of this segment increased by 4 percentage points during the last ten years; among other things, this reflects the extra capital spending necessitated by the stipulation of guaranteed *kindergarten* places. The sector social security and health, which primarily comprises spending on hos-

pitals and sports amenities, recorded a share of 15 % in 1996. Its importance has likewise grown somewhat, with hospitals constituting a focal point of capital formation activity. By contrast, the share of municipal utilities declined distinctly by nearly 4 percentage points to 12 %, though this should not be taken to imply a uniform, across-the-board decrease in capital formation in this sector, which includes important responsibilities in the field of environmental protection such as waste management and water treatment. It is more likely that the aforementioned “outsourcing” of certain municipal facilities is felt particularly strongly. Administration accounted for only 5 % of public sector capital formation, while

<sup>6</sup> This sector also has a great weight in respect of investment grants. In particular, the extensive capital formation by the railways is largely financed in this way.



the share of town planning and urban development came to just 4%. The category "Other", which makes up 18%, mainly includes real property not allocatable to specific sectors and the capital formation of public enterprises whose accounts form an integral part of the accounts of other public entities.

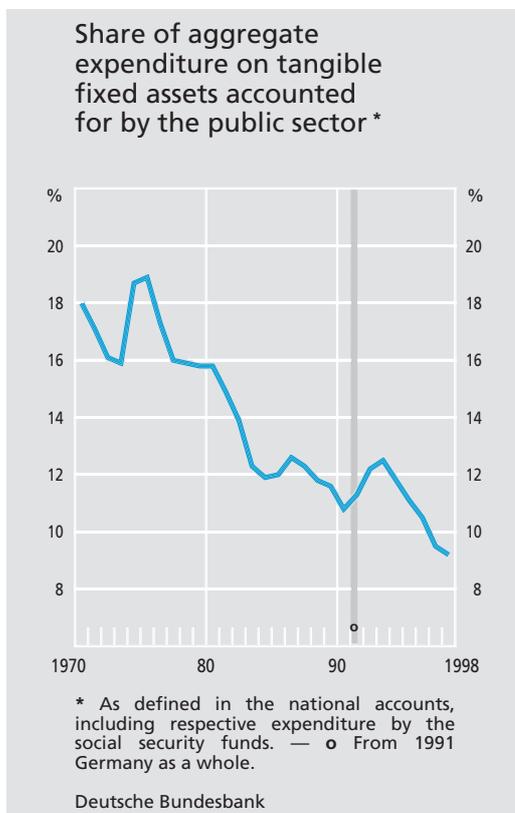
formation correlate positively with those of GDP (see chart). One plausible explanation for this are the above-mentioned financial constraints on the local authorities, which are the foremost public investor. During recessionary phases the tax receipts, the level of which fluctuates sharply in line with the cyclical momentum, do not yield sufficient revenue to finance an increase in capital formation. An additional factor is that the investment grants received from the Länder Governments have not had a steadying influence either.

*Capital formation in the course of the business cycle*

Calls are sometimes made to use public sector capital formation as a means of moderating cyclical fluctuations. A longer-run view of the development of public sector capital formation (as defined in the national accounts) shows no such pattern of response. Contrary to the intentions of the Economic Stability and Growth Act of 1967, no anti-cyclical trend is discernible in public sector capital formation on a longer-term view. Instead, the rates of change of public sector gross capital

Public sector capital formation was less susceptible to cyclical swings than that of the enterprise sector, however. Thus the public sector's share in the expenditure on tangible fixed assets of the economy as a whole rose

*Share in aggregate expenditure on tangible fixed assets*



appreciably during the downswings of 1974-5 and 1992-3. Only during the economic lull of 1980-2 did public sector capital formation decline more sharply than asset formation by enterprises. However, this was partly due to the fact that the ending of a government economic stimulation package ("Programme of Future Investment") launched in 1977 coincided with the start of the downturn.<sup>7</sup> On a longer-run view, however, the weight of the public sector in aggregate capital formation has declined considerably. Whereas public sector expenditure on tangible fixed assets had accounted for around 4½% of GDP in 1970, this fell to less than 2% last year. On the other hand, the share of capital formation accounted for by the enterprise sector remained fairly constant, at almost one-fifth. Consequently, the public sector's share of ag-

gregate expenditure on tangible fixed assets fell by half between 1970 and 1998 from 18% to just over 9% (see chart). As past experience has shown, public sector capital formation is rather problematical as a macroeconomic control variable. Besides the difficulties of getting the timing right, anti-cyclical programmes are *per se* not a suitable antidote if the economic weakness has supply-side causes.

Developments in the main EU member states in the recent past were similar to those in Germany. While the share of public sector gross capital formation in GDP (as defined in the national accounts) had largely stayed constant or even increased from the mid-eighties to the early nineties, it declined markedly thereafter, not least because of the efforts to reduce government deficits. In the European Union the government investment ratio fell by 0.8 percentage point to 2.2% between 1991 and 1998.<sup>8</sup> In Germany it rose up to 1992 in the wake of unification, but subsequently it decreased sharply to 1.8% in 1998, which was among the lowest ratios in the EU. Lower government investment ratios were recorded only by Belgium, Denmark, Sweden and the United Kingdom (in the UK an important role was played by the growth of private sector financing of capital formation for the public sector). Government investment in the south European states Spain, Portugal and Greece shows fairly strong

*Developments  
in the EU*

<sup>7</sup> The handling of this programme graphically illustrates the difficulties of correctly timing anti-cyclical fiscal policy measures, for the capital formation programme had an impact on demand just as the share of private sector capital formation in GDP was also rising.

<sup>8</sup> The figures for 1998 are European Commission estimates.

shares. These countries receive large grants from the European Structural Fund and the Cohesion Fund to improve their less well developed infrastructure.

### The financing of public sector investment

*Original rule of project-related debt-financing ...*

Both in public finance literature and in budgetary practice, investment was treated very early on as a separate category which, as "expenditure for productive purposes", has an impact that extends beyond the time frame of the current budget and which helps to increase the government capital stock. This led to the conclusion that such expenditure could legitimately be debt-financed – in contrast to "ordinary" public expenditure, which should be financed out of current revenue. In the original wording of the relevant clause in the present-day Constitution (Article 115), which was largely taken over from the Weimar Constitution, it was stipulated that credit may be procured only to meet exceptional needs and, as a rule, only for expenditure for productive purposes.

*... was supplemented by a more situation-related rule*

With the spread of anti-cyclical fiscal policy concepts, as mirrored in the Economic Stability and Growth Act, this traditional project-related funding principle was supplemented by a situation-related approach, however. The economic policy imperative of linking budgetary policy to the requirements of overall economic equilibrium was given the force of constitutional law in Article 109. The borrowing rule contained in Article 115 was adjusted at the same time. Although the Federal Government's borrowing may not exceed total in-

### Gross capital formation by the public sector

as % of GDP

Country	1991	1997	1998 e
Austria	3.2	2.0	2.0
Belgium	1.3	1.4	1.4
Denmark	1.5	1.9	1.7
Finland	3.7	3.1	2.9
France	3.4	2.8	2.8
Germany	2.6	1.9	1.8
Greece	4.8	5.2	3.7
Ireland	2.1	2.4	2.5
Italy	3.3	2.3	2.9
Luxembourg	4.9	4.7	4.4
Netherlands	2.7	2.5	2.6
Portugal	3.3	4.3	4.1
Spain	4.8	3.0	3.4
Sweden	3.0	1.8	1.1
United Kingdom	2.4	1.3	1.2
EU 15	3.0	2.2	2.2

Source: European Commission.

Deutsche Bundesbank

vestment as a rule, this ceiling may be exceeded in case of "a disturbance of the overall economic equilibrium". Article 115 relates solely to the Federal Government, but the Länder Governments have included similar provisions in their constituting laws or budget regulations. Only in the case of the local authorities is borrowing strictly tied to the implementation of investment measures, as well as being subject to additional budgetary law restrictions.

The permissibility of borrowing up to the level of total investment enshrined in Article 115 of the Constitution is ultimately substantiated by the argument of intergenerational burden-sharing, according to which investment provides public capital goods that will create welfare in future periods. At the same time the

*Arguments for debt-financing of investment and ...*

growth of the production potential can be promoted and hence the income base of future generations broadened. According to this view, investment, in contrast to consumption spending, generates future income streams both for the government and its citizens. It is therefore considered justifiable to finance such spending by incurring debt, which is serviced by tax payments of future generations as the "fee" for using the public capital goods thus created ("pay as you use"). Servicing the debt (so the argument goes) will be made easier by the enlarged income base. These intergenerational and macroeconomic considerations are supplemented by arguments based on the long-term sustainability of budgetary policy. Analogously to private sector financial analysis, the fiscal policy trend is regarded as sustainable if the requirement of net value neutrality is observed over time, that is if new borrowing is offset by an equal value of assets created through net capital formation.

This substantiation for the debt-financing of public sector investment is not completely valid, however. Even the assertion that an intertemporal equalisation of burdens between different generations can only be achieved by such financing is questionable. Various concepts can be found in the literature for the definition of intergenerational equivalence. For example, an unchanging net burden on different generations over time could be deemed to be met if the relationship between the financing costs of public sector investment per inhabitant and the return on the government capital stock per inhabitant is constant in all periods. In the case of

tax-financing, the costs include the expenditure incurred by the investment and, in the case of debt-financing, the interest payments – which likewise have to be funded by tax receipts – on the government debt incurred for the purpose of creating the capital stock. If a given economy has reached the steady state of long-term growth equilibrium, the specified condition can be met for both financing alternatives.

In the long run, however, the tax burden ensuing from debt-financing is greater than that caused by tax-financing (see box on page 39). But this only holds true in the steady state in which the government capital stock grows at the same rate as national income. Whenever a new or additional investment requirement arises and public sector capital formation accelerates in the short run, the burden on the present-day generation during the adjustment period to a new steady-state growth equilibrium is greater in the case of tax-financing than for debt-financing. The burden on the present-day generation during the adjustment period is likewise greater if there is a switch to increased tax-financing. Hence choosing between the two financing alternatives implies assessing how the welfare of future generations is to be valued in relation to the current generation. Another point to bear in mind is that the fiscal burden on future generations will be greatly intensified anyway by demographic trends, in particular.<sup>9</sup> In order to limit the overall future burdens, therefore, it would make sense to resort more

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<sup>9</sup> See Deutsche Bundesbank, The fiscal burden on future generations – an analysis using generational accounting, Monthly Report, November 1997, pages 17 ff.

## Financing of public sector investment and the burdens to be borne by different generations

If public sector investment is debt-financed, taxes must be sufficiently high over the long term to ensure that the interest payments can be made. On the other hand, if it is funded by taxation, the taxes must be able to finance current investment by the public sector on a long-term basis. Irrespective of the method used for financing public sector investment, a uniform inter-generational relationship can be achieved in the long run under certain conditions between the tax burden arising from the investment or the resulting debt service, on the one hand, and the return on the public investment, on the other. If it is assumed, however, that *per capita* public sector investment requirements remain constant over the long term, the long-run tax burden is higher under debt-financing than in the case of tax-financing.

The government must finance the public sector investment  $K_{t+1}^{\circ} - K_t^{\circ}$  and the interest payments on the government debt  $rB_t$  during period  $t$  out of the funds borrowed in period  $t$  (the change in the government debt  $B_{t+1} - B_t$ ) and the tax receipts  $T_t$ . Hence the budget constraint for the government (ignoring other government expenditure) is given by:

$$(1) T_t + (B_{t+1} - B_t) = (K_{t+1}^{\circ} - K_t^{\circ}) + rB_t.$$

The public sector capital earns a return  $uK_t^{\circ}$  which flows to the private sector. A constant rate of return  $u$  and a constant growth of the population and of labour productivity (technical progress) at the rates  $n$  and  $a$  are assumed. Then in the long run the interest rate  $r$  is constant, the national income grows at the rate  $g = n+a$ , and all *per capita* variables grow at the rate of technical progress – this characterises the equilibrium growth of the economy over the long term ("steady state"). Thus the steady-state budget constraint can be approximated as follows:

$$(2) \tau_t = (r - g)b_t + gk_t^{\circ}$$

1 Equation (2) can be interpreted as follows. The *per capita* tax burden required over the long term is given by the sum of the primary balance  $(r-g)b_t$  and *per capita* net investment by the public sector  $gk_t^{\circ}$ . — 2 This statement holds true only under steady-state conditions. If, by contrast, we consider the case of a young economy which still has to accumulate its equilibrium capital stock, or if higher net in-

vestment is required in the short term, so that the rate of growth of  $k_t^{\circ}$  increases, the statement no longer holds true. This also applies to the case of a change in the financing structure. — 3  $\Delta^K$  and  $\Delta^{St}$  denote the absolute changes arising from pure debt-financing and pure tax-financing, respectively. The simple symbol  $\Delta$  is used for changes that do not differ in respect of the financing method.

where  $b_t$ ,  $k_t^{\circ}$  and  $\tau_t$  stand for the debt level, the government capital stock and the tax burden – all *per capita*.<sup>1</sup> As  $k_t^{\circ}$  and  $\tau_t$  grow at the same rate under steady-state conditions, the relationship between the tax burden and the return on public sector capital  $\tau_t/(uk_t^{\circ})$  must also remain constant, irrespective of the way in which public sector capital formation is financed.<sup>2</sup>

The change in the steady-state tax burden ensuing from the change in the endogenous and exogenous variables can be approximated using the total differential of (2):

$$(3) \Delta\tau_t = b_t\Delta r + r\Delta b_t - g\Delta b_t + g\Delta k_t^{\circ}$$

If investment is exclusively debt-financed,  $\Delta b_t = \Delta k_t^{\circ}$  holds, so that (3) can be rewritten as<sup>3</sup>

$$(4) \Delta^K\tau_t = b_t\Delta^K r + r\Delta k_t^{\circ}.$$

In the case of pure tax-financing,  $\Delta b_t = 0$ . Then (3) is transformed into

$$(5) \Delta^{St}\tau_t = b_t\Delta^{St} r + g\Delta k_t^{\circ}.$$

The difference between (4) and (5) is the difference between the respective burden of pure debt-financing and pure tax-financing:

$$(6) \Delta^K\tau_t - \Delta^{St}\tau_t = b_t(\Delta^K r - \Delta^{St} r) + (r - g)\Delta k_t^{\circ}.$$

It can be taken as read that in the long term the interest rate  $r$  lies above the rate of growth of national income  $g$ . Over and above this, the capital market is as a rule additionally burdened in the case of pure debt-financing, so that in this case the new steady-state interest rate is greater than under pure tax-financing, with the result that  $\Delta^K r > \Delta^{St} r$ . Hence the difference in (6) is greater than zero. The long-run tax burden is higher in the case of pure debt-financing than in the case of pure tax-financing.

to tax-financing for the purpose of funding investment.

*Growth effect  
often lacking*

Regarding the growth effect of public sector investment, which might justify the use of debt-financing, the picture is likewise mixed. The very broad definition of investment given in Article 115 of the Constitution (which corresponds to the definition used in the financial statistics, as shown in the box on page 31) contains components for which growth-stimulating effects are either questionable or even non-existent. This applies, for example, to the acquisition of financial assets in the form of participating interests.<sup>10</sup> Investment promotion measures such as grants and low-interest loans do nothing to promote growth to the extent that they merely lead to “profit-taking” effects. If the financial aid is more of a subsidy, it could actually impede growth because it ties up both public and private sector capital that could be put to more profitable use elsewhere.

Similarly, capital formation does not always increase the growth potential. Growth is promoted only by net capital formation but not by that part of gross capital formation that is accounted for by replacement investments and which merely serves to maintain the existing level of production of the government capital stock. Furthermore, the latter can be divided into productive assets and consumption-related assets (which include such things as public recreation and sports amenities and nursing homes for old people). Although investing in the latter is an integral part of the provision of basic public services,

it does little to improve the prospects for macroeconomic growth.

Certain reservations must be made even in the case of public infrastructure capital formation. Thus capital formation for the sake of environmental protection, notwithstanding its necessity, is less “productive” in the customary sense. Moreover, government capital formation includes capital goods that could be more efficiently provided and maintained by private suppliers. In general it can be said that public sector capital goods are more likely to promote growth if they complement private sector capital formation. Their influence is thus dependent on the specific overall economic framework. Studies on the effect of public infrastructure capital formation in Germany during the past years come to relatively divergent conclusions. On balance, however, such investment is said to have a productivity enhancing tendency (see box on page 41).

If by no means all investment – especially as widely defined under Article 115 of the Constitution – promotes growth, it is also a fact, on the other hand, that part of the expenditure assigned to government consumption has productivity-boosting effects. This applies, in particular, to spending on education and science, which to some extent may be regarded as an investment in human capital. Spending on health care has a similarly mixed character. On the one hand, it maintains and promotes the efficiency of the factor labour. On the other hand, the entire population’s right to a high level of medical treatment is

*Consumption  
spending may  
also promote  
growth*

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<sup>10</sup> In fact, it is conceivable that efficiency could be increased through disinvestment by way of privatisations.

## Studies on the productivity effects of public infrastructure capital formation

Studies on the productivity effects of public infrastructure capital formation examine the relationship between the creation of public infrastructure facilities and the costs or marginal yields to enterprises in temporal, sectoral and regional comparisons. In methodological terms a distinction may be made between pure time series studies and panel analyses using cross-sectional and longitudinal data.

In a purely longitudinal study, Kitterer/Schlag (1995) examine the effect of public infrastructure capital formation on the costs (the sum of capital cost and labour cost) in the private enterprise sector in western Germany. Using an error correction model, they estimate that an increase in public sector capital formation entails no noticeable lowering of costs in the enterprise sector.

More favourable overall results are obtained by panel studies in which the private producing sector is disaggregated by region or branch of industry, although there are some considerable differences between the cross-sectional units. Thus the panel study by Conrad/Seitz (1992), which is broken down into four sectors, gives values for the cost elasticities of between + 0.02 for the service sector and - 0.36 for the manufacturing sector. In the panel study by Seitz/Licht (1995), which is broken down by Länder, the largest cost elasticities appear in Bavaria, Baden-Württemberg and North Rhine-Westphalia (with values of - 0.35) and the smallest in the city-states Hamburg (- 0.10) and Bremen (- 0.02). In their panel study, which is broken down by west German Länder, Kellermann/Schlag (1998) conclude that an increase of 1% in public infrastructure capital formation increases the value added of the private sector in the old Länder by 0.2%, with only a small variance between the individual Länder.

The present state of the discussion does not permit a definitive assessment to be made of the scale of the productivity effects of public infrastructure capital formation. The major differences in some cases in the estimated cost and output elasticities between the cross-section units in panel designs, on the one hand, and the negligible effects in pure longitudinal studies, on the other hand, suggest that the estimations should be interpreted with caution. Even so, the results indicate that public infrastructure capital formation makes a contribution – albeit a limited one – to value creation and cost reduction in the private sector.

### Literature:

Conrad, K./H. Seitz (1992): The "Public Capital Hypothesis". The Case of Germany, *Recherches Economiques de Louvain* 58, pages 1–19.

Kellermann, K./C.-H. Schlag (1998): Produktivitäts- und Infrastruktureffekte öffentlicher Sachinvestitionen, *Kredit und Kapital* 31 (3), pages 315–342.

Kitterer, W./C.-H. Schlag (1995): Sind öffentliche Investitionen produktiv? Eine empirische Analyse für die Bundesrepublik Deutschland, *Finanzarchiv* 52, pages 460–477.

Seitz, H. (1995): Public Infrastructure Capital Employment and Private Capital Formation, *OECD Job Study: Investment, Productivity and Employment*, Paris, pages 123–154.

Seitz, H./G. Licht (1995): The Impact of Public Infrastructure Capital on Regional Manufacturing Production Cost, *Regional Studies* 29 (3), pages 231–240.

the consequence of political considerations concerning income distribution.

*Statutory  
financing rule  
barely operable*

Given this complex of problems, it is very difficult to translate the concept of coupling borrowing to the level of investment into a statutory financing rule. Moreover, from a macroeconomic point of view the implications of the two alternatives tax-financing or debt-financing for the decisions of enterprises and households should be considered as well. It needs to be borne in mind, in particular, that government borrowing may lead to rising interest rates, with the result that more interest-sensitive private sector capital formation is crowded out.

*Budget policy  
justification  
likewise  
inadequate*

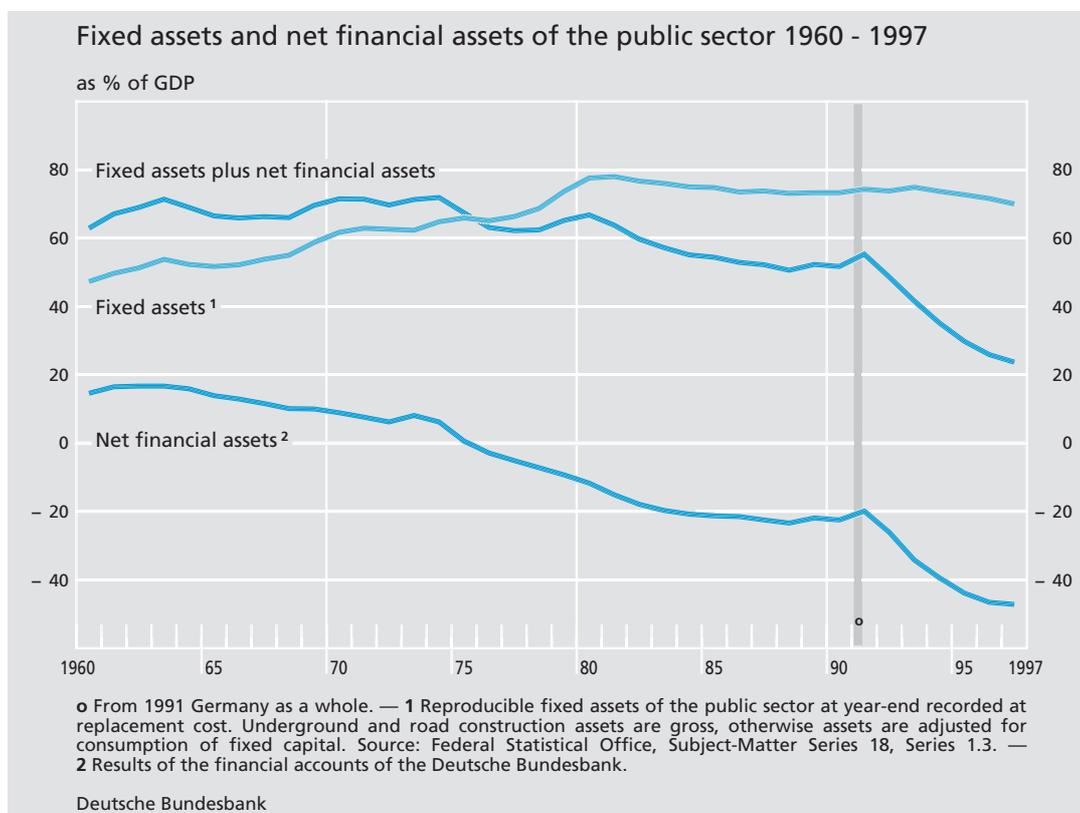
The budget policy argument that financing investment through borrowing leaves the stock of government net assets intact, and that it consequently has no effect on the long-term sustainability of public finance, is rather unconvincing, not least in the light of current budgetary law. Thus borrowing is not counterbalanced by the acquisition of assets "of equal value", as the stock of government assets have no, or only a minimal, realisable market value owing to the specialised nature of their use. One also needs to take into account the follow-up costs, in the form of increased personnel and other operating expenses, which limit the government's future room for manoeuvre. A quantifiable rate of return on the individual investments is virtually impossible to calculate with any accuracy, nor does it have a direct impact on the budget – in contrast to the interest charges ensuing from the debt-financing of investment. Of the indirect forms of investment,

the quantitatively very significant investment grants result in no asset acquisition at all by the government. The rate of return on loans granted by the public sector is often lower than the market rate of interest; moreover, a complete recovery of the capital may not be expected in all cases.

Finally, the concept of maintaining the net government capital stock would require subtracting both the imputed cost of consumption of fixed capital and the disposal of fixed and financial assets from gross capital formation. This is graphically illustrated by the massive privatisation proceeds that have accrued during the past few years. The amount earmarked for investment in the 1999 draft Federal budget, in line with the provisions of Article 115 of the Constitution, marginally exceeds the budgeted net borrowing of just over DM 56 billion. But if disposals of fixed assets and participating interests as well as loan repayments are taken into account, the increase in the capital stock would come to not quite DM 24 billion – even without allowing for the consumption of fixed capital. In other words, consumption spending has been financed on a large scale by a decline in the Federal Government's net assets.

The same applies very much to the practice in past years and to other levels of government. In a longer-run comparison, therefore, government borrowing has for some time no longer been accompanied by a corresponding growth of the government capital stock. The chart on page 43 shows the trends in fixed assets and net financial assets (as the balance of the financial claims and liabilities of the

*Negative trend  
in net assets*



government sector vis-à-vis other sectors) in the Federal Republic of Germany between 1960 and 1997. It shows that the ratio of fixed assets to GDP increased up to the beginning of the eighties and thereafter tended to decline slightly.<sup>11</sup> The ratio of net financial assets to GDP has been falling almost from the outset. Since the mid-seventies the stock of net financial assets has been used up and superseded by the accumulation of financial liabilities. If the sum of tangible fixed assets and net financial assets is taken as a rough indication of government net assets,<sup>12</sup> this figure stagnated in relation to GDP from 1960 to the mid-seventies. Since that time the ratio has fallen sharply. In fact, the provisions of Article 115 of the Constitution, and the similar regulations at the Länder Government level, have been unable to prevent an abso-

lute decrease in government net assets during the past few years.

Over and above the conceptual misgivings about pegging borrowing to the level of investment, Article 115 of the Constitution also has certain institutional shortcomings which further weaken its ability to promote fiscal discipline and which have likewise contributed to the depletion of the government capital stock described above. For example, the

*Other shortcomings of Article 115 of the Constitution*

<sup>11</sup> These figures, taken from the national accounts, probably overstate the weight of government fixed assets as no consumption of fixed capital is calculated on underground and road construction assets.

<sup>12</sup> At present no well substantiated accounting concept exists for calculating the total net assets of the public sector in Germany as a whole owing to diverse recording and valuation problems. Hence the indicator used here cannot provide exact figures for government net assets; nevertheless, it probably reflects the longer-term trend accurately.

provisions of the Article relate only to the net borrowing requirement as projected in the budget and not to the actual figure incurred during the year.<sup>13</sup> Moreover, the rule applies solely to the Federal budget itself and not to the off-budget special funds through which, for example, a large part of the borrowing to finance German unification was handled. Finally, the exception clause in the event of a disturbance of the overall economic equilibrium is asymmetric in that the authorisation to exceed the prescribed limit is not counterbalanced by any compensatory requirement when the economy is buoyant. After all, in ten of the years since 1970 the net borrowing figure given in the Federal budget was higher, by virtue of invoking the exception clause, than the budgeted volume of investment.

### Fiscal policy consequences

*Pressing need  
for  
investment ...*

The fact that the growth effects of public sector investment cannot be estimated unambiguously and that the corresponding budgetary rules appear problematical does not imply that such spending is unimportant. Replacement investments and investment in environmental protection, as well as consumption-related assets, satisfy a somewhat pressing need and create important conditions for balanced overall economic development, not least by enhancing the country's attractiveness as a business location.<sup>14</sup>

*... does not  
justify its  
debt-financing*

However, the pressing need for investment and the appropriate method of financing it are two separate issues. It is true that, in principle, the debt-financing of investment is

more justifiable than borrowing for consumption purposes. For the reasons explained above, however, it is difficult to regard the debt-financing of public sector investment as being generally unproblematical, especially if such investment is so broadly defined as it is in Article 115 of the Constitution. Furthermore, such debt-financing rules should not be considered in isolation from the underlying fiscal policy situation. Whereas in 1970 the gross indebtedness of the west German public sector was less than 20 % of GDP and interest payments amounted to just 1 % of GDP, by 1998 the government debt had increased to over 60 % of GDP, while interest payments totalled almost 4 % of GDP. Given this situation, which prevails to a greater or lesser extent in the other EU states, too, the European Commission – while in favour of higher public sector investment in the member states – is urging that it should be funded by restructuring government expenditure. It considers that, by contrast, the “golden rule” of debt-financing of investment offers no guarantee for a sustainable public finance situation and a control over the government debt level.<sup>15</sup>

In the Stability and Growth Pact, which was agreed as a supporting measure for the launch of European monetary union, the

*Debt-financing  
of investment  
would  
jeopardise goals  
of Stability and  
Growth Pact*

<sup>13</sup> The Federal budget plans for 1993 and 1996, for example, envisaged that borrowing would keep within the investment limit, whereas in actual fact the amount borrowed exceeded that limit when the budget was implemented.

<sup>14</sup> It must also be said, though, that some of these goods could be provided more efficiently by the private sector.

<sup>15</sup> See COM(98) 682, Commission statement on public sector investment as part of overall economic policy strategy, of December 2, 1998.

member states are pledged to achieving a medium-term budgetary position that is "close to balance or in surplus". This presupposes that the "norm" for new borrowing – unlike that provided for under Article 115 of the Constitution – does not correspond to the level of investment but instead is close to zero. This more ambitious objective is designed to enable public authorities to cope with cyclically induced additional burdens without exceeding the current deficit limit of 3% of GDP stipulated by the Maastricht Treaty. It also accords with the need to reduce the currently excessive debt levels and interest charges in relation to GDP. Above all, it is necessary to take due account of the long-term

burdens on public finance that are likely to ensue, in particular, from demographic developments. Thus the strongly growing burden on future generations could be limited by the formation of a government capital stock that is not debt-financed. Attempts that have been evident recently to exempt investment from the objective of achieving a balanced budget in the medium term cannot be adequately justified by budget and growth policy considerations. Instead, they would dilute the aims of the Stability and Growth Pact and make it harder to take the steps necessary in order to put public finance in the member states of the European economic and monetary union lastingly on a sound footing.

## Investment of the central, regional and local authorities

DM billion

	1988	1989	1990	1991 1	1992	1993	1994	1995	1996	1997 p	1998 pe
I. As defined in the financial statistics											
1. Capital formation											
Federal Government	7.68	7.99	8.53	11.01	13.78	12.48	12.02	12.23	11.99	12.17	13.54
Länder Governments	11.92	12.75	13.40	18.68	20.21	19.50	19.78	19.86	19.54	18.92	18.16
Local authorities	38.63	41.49	44.81	60.89	73.31	71.48	67.88	64.84	59.96	56.30	54.96
Total	58.23	62.23	66.73	90.58	107.30	103.45	99.68	96.93	91.49	87.40	86.67
2. Indirect investment											
a) Loans											
Federal Government	6.10	6.19	7.49	6.93	7.17	11.12	15.32	14.11	10.16	11.29	6.74
Länder Governments	5.84	5.30	5.18	5.57	6.33	6.47	6.35	6.23	5.74	5.16	4.50
Local authorities	0.97	1.06	1.49	1.60	1.87	1.81	1.77	1.52	1.46	1.17	0.93
Special funds	3.56	3.73	6.50	11.44	11.79	9.60	11.30	10.62	9.47	10.81	13.40
Total	16.47	16.27	20.66	25.53	27.17	28.99	34.74	32.49	26.84	28.43	25.56
b) Grants											
Federal Government	9.76	9.76	10.27	17.38	21.86	20.21	13.88	14.20	11.59	9.87	14.01
Länder Governments	8.47	9.31	10.76	20.04	22.64	22.93	23.92	24.98	25.54	25.09	23.66
Local authorities	2.33	2.57	2.72	3.31	3.80	4.37	4.66	4.78	4.88	4.74	4.48
Total	20.56	21.63	23.74	40.73	48.30	47.51	42.45	43.95	42.01	39.70	42.15
c) Participating interests											
Federal Government	1.24	1.33	1.29	1.69	1.64	1.32	1.95	1.42	1.49	1.41	1.33
Länder Governments	0.79	0.80	0.98	1.89	1.90	1.90	0.91	1.54	3.75	1.66	3.27
Local authorities	1.37	1.11	1.23	1.43	2.36	2.47	2.17	2.61	1.94	1.80	2.20
Special funds	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00
Total	3.40	3.24	3.51	5.02	5.90	5.94	5.02	5.57	7.18	4.86	6.80
d) Total indirect investment											
Federal Government	17.10	17.28	19.04	26.00	30.67	32.64	31.15	29.74	23.25	22.57	22.08
Länder Governments	15.10	15.41	16.92	27.50	30.88	31.30	31.17	32.75	35.04	31.91	31.43
Local authorities	4.67	4.73	5.44	6.34	8.03	8.65	8.60	8.90	8.28	7.71	7.61
Special funds	3.56	3.73	6.50	11.44	11.79	9.85	11.30	10.62	9.47	10.81	13.40
Total	40.42	41.14	47.91	71.28	81.37	82.44	82.21	82.01	76.04	72.99	74.51
3. Total investment											
Federal Government	24.78	25.27	27.57	37.01	44.45	45.12	43.17	41.96	35.24	34.74	35.63
Länder Governments	27.02	28.16	30.32	46.18	51.09	50.80	50.95	52.60	54.57	50.84	49.58
Local authorities	43.29	46.22	50.24	67.23	81.34	80.13	76.48	73.75	68.24	64.01	62.57
Special funds	3.56	3.73	6.50	11.44	11.79	9.85	11.30	10.62	9.47	10.81	13.40
Total	98.65	103.37	114.64	161.86	188.67	185.89	181.90	178.94	167.53	160.39	161.18
II. As defined in the national accounts											
Gross capital formation	47.82	51.42	54.43	73.23	85.03	84.43	84.11	79.05	74.36	67.79	65.99
Consumption of fixed capital	14.10	14.94	16.00	19.30	21.05	22.59	23.53	24.48	25.06	25.54	25.97
Net capital formation	33.72	36.48	38.43	53.93	63.98	61.84	60.58	54.57	49.30	42.25	40.02

1 From 1991 including eastern Germany.

Deutsche Bundesbank