Costs and benefits of vocational education and training at the microeconomic Level

Winand Kau

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COSTS AND BENEFITS OF VOCATIONAL EDUCATION AND TRAINING AT THE MICROECONOMIC LEVEL

Winand KAU (BIBB)

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1. INTRODUCTION

Society as a whole spends large amounts on education and training: the state and private organizations on schools and universities; employment authorities on retraining, further training and upgrading; enterprises on the initial and continuing training of their employees; private individuals on their own continuing training. This spending is an investment in the human capital of individuals and of the economy as a whole. The economics of education and training invariably focus explicitly or implicitly on the benefits, or rates of return, of these investments. The rate of return is the capitalized difference between cost and benefits.

This contribution looks only at the financial aspects of costs and benefits in vocational education and training. The economic costs are compared only with the economic benefits, although benefits also exist at the societal and cultural levels and are very important for the functioning of a community. Financial benefits are taken to encompass the microeconomic benefits accruing to enterprises and employees, as well as macroeconomic, or social, benefits.

Spending on education and training is intended to create a capable working population. The economic benefits are reaped in enterprises, practices and administrative bodies in conjunction with other production factors from the work performed by the vocationally qualified. The benefits can therefore be analysed at three levels. At the first level, they are expressed in growing labour productivity and rising profits (or falling losses). The second form of benefits accrues to the employees in the shape of higher wages and salaries, and the third to the state through revenues from taxes and duties, and lower expenditure on social security benefits. The range of costs and benefits can thus be examined in two dimensions which may be represented by the questions: "what benefits?" and "whose benefits?".

For enterprises, initial and continuing training are forms of personnel recruitment.[1] They are also the two parts of an investment in an enterprise's human resources. We can only speak of benefits if we know the costs of investments which aim to yield these benefits. Only very few accounting departments keep track of these costs. That would call for the separate accounting of human capital. The ability to manage human resources is closely associated with the standard of training accounts. And this in turn is conditional on an awareness of the complete breakdown of costs, yields and benefits associated with training. The focal problems of enterprise cost and benefit accounting have to do with the difficulties of drawing up balance sheets/bookkeeping on the benefits side. Balance sheet problems may mean that enterprises are unaware of the real value of their investment in human capital. If they concentrate in these circumstances on partial balance sheets and the short term rather than the long term, as they ought to, they are likely to make wrong decisions.

At the second cost-benefit level we find the working population. Their costs include in particular all forms of lost income and the immediate expenses incurred in the training process, including the cost of living. Pupils and students receive no or only a small income from their work. They themselves or third parties (parents, state) bear the direct costs associated with the pursuit of education and training. Trainees may receive a nominal payment which they earn, for the most part, through the productive work they do while training. It is instrumental for a personal cost-benefit analysis to distinguish between the various training paths, which are of course rather numerous. Examples:

a) School qualifications → no training → semiskilling → work
b) School qualifications → apprenticeship → skilled worker/skilled employee
c) Lower/intermediate secondary school qualifications → apprenticeship → master craftsman
d) University entrance qualifications → apprenticeship → additional training → occupation
e) University entrance qualifications → apprenticeship → higher education → executive position
f) University entrance qualifications → higher education → executive position

These examples illustrate that there are two ways of looking at the benefits of training. The first, which is marginal in one sense, answers the question of what benefits are to be obtained from

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[1] D. Sadowski: *Berufliche Bildung und betriebliches Bildungsbudget*, Stuttgart 1980, pp. 53 ff. Organisatie voor Strategisch Arbeidsmarktonderzoek (OSA): *Economic Returns of Education and Allocation of Labour. English Summary of the OSA-Report No 19*, The Hague, May 1994, pp. 1 ff.

adding a further stage to the training path already completed. The second is more typical and concerned with the incomes to be obtained from specific training routes. A comparison is made between the incomes attained at 30 years of age and those resulting from the next lower training path. This may be, for example, the benefits of an enterprise-based apprenticeship on the road to an academic qualification (path 6 compared with path 5). The additional income minus the costs of training produces (allowing for interest) the return on the training investment.

From a macroeconomic viewpoint, investments in education and training are, to a certain degree, investments in the infrastructure, and the return on such investments becomes apparent only in the long term. The concept of benefits also includes other aspects which need to be kept apart. It is helpful in the first instance to distinguish between the benefits resulting from the efficiency of the education system and its quantitative performance, on the one hand, and the benefits in terms of subsequent yields (economic growth, low unemployment, tax revenues) on the other. The efficiency benefit is the ability of the education and training system to train the younger generation in "suitable" institutions so as to minimize the costs of students repeating classes or dropping out of higher education and thus reduce excessively long education and training periods.

The benefits from vocational education and training are also associated with the allocative functions of the labour market. One function of vocational education and training is to ensure that the supply of labour matches demand. A training system should at least produce approximately those qualifications which are required on the labour market. There are therefore two sides to the benefits of investments in training. In formal terms, the benefit is the return on a long-term investment, but this return results from the allocative effects of the labour market. It would be an excessively narrow perspective if researchers were to look only at the return on investment in terms of human capital. And concentrating exclusively on the allocative aspects of the labour market would ignore the fact that education and training are an investment in themselves.

There is also a third aspect to consider. Return on investment calculations can normally encompass only the direct costs and benefits, i. e. the returns of the first type. But investments in education and training also have effects on other areas. There may be positive or negative effects of a second type. Positive (synergy) effects occur when investments in education and training at one point raise productivity at another. These include in particular education and training investments which equip their recipients to work in research and development. Negative secondary effects occur in the form of redundancies when lesser qualified employees are replaced by their more qualified counterparts.

2. COSTS AND BENEFITS TO ENTERPRISES

2.1 Theoretical foundation of initial and continuing training in German enterprises based on existing approaches to human capital theory

Figure 1 (p. 227)[2] depicts the neoclassical theory of investments as a basis for corporate growth. In a highly simplified form, the cause and effect relationships can be described as follows. Corporate growth depends:

- on personnel investments (recruitment, initial and continuing training);

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[2] The flowchart is produced by disaggregation of a diagram from the "new theory of endogeneous growth" by M. Graff: *Bildung und technischer Fortschritt als Determinanten wirtschaftlicher Entwicklung*; cited in M. Tessaring: *The Relationship between Education, Training, Employment and the Labour Market - Some Research Findings and Conclusions* p. 22. Cf. also P. Romer: "Endogenous Technological Change", *Journal of Political Economy*, 98/1990, pp. 297 ff. and G. Ballot, F. Fakhfakh, E. Taymaz: *Firms Human Capital, R&D and Performance: An International and Comparative Study*. Paper presented at the Maastricht Conference of the Applied Econometrics Association, 14 - 16 May 1997. On the last point cf. Section 4.7 ("A look at outstanding issues and conclusions").

- on net investments in equipment, buildings, participating interests, manufacturing capacity abroad;
- on innovations (introduction of new production processes including new forms of work organization, new products, distribution and marketing channels);
- and on investments in research, development and licences from other companies.

These investments become part of the production factors, i.e. they increase the human capital, the capital stock, the company's technical and organizational experience and expertise, and thus change capacity and efficiency. Production and capacity determine the utilization rate of capital assets and development of profits, which in turn help to fuel corporate growth.

Growth therefore depends, among other things, on the economic success of human capital investments, or on the difference between discounted cost and benefit flows. Costs in this conjunction mean the assessed consumption of corporate resources, and benefits the assessed yields, savings in opportunity costs and competitive edges resulting from higher productivity and rising efficiency. The last magnitude, however, cannot normally be quantified, since the efficiency of human resources also depends on a number of very complex factors which cannot be evaluated in monetary terms, although they are vital to the enterprise's survival. If they are to be quantifiable, effects which can be assessed must be matched with causes which can be determined and isolated. But this is not possible for many elements of training, such as most core skills.

Companies normally have a choice of three ways to cover their personnel requirements. They can look for skilled workers on the external labour market and give them induction training. They can train school-leavers in a recognized training occupation and employ them upon completion of training, or they can give continuing training to existing employees with a view to equipping them with the new skills required. The choice between these three alternatives, however, is never a true option, since there is basically only one decision to be made. Companies can choose whether they wish to train or not. If they do not provide initial training, they must look for skilled employees on the external labour market or else provide further training for existing employees. If we choose to explain personnel recruitment behaviour by means of human capital theory, we must answer the question of why there are companies which invest in training school-leavers although they have no property rights over the qualifications produced.

To illustrate what this question means in business terms, we shall introduce the terms gross costs, yields and net costs, which will be examined in greater detail in Section 3. The gross costs of in-company training are made up of personnel costs (for the trainees and trainers), calculated capital costs, costs of materials and administration, and other costs for teaching materials, protective clothing, fees payable to chambers, external courses, etc. Normally trainees are not just a cost factor for their enterprises. In the course of their training they generate returns through productive skilled or ancillary work, which have either a market or a calculated value. If the enterprise did not provide training, it would have to engage other personnel to perform this work. Since the trainees do not receive any extra payment for this work, but only the considerably lower (fixed) training remuneration, the returns are tantamount to indirect finance for the enterprise. However, the net costs (gross costs minus returns) are generally higher than zero, as will be explained below. The above question should therefore be understood as follows: Why are German companies prepared, positive net costs notwithstanding, to provide school-leavers with an average of three years' training which equips them to perform an occupation?

2.1.1 Becker's human capital model: the distinction between investments in training with a general market value and enterprise-specific training[3]

The present-day theory of corporate human capital draws on fundamental works by Schultz (1959), Mincer (1958, 1962) and particularly Becker (1962, 1975, 1983). In his model analysing on-the-job training, Becker distinguished between the general and the enterprise-specific usability of knowledge and skills. This model is based on personnel recruitment practices of US corporations, and we must examine closely which aspects can be applied to the German dual system.

According to Becker, generally applicable knowledge and skills have a market value because they can be used to increase production in many enterprises. The marginal product value from the additional employment of one skilled worker and the associated remuneration are, at least under neoclassical, or rather perfect, market conditions, identical in all enterprises. Under these highly specific conditions, enterprises derive no benefits from their training investments.

Enterprise-specific training contents, in contrast, are intimately associated with the workflows and qualification requirements of a certain enterprise and can be applied only in that enterprise. The investment in training is profitable for the enterprise for two reasons. Trainees contribute to the costs through the returns from their productive work and, second, the enterprise can pay the skilled workers on completion of training a wage below their marginal product value but above the income they could obtain elsewhere. Under these circumstances, the incentives for trainees and enterprise to part company at the end of training are low. If newly qualified skilled workers were to leave, they would lose their contribution to the training investment and their above-average wages. And the enterprise, by choosing to part with its newly qualified skilled workers, would be foregoing the difference between their marginal products and their wages.

The conclusions to be drawn from Becker's model are therefore quite straightforward: A rationally calculating entrepreneur will not be prepared to invest in training generally marketable skills unless the costs are borne by the trainees themselves in the form of sufficient returns. Training skills which can be applied only in the specific enterprise, however, is a rewarding investment since, upon completion of training, the skilled workers can be paid a wage below their marginal product value. The difference is the benefit accruing to the enterprise from the investment. The difference between the wage earned in the specific enterprise and that they would earn elsewhere is the benefit of the investment for the employees.

2.1.2 Applicability of Becker's model to the German dual system

Is in-company training under the dual system an investment in general or specific human capital? German literature on the subject often stresses the former aspect, arguing that enterprise-specific knowledge and skills play only a marginal role in training. The dual system, so the argument continues, is geared to a relatively small number of 364 recognized training occupations, often with high substitution potential, compared with a total of approx. 25 000 "adult" occupations (Kempf 1983, 1985; Lehne 1991).

This would certainly seem to be true with regard to the intentions of the German Vocational Training Act. The training ordinances which regulate the system have virtually the status of laws. They have a standardizing effect, apply throughout the country, and the examination requirements ensure that training is independent of regional, sectoral and enterprise-specific peculiarities. In order to achieve this, the training ordinances include skeleton curricula reflecting the substantive aspects of training occupations. These are not structured according to specific jobs or workplaces, but serve specific learning objectives. However, the training

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[3] Cf. in particular the fundamental work by D. Sadowski: *Berufliche Bildung und betriebliches Bildungsbudget*, Stuttgart 1980, pp. 9 ff. Cf. also H. Maier: *Bildungsökonomie*, Stuttgart 1994, pp. 43 ff. S. Grossmann and H.L. Meyer: *Kosten und Nutzen der betrieblichen Berufsausbildung, eine theoretische und empirische Analyse.* Dissertation, Hannover 1996, pp. 21 ff. The modelling of human capital theory below is based largely on the last-named study and the literature to which it refers.

ordinances are not 100 per cent binding. The skeleton training curriculum serves rather as a guideline. Enterprises can depart from the course schedule and the material covered in line with their own requirements, gearing training more closely to their own specific investments. They only need to ensure that trainees pass the examination. The learning objectives are minimum standards. Enterprises may not fall below them, but they certainly can rise above them.

However, the conclusions suggested by Becker's model are considerably at odds with empirical findings. German enterprises continue to provide training on a huge scale, although there is a general downward trend, particularly in small enterprises. All in all, i.e. including one-person enterprises, 23.7 per cent of companies provided training in 1995 (1990: 28.3 %). The reasons for this development are the structural decline in employment, particularly in craft trades.[4]

Proportion of training enterprises in %	1990	1995
Enterprises with 1 to 9 employees	21.4	16.9
with 10 to 49 employees	51.7	46.5
with 50 to 499 employees	73.6	67.6
with 500 or more employees	94.0	93.8

The proportion of trainees in the economy as a whole (= share of trainees in the workforce generally) currently stands at approx. 5 to 6 per cent (1990: 7 per cent). Almost two thirds of school-leavers in any year in Germany start their occupational life with craft trade, technical or commercial/administrative training. But a distinction needs to be made in this context at least between training in craft trade enterprises and that in big companies.

For many - if not all - craft trade enterprises trainees are a source of inexpensive labour (this is fiercely, but not convincingly, disputed by master craftsmen). Since training in the craft trades is provided at the workplace or in the context of actual orders, the returns are much higher than in large enterprises. Master craftsmen have every interest in minimizing training remuneration and the time spent at vocational school while maximizing the average period of training, because trainees become profit factors from the third year of training if not before. All these factors suggest that the returns are one, if not the only, motive for training in the craft trades. Craft trade enterprises are good examples of training in generally applicable skills. They become unwilling to offer training if the returns do not cover their costs.

Large enterprises, by contrast, mainly provide training in training workshops and in-company training centres. The training costs are quite considerable, and returns do no more than help to cut these costs. According to Becker's model, training in large enterprises must therefore be enterprise-specific training, although the generalizing intentions of the German Vocational Training Act apply here, too. How is this discrepancy to be understood?

2.1.3   Extension of Becker's model having regard for market imperfections

There are many different ways of resolving the incompatibility of theory and practice in training by large enterprises. One is a kind of aggregation effect which Becker and others have overlooked. Even if all training is "general" in Becker's terms, it is still worthwhile for the individual enterprise provided the likelihood of losing an employee to another enterprise on completion of training is no greater than that of gaining an employee who has been trained elsewhere. The question, however, is: how far must the dual system proliferate or penetrate the economy as a whole before this aggregation effect becomes noticeable at the individual enterprise level? There must be something like a "critical mass" of training enterprises if the system is to sustain itself. If all enterprises provide training, this condition is satisfied, but if only one does so, the likelihood of losing trainees is virtually 100 per cent. It may be that this "critical mass" has just been reached in Germany. Of the larger enterprises with around 500

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[4]   Cf. Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie: *Berufsbildungsbericht 1997*, Section 4.4, "Ausbildungsbeteiligung von Betrieben", pp. 136 ff.

or more employees, almost all provide training, while one in two craft trade enterprises continue to do so. It is mainly the very small (one-person) industrial enterprises which provide no training.

The second way of extending Becker's model is to omit the neoclassical assumption of perfect markets (Eckaus 1963, Oatey 1970). If employees are immobile and do not immediately take alternative employment where they can earn more elsewhere, training enterprises can pay lower wages than others, so that even generally marketable vocational training becomes profitable.

Enterprise training practices therefore depend not on factors associated with the marketability of the training provided, but on whether qualified employees have a higher or lower degree of mobility. The model has an explanatory value not to the extent that newly qualified trainees *can* leave the training enterprise in order to offer their qualifications for their own benefit elsewhere, but only to the extent and under what conditions they actually do so. If all trainees leave after the examination, the enterprise will discontinue training where it incurs positive net costs. If all of them stay, training will be a profitable investment whether general or not. General training in terms of course content is therefore not the same as general training in terms of mobility and marketability. Winterhager (1969) and Meyer (1977) take a similar view. They distinguish between market imperfections which are inherent in the system and imperfections resulting from entrepreneurial behaviour. The limited market rationality of enterprises and employees is an inherent constraint.

A market imperfection arises when enterprises do not know their own training costs. Training costs do not normally figure separately in corporate accounts. Relevant studies (von Bardeleben et al. 1995) indicate that only a small minority of companies have a complete picture of their training costs. Most are aware of the personnel costs of trainees and full-time trainers, and possibly the capital costs of their training workshop, but only very few make the effort to keep a record of personnel costs for part-time trainers and still fewer of training returns. It is a fact that enterprises have limited budgets for initial and continuing training and the available funds can only be spent once, either on training or on breaking down training costs in their bookkeeping. So enterprises provide training because they "have always done it" and because "it has proved worthwhile to train".

Excessive emphasis on the short-term quest for profits detracts from long-term planning and makes training costs and benefits still less calculable. Companies are increasingly less able to plan more or less reliably for the following year, let alone the year after that. This is associated, among other things, with the declining half-life of markets and with fashions, with the incalculable risks of technological change and the globalization of competition, e.g. due to the relocation of manufacturing operations abroad and - last but not least - with the emergence of just-in-time thinking. However, decisions on training investments are, by their nature, long-term. The human capital calculation suffers as the planning horizon is narrowed. Enterprises experience this as training insecurity. This may tempt them to look only at short-term profits, i.e. only the returns during the training period. The inevitable net costs then reinforce this trend to reduce the number of training places although, seen from a long-term perspective, it is a strategic error.

But there are also other forms of imperfection. Big companies in particular which have a public reputation to lose often cite their social responsibility as trainers of young people. They offer additional training places even when they do not need additional trained personnel.

Neither are the trainees themselves always rational. Questioned about their motives and behaviour (Herget 1994), they repeatedly reply that income is only one of several considerations. They also set great store by interesting and varied duties, independence in performing their work and opportunities for promotion within the enterprise. Young workers are very often prepared to accept lower wages than they could obtain elsewhere when they like the atmosphere at work, out of a sense of identification with their company, due to job security and the costs of looking for alternative employment, or because of the social and family frictions associated with a change of job. Other reasons which may persuade skilled

workers to remain with their training enterprise are contractual provisions on a minimum period of service, long-service bonuses, profit sharing and company pension schemes.

2.1.4   Extension of Becker's model having regard for saved opportunity costs

A major defect of Becker's approach to human capital is that he omitted to include saved opportunity costs in the benefits. Training enterprises save the costs which non-training enterprises have to invest in personnel recruitment (costs of looking for suitable employees, induction and continuing training costs). A theoretical model of the economic benefits of training investments to an enterprise is only complete if it includes opportunity returns, too.

The latest study by Franz and Soskice (1995) in particular stresses the specific nature of the German dual system. They reach three conclusions. First, it is profitable to teach specific knowledge and skills as part of an initial training programme where this is less expensive than the continuing training of new recruits who have already completed initial training. Section 3 below looks at empirical studies which confirm this is one distinguishing feature of the German training system. Second, the authors claim that, since general and specific skills are complementary, the former can be learned only in conjunction with the latter. Given the changes in work organization which occurred with the introduction of team production methods in which teams are wholly or partly autonomous in their responsibility for quality, their time input and continuing training, there are convincing examples (Kern/Schumann 1984, Schumann et al. 1994) to support this, too. These teams demand from skilled workers not only (general) occupation-specific competencies, but most notably mutlifunctionality, the ability to fit into a team, communicate and work independently.

These traits as such are core skills which extend beyond the boundaries of specific occupations. Although this seems to suggest they have a general market value, they are in fact qualifications embedded in a specific context. Core skills are brought out in a familiar and internalized communication context, which is highly specific. During the latest interviews conducted by the Federal Institute for Vocational Training (Kau et al. 1998) with major industrial enterprises and focusing on a suspected change in the training behaviour of large enterprises, it was repeatedly stated that the dual system is very useful for introducing team production in industry. High expectations were placed in the rationalization effect to be attained from manufacturing in teams. Respondents believed 60 to 80 per cent of production could be performed by teams, increasing labour productivity by up to 30 per cent.

Franz and Soskice (1995), as well as Sadowksi (1980) earlier, extended Becker's model by a third, institutional aspect. One of the major features of the German labour market is the high hurdle of protection against dismissal. After the end of the trial period, it is difficult and expensive for German enterprises to dismiss skilled workers they have engaged indefinitely. The labour courts provide a large body of case law, and except where dismissals occur for operational reasons, notably a decline in orders, enterprises have little chance of obtaining property rights from employment contracts. Recent attempts to introduce greater flexibility through legislative provisions on temporary contracts have provided some relief without changing the situation fundamentally.

From the viewpoint of the enterprise, the only way to avoid the disadvantages of an inflexible labour market is in-company training. The training market is absolutely flexible. Trainees conclude a training contract with an enterprise. There is no need for dismissal at the end of training. Trained workers can remain with their training enterprise only if it formally recruits them and gives them an employment contract.

This fact gives training enterprises a highly effective selection mechanism which is not available to those companies which provide no training. Young people can be moulded, and the enterprises have three to four years to test them inside and out. The enterprise recruits only those newly qualified workers whose skills and character promise good prospects. Non-training enterprises run a much higher risk of recruiting unsuitable personnel. It is therefore hardly surprising that many enterprises, particularly large ones, have made a virtue out of a

necessity and now supply all their own young recruits. For some years now, recruitment by such enterprises of staff trained in other enterprises has been the absolute exception.

The conclusion from what has been said above is quite clear. For larger companies, the German apprentice system is basically an investment in specific human capital. This is the only explanation for the empirical findings described in the next chapter. The qualifications obtained benefit other enterprises only if the training enterprise does not wish to take on previous trainees as part of its permanent workforce. At the same time, there are quite a number of young people who voluntarily leave their training enterprise because they wish to go on to higher education. However, training enterprises make a considerable effort to re-recruit them after graduation.

2.2 Results of empirical cost and benefit estimates for Germany

2.2.1 In-company vocational training

a)   Available data

Enterprise training costs in Germany are note a subject-matter of official statistics. They are established in infrequent surveys by the relevant research institutes. Five major surveys have been carried out to date:

- In 1971, the Expert Commission on Costs and Financing of Vocational Education and Training developed the first economic net cost model for in-company training and estimated the costs of training in industry, commerce and craft trades based on a statistically representative survey of enterprises (Sachverständigenkommission 1974). The net costs to enterprises were calculated by subtracting the training returns from the gross costs.

- Following the method employed in this standard work, two further cost estimates were drawn up in 1980, one by the Federal Institute for Vocational Training (BIBB) (Noll et al. 1980) and the other by the Institute of the German Economy (IW) (von Bardeleben et al. 1995, 1997; Kau 1994). They were based on separate representative surveys.

- Another poll (oral, 1500 enterprises, representative of training sectors in industry/commerce and craft trades in western Germany) was conducted in 1991 by BIBB, and three years later the figures were recalculated at constant structures based on the situation in 1991 and at constant 1995 prices.[5] The assumption of constancy was based on the experience that actual enterprise structures, such as the duration of vocational school and in-company instruction time, the productive working time of trainees in the enterprise and the time spent by part-time trainers instructing and supervising trainees change only slowly.

For various reasons, the different surveys are comparable only to a limited extent. However, Figure 2 (p. 228) gives a rough idea of the costs trend from 1971 to 1995.

b)   Breakdown of in-company training costs in industry, commerce and craft trades

b 1)   The cost model

The gross costs part of the corporate costs model (cf. Figure 3, p. 229) consists of
- personnel costs for trainees
- personnel costs for full, part-time and external trainers

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[5]   R. von Bardeleben et al.: "Betriebliche Kosten und Nutzen der Ausbildung (1991)." In: Bundesinstitut für Berufsbildung (ed.), *Berichte zur beruflichen Bildung*, No. 187, Berlin and Bonn 1995. W. Kau: "Kosten und Nutzen der betrieblichen Berufsausbildung - Ergebnisse der Sachverständigenanhörungen." In: *Berufsbildung in Wissenschaft und Praxis*, No. 3/1994, pp. 12 ff. R. von Bardeleben et al.: "Was kostet die betriebliche Ausbildung; Fortschreibung der Ergebnisse 1991 auf den Stand 1995." In: Bundesinstitut für Berufsbildung (ed.), Berichte zur beruflichen Bildung, No. 210, Berlin and Bonn 1997.

- capital and material costs
- and a number of other cost types.

A proportion of the gross costs are incurred regardless of whether or not an enterprise provides training. These include personnel costs for part-time trainers and pro rata costs of training administration (cf. grey-shaded boxes in Figure 3, p. 229). Part-time trainers are experienced skilled workers who have completed vocational training and perform their regular occupational duties at the enterprise while instructing trainees for brief periods whenever the need arises. The enterprise needs these skilled workers, even if it has no apprentices under contract. Therefore they entail almost no extra costs and are irrelevant for decision-making purposes.

Corporate accounts in the strict sense must include all costs incurred. The result is what is known as absorption costing (full cost accounting). If the cost elements which play no role in decision-making are omitted, we have partial cost accounting. Net costs can be calculated according to the full (absorption) or the partial costing method, depending on the approach to gross costs.

The benefits side of training is based on the value added work of trainees in production and commercial departments. This is weighed up against the costs which the enterprise would have incurred had it engaged employees on full pay instead of the trainees to perform the work. A distinction is drawn in this context between ancillary and skilled work. Three types of information are required to calculate the yield: first, the apprentice's productive working time in hours per year, subdivided according to ancillary and skilled work, calculated by subtracting the time the apprentice spends attending vocational school and receiving in-company instruction, e.g. in the training workshop, as well as holidays and days lost through illness, from the number of working hours stipulated in the training contract. Second, a measure of the apprentice's output on a progressive scale according to the year of training, and third, the costs of employing a trained skilled worker or an ancillary worker on full pay for the same periods. These three components produce the annual per capita returns on training. The calculated net training returns are subtracted from the aforementioned gross costs to establish the net costs.

b 2)   Survey results

Tables 1 and 2 (pp. 234-235) indicate the gross and net costs for 1991 (according to the full costing method) in industry/commerce (IC) and the craft trades (CT), while Tables 3 and 4 (pp. 236-237) give the results of a survey for selected industrial, commercial and craft trade occupations according to the partial and full costing methods.[6] The updated results for 1995 differ only in their absolute magnitude from the 1991 figures. They are, on average, 20 per cent higher. Since real structures were held constant, the proportions for the various items have changed only marginally.

According to the full costing method all forms of apprentice training entail positive net costs. The overall average (IC and CT) net training costs for 1991 were approx. DM 18 000 per capita and year. Assuming three years' training, this adds up to a grand total of approx. DM 54 000 (approx. DM 64 000 in 1995).[7]

The full net costs per capita and annum (1991) are more than 40 per cent higher in industry and commerce than in the craft trades, mainly due to higher personnel costs and lower returns. Only the craft trades reveal any considerable difference in the costs of training between technical and commercial occupations:

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[6]   The surveys have been carried out by the German Federal Institute for Vocational Training (BIBB).

[7]   Extrapolating these figures for the economy as a whole, which is possible only with severe limitations since industry, commerce and the craft trades are not entirely representative of enterprise training throughout Germany, we arrive at a grand total of approx. DM 30 billion for 1991. This represents approx. 1.9 per cent of all gross wages and salaries.

Average for all occupations   DM 20 509 (IC) versus DM 12 352 (CT)
Technical occupations   DM 20 479 (IC) versus DM 13 298 (CT)
Commercial occupations   DM 20 524 (IC) versus DM   7 436 (CT)

A completely different picture emerges when we look at partial costing. As explained above, most enterprises regard only the partial costs as a strain on their budgets. The remaining costs are incurred regardless whether training is provided or not. Variable costs are therefore the "sore point" when it comes to taking decisions on training. Tables 3 and 4 (pp. 236-237)give the training costs for selected industrial, commercial and craft trades occupations according both to the full costing and the partial costing methods.

The most interesting point is that the net partial costs in the crafts trades are mostly negative, or in other words training is a source of net revenues for craft trade enterprises. This explains, (1) why there is such a high proportion of apprentices in the craft trades, averaging 6 to 8 per cent of the total workforce in these sectors, (2) why craft trade enterprises retain a smaller share of apprentices than many industrial enterprises on completion of training, and (3) why training patterns in the craft trades run counter to economic cycles: the willingness of craft trade enterprises to provide training tends at least to rise in a recession and to fall in a boom.

Industry and commerce incur positive net costs, even considering only partial costs, and there are sometimes major differences between industrial and commercial occupations. In this conjunction, we must ask why enterprises are prepared to shoulder these costs. There may be any number of reasons. Some of them were examined when we looked at imperfect training markets in Sections 2.1.3 and 2.1.4. Other, and possibly more substantial, reasons are associated with the technical difficulties encountered in keeping track of costs and benefits. Apart from the actual returns which apprentices generate during training, there are a large number of benefits which are not felt until training is completed and the newly qualified skilled workers join the permanent workforce. However, the majority of these are so intricately associated with operational flows that they can be identified only in terms of quality. They do not figure in the books and cannot be measured in terms of value.

A case study of a major German industrial corporation carried out in 1991 revealed a substantial benefit factor which aroused considerable interest among German vocational training researchers (Cramer/Müller 1994; Müller 1996). In-house accounts were used for the first time to identify opportunity returns in the form of saved personnel procurement costs. These are the costs which non-training enterprises incur in recruiting skilled workers from the labour market and providing induction and continuing training for the new recruits. Training enterprises do not incur these costs. Since the industrial corporation in question both trains its own staff and recruits pretrained employees, the opportunity returns could be calculated directly from the corporate accounts. The study sought to analyse:

- the personnel recruitment costs per employee (advertising costs, time lost in preparing for, holding and assessing interviews, costs of administering and processing applications)
- additional wage costs incurred in persuading skilled workers to move from other companies (currently irrelevant due to high unemployment)
- costs of induction training, which do not arise or are lower for employees trained in-house
- continuing training costs (payment of wages for lost working time, seminar fees, expenses) for knowledge and skills already acquired by employees trained in-house.

The total value of these opportunity returns was up to DM 23 000 both for commercial and technical occupations in this industrial corporation. This covers only part of the full net costs incurred in three years of apprentice training, and the proportion is higher in commercial than in technical occupations since technology and equipment costs are higher in the latter sector. However, there are a number of other benefits of major strategic importance which generate savings that cannot be quantified.

Training is used as a means of selection with a view to developing a capable body of skilled workers. Companies engage permanently only those former apprentices who are likely to perform well, have the personality to fit in with the other employees at the enterprise and, in all probability, will identify with their company, thus keeping down staff turnover costs. The risk of an erroneous recruitment is considerably higher when employees are hired from outside. Enterprises get to know their apprentices better during training than they do outside recruits in the trial period.

It is easier to redeploy staff for technical and organizational reasons and to have them stand in for fellow workers who are on holiday or sick leave if they are familiar with the enterprise from their training. Training is very important for a company's image and its public reputation. Enterprises with a training record have an additional selling point and can make their presence felt more effectively at least on the regional labour market.

All the above points assume that an enterprise which does not provide training can readily find suitable new recruits on the labour market. This may well be true at times of high unemployment, but it is unlikely to apply in the long term. Whenever the economy shows an upward trend, it eventually reaches a point where the rise in output is limited by a shortage of manpower and delivery times are delayed. Continuous corporate investment in training provides an effective medium-term personnel planning instrument. However, it is completely impossible to assess those personnel planning benefits. Training enterprises are slower to suffer from shortages on the supply side of the labour market, and the impact is cushioned. The opportunity benefits may be many times higher than the training costs.

One of the focal problems of cost and benefit accounting for training decisions is the difficulty of drawing up balance sheets. This generally means that most enterprises are not aware of the true returns on their training investment or only have a rough idea at best. If they choose to concentrate under these circumstances on partial balance sheets and short-term considerations rather than the longer term, as they ought to, they are likely to make misguided decisions.

A second cost and benefit problem is that most enterprises do not treat apprentice training as a business investment. Training costs are not itemized in an accounting subsystem such as a separate human capital account, but are depreciated in full in the year they arise, just like wages/salaries, consumption of materials and energy. If training were considered an investment, cost and benefit flows would be set against each other for a longer period as a basis for establishing depreciation rates. Enterprises choose not to do this because the temptation of immediate write-offs is too great.

Bearing these problems in mind, BIBB has decided to focus its future research into the economics of training on measuring the corporate benefits and, implicitly, on the conduct of accounts and auditing in the training field. BIBB will probably carry out the next cost surveys in the year 2000. The approach adopted by the "Commission of Experts", which originates from the seventies, is no longer sufficient for the poll of enterprises which this will involve. Answers need to be found to methodological issues involved in recording the benefits.

2.2.2   *Costs and benefits of continuing training to enterprises*

a)   Cost model

Enterprises do not normally apply the strict business definition (= costed consumption of goods and services incurred in generating products) in connection with their training budgets. They tend instead to refer to costs when it is a question of charges or expenditure. It hardly needs to be stated that calculated costs exist which cannot be matched with any direct charge or investment. They take on the status of costs only when they become a depreciation factor. This blurring of terms simplifies day-to-day bookkeeping. It is acceptable to the extent that "continuing training costs", construed in this way, are used as a basis not

for calculating prices and supply, but for training auditing and human capital accounting. Both are corporate and strategic management tools when assessing targets and performance.

The figures below are based on a continuing training survey (Weiß 1996) by the Institute of German Economy (IW) in 1993 for the industrial, commercial and craft trade sectors (written survey of 1450 enterprises representative of Germany as a whole). It follows on from similar surveys performed by the IW in the seventies and eighties. The survey looked at a broad package of cost types:

- costs of full and part-time continuing trainers

- costs of in-house and outside seminars

- costs of retraining

- costs of in-house and outside information events

- other costs, such as donations, payments to continuing training centres, grants

A distinction was drawn between direct and indirect (calculated) costs. While direct costs encompass all spending on personnel and materials in immediate conjunction with continuing training, indirect costs are the costs of wages for employees while they attend continuing training sessions. They are an indicator of the value of the work lost to the enterprise. They are calculated costs unmatched by any outlay. Since they do not make any additional demands on the continuing training budget, they are comparable with the personnel costs for part-time trainers of apprentices which, while not having any influence on decision-making, have led to a distinction being made between full cost and partial cost accounting.

Apart from indirect costs, there are also the calculated costs of learning in a work situation and the calculated costs of self-regulated learning. In both cases, it was assumed that the enterprise and employees share the costs. It was assumed for learning in a work situation that the productive work performed in this situation reduces the costs by half. It was likewise assumed that half of the time spent on self-regulated learning falls within non-working hours, halving the costs here, too. Both assumptions are arbitrary and without empirical foundation.

The problem with enquiries of this nature is that enterprises keep only fragmentary continuing training records. In the latest European continuing training survey (see below), only one in twenty enterprises had computerized records of continuing training events. Since many enterprises have to sift through large volumes of paper even to establish the attendance at continuing training sessions, such surveys often encounter considerable resistance. And that is not all. One of the problems encountered in surveys of initial training costs recurs with regard to the costs incurred in continuing training, too. The expenses involved do not feature as a separate part of company accounts, but are concealed in many other items, so that even most big companies can only provide estimates, with the risk of omitting certain items.

b)   Results of the IW continuing training surveys

Table 5 (p. 238) looks at five different indicators of the costs listed above:
- costs per programme/event
- costs per employee
- costs per participant
- costs per participant-hour
- costs as a percentage of the gross wage and salary bill.

Not only the different indicators given in Table 5 (p. 238) are of interest, but also the continuing training costs per enterprise. The direct costs, including full and part-time trainers, were approx. DM 1210. The indirect costs of wages for employees in continuing training and retraining, of on-the-job training and self-regulated learning amounted to approx. DM 1640. This means that each enterprise spent a total of DM 2850 on the continuing training of its staff.

In the IW study, Weiss noted that there were some problems in extrapolating the results of the survey for the economy as a whole given incalculable errors in recording the costs in the enterprises. Another problem of a methodological nature is that unavailable information often has to be substituted by assumptions which cannot be verified. The IW went ahead with the extrapolation nonetheless, believing that it gave at least a rough idea of the sums involved. Bearing in mind this qualification, it arrived at enterprise continuing training costs of approx. DM 36.5 billion throughout the economy as a whole. In-house and external training sessions accounted for about half, on-the-job training for 25 per cent and the cost of continuing trainers for 10 per cent of the total.

The statistical risks involved in surveys of enterprise continuing training become quite clear if we compare the IW survey with the German section of the three-stage FORCE survey of 1993/94. It consisted of a preliminary written survey in late 1993 (9300 enterprises), the main written survey by the Federal Statistical Office together with the Federal Institute for Vocational Training in 1994 (4100 enterprises) and a follow-up oral survey in 1995 (500 enterprises). The costs were recorded only for enterprise continuing training in the narrow sense (courses and seminars) in companies with 10 or more employees. Extrapolating the results for Germany as a whole produced continuing training costs just in excess of DM 9 billion. Grünewald/Moraal (1995) employed heuristic assumptions to estimate the costs of continuing training in enterprises not covered by the survey. They arrived at an additional sum of approx. DM 8 billion. This makes a grand total of DM 17 billion. The IW survey put this total at just under DM 23 billion.

The differences are too great to be tolerable. On the surface, they are associated with the different definitions, distinctions and models, with the pros and cons of various accounting methods. However, the "invisible" comparability problems are more serious. They include the consequences of extreme non-response rates and systematic errors of all kinds where enterprises seek to make up for a lack of information with estimates and even inventions. And finally they include the uncontrollable risks of errors being potentiated as they are carried forward from one stage to the next. The extrapolation process runs the risk not just of random errors. It is, at best, a rough estimate based on rough estimates and, at worst, on unfounded assumptions. To this extent, any attempts, however well-meant, to estimate on the strength of the existing information on continuing training costs in the sectors not covered by the IW survey in 1993 and in this way to arrive at an estimation for the economy as a whole, are highly questionable (von Bardeleben/Sauter 1995).[8]

Continuing training researchers need to ask themselves where to proceed from here. Statistical surveys are clearly the wrong way. It would be better to ignore the "law of big numbers", which is very deceptive here, and to make an attempt at qualitative analyses based on prototype case studies in enterprises which are willing to cooperate. Of course, these figures cannot be extrapolated. In 1998, BIBB will launch a research project looking at the practical handling of continuing training audits. The aim is to develop guidelines for enterprises wishing to introduce detailed accounts for continuing training. Training auditing is in principle a process-related management tool with a systematized sequence of comparisons between targets and actual performance, starting at the level where continuing training is planned and extending to efforts to ensure the transfer of expertise gained in continuing training to the workplace. To apply this instrument, we must first know the investments in human capital, or in other words, the costs invested in continuing training. The enterprises involved will therefore need not only to implement suitable auditing procedures. They will also need to acquire the knowledge and skills (i.e. the expertise) for keeping track of their business data.

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[8] In addition to the DM 36.5 billion established by IW, agriculture, the liberal professions and voluntary organizations accounted for a further DM 6.7 billion. Spending by local authorities amounted to DM 9.3 billion, that by the Federal Labour Office to DM 21 billion and spending by private individuals (cf. Section 3.3) to DM 9.8 billion. The total of DM 83.3 billion rises by a further DM 36 billion if we place a value on the leisure time lost (!) as a result of individual continuing training.

3. COSTS AND BENEFITS OF INITIAL AND CONTINUING TRAINING FOR THE WORKFORCE IN GERMANY

3.1 Costs and benefits of dual training to apprentices at the first and second thresholds

Due to the expansion in education and training over the past 25 years, an average of about 14 per cent of young west Germans of one age group do not complete vocational training. In 1993, some 38 per cent of 60-year-olds had not completed vocational training. The corresponding figure for 50-year-olds was 23 per cent, for 40-year-olds 15 per cent, and for 30-year-olds 14 per cent (Pfeiffer 1996; Bellmann und Tessaring 1994). This proportion is likely to have fallen slightly in the meantime. If we assume that some 5 per cent of the up-and-coming generation cannot be trained because they lack the talent and/or for behavioural reasons, 14 per cent is a good performance level even by international standards. Experience suggests that the dropout rate is stable and fluctuates within narrow limits. In times of economic difficulties it is higher, and when the economy picks up it is lower. The reasons are, first, that no (formal) requirements exist for admission to in-company vocational training. Second, it is an attractive proposition for youngsters who have grown tired of school, not least because apprentices are now paid around DM 1000 per month, money which those who stay on at school do not have. And third, vocational training provides the basis for a relatively secure career.

Beginning in 1984, BIBB carried out a number of longitudinal studies covering over a period of ten years the occupational destinies of young people who had completed training under the dual system (cf. Schöngen (ed.) 1994, and the literature referred to there). Figs. 4-6 give an idea of their employment situations in the first five years of their working life. The results may be summed up as follows:

- Immediately upon completion of training, approx. 70 per cent work in the occupation they have learned. Approx. 10 per cent work in a different occupation. A further 8 per cent continue their education at school or university. The remaining 12 per cent do not figure among the employed population. They are either looking for work or - the males among them - have been called up to do their military or alternative service.

- Five years after completion of training, the number remaining in the occupation for which they have trained has basically stabilized. Approx. 54 per cent are employed in the occupation they learned, 20 per cent have moved on to other occupations, some 18 per cent are still students. Only around 8 per cent are unemployed.

According to the joint enquiries of the working population carried out approx. every six years (1979, 1985/86, 1991/92) by BIBB and IAB, two thirds of those with completed vocational training surveyed in 1979 said they could use in their jobs "a great deal/rather a lot" of the knowledge and skills they had acquired in training (48 per cent "a great deal" and 19 per cent "rather a lot"). Around 14 per cent answered "some things" and approx. 20 per cent "very little/little/nothing at all". The response pattern remained more or less unchanged up to 1985/86. In 1991/92, however, it changed markedly. The proportion who answered "a great deal" fell by 13 percentage points to 35 per cent, while "quite a lot" was the answer chosen by 23 per cent, 4 percentage points higher than in 1979. The proportion of respondents in these two categories together therefore declined from 66 to 58 per cent. The other figures for 1991/92 were

some things	20 per cent
very little/little/nothing at all	22 per cent

The usability of vocational training declines with growing occupational experience, as shown by polynomial logit models in the ZEW study of 1996 (Pfeiffer 1996). However, this loss of usability and relevance accelerated markedly in the period up to 1992. The major reasons are technological change and particularly the spread of microelectronics, on the one hand, and a growth in retraining and career changes together with escalating unemployment, on the other.

If ultimately only 50 per cent of young people completing training within the dual system remain in the occupation they have learned, this could mean that training the other 50 per cent was a wasted investment or has led to "overeducation". The ZEW figures cited above corroborate this only to a certain extent. As many as 20 per cent of respondents who had completed vocational training said they could use "some things" while only just above one fifth felt their training had been in vain.

This last group is likely to consist, firstly, of young people who have taken up semi-skilled employment. It also includes, secondly, persons who have moved on to higher education after completing their apprenticeships and, thirdly, employees who have been retrained or (temporarily) discontinued their employment for family reasons.[9]

However, there is a reverse side to in-company vocational training for the trainees. The provision of apprenticeship training by enterprises depends on business cycles and growth (Kau 1990). At times of rising employment the demand for trainees grows, and it falls when employment declines. Given that the situation on the labour market has become very strained since 1992 due to redundancies caused by productivity and structural change, not only has the provision of apprenticeship training places fallen. In addition, enterprises are less prepared to retain the apprentices they have trained. This can be seen first and foremost from the number of people who become unemployed after passing their final examination. While 13 per cent of newly qualified skilled workers were jobless in 1991 and 1992, this increased to 18 per cent in 1993, 20 per cent in 1994, 23 per cent in 1995 and is still continuing to rise (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF) 1997). But this figure includes many jobseekers who remain unemployed only for a few months.

For this reason, the average annual unemployment rate for young people below 20 is much lower. In the years from 1990 to 1992, it fluctuated between 4 and 5 per cent, rising to 6.4 per cent in 1993, 7.3 per cent in 1994 and 8.0 per cent in 1995 (Bundesanstalt für Arbeit 1996). However, these figures have to be compared with youth unemployment in other EU Member States.[10] In some Member States, the proportion of jobless young people was several times higher than in Germany. By far the greatest benefit of the dual system is therefore that it reduces the risk of unemployment.

3.2 Vocational qualifications, occupational experience and earnings

In a recent study (Pfeiffer 1996) based on its own random samples from the 1991 microcensus, ZEW looked at the factors influencing individual earnings at the three levels of qualification: no completed vocational training, apprentice training and university degree.[11] The following explanatory factors were incorporated in polynomial logit models and extended "Mincer-type" human capital equations:

- school education and initial vocational training
- technological and economic change
- trade union influence on wages and salaries
- investments in formal continuing training
- occupational experience as an indicator of informal continuing training.

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[9] However, the fact of having internalized basic working virtues during apprentice training is what opens the door to semi-skilled employment in many cases. This is a major positive factor given rising unemployment. For people proceeding to higher education, an apprenticeship can be very useful if they wish to return to their training enterprise at a later date. For anyone who has trained for one occupation, it is relatively easy to retrain for another. The benefit of an apprenticeship in this case is that it saves time. Even young mothers find it easier to return to working life if they have completed apprentice training.

[10] Graph in Tessaring (1997) p. 35.

[11] Cf. also the IAB 1994 study by Bellmann and Tessaring, pp. 13 ff.

Occupational experience had the greatest influence by far in all three earnings equations. Figure 5 (p. 231) shows estimated net earnings as a function of occupational experience in conjunction with the highest vocational qualification. The dependent variable is the net monthly earnings of married men employed in particularly innovative branches of manufacturing trade, with up to 30 years' occupational experience and employment as their main source of income.[12]

Steep initial increases in net earnings give way to flat curves after about 10 years. The reason for this flattening out is falling investment in human capital as retirement draws closer, which leads to a levelling process. The curves were interpreted as follows:

- Initial earnings are lowest for persons with no vocational qualifications. Subsequently net incomes rise steeply as a result of trade union policy, which attached priority to high minimum wages for many years. After about ten years, net incomes in the group without qualifications have risen by about 300 per cent, but remain constant thereafter. Rises in incomes after ten years in employment are subject to narrow constraints since investments in human capital through continuing training are relatively low. This may be attributable to the behaviour of the group of persons in question, or to restricted access.

- The initial earnings of employees with apprentice qualifications lie between the top and bottom groups but are closer to the group with higher qualifications. They are more than 100 per cent higher than the initial earnings of the group without vocational qualifications and double in the space of thirty years. Rises in income are slowest at the initial stage. After about ten years, average incomes are almost identical with those of the group without vocational qualifications. But while the earnings of the latter subsequently stagnate, those of the former group continue to rise up to the 30th year of employment due to better continuing training opportunities. At the end of their working lives, employees who have completed apprenticeship training earn just under 20 per cent more than those without vocational qualifications.

- There is therefore no great difference between the income curves for persons without vocational qualifications and for those with apprentice training. The interval between them is a measure of the difference in lifetime incomes. This finding may be one reason why skilled workers often feel it does not pay to remain in the occupation for which they were trained, which would be a plausible explanation why only 50 per cent choose to do so, as described above.

- The earnings curve for university graduates also flattens out. The curve begins close to the final earnings of the group who have completed apprenticeship training and ultimately rises to two-and-a-half times that amount. The flattening of the curve is less pronounced than for the other groups, so that the earnings gap continues to grow in the latter stages of occupational life.

Formal school qualifications boost the earnings of employees who have not completed vocational training. The same is true to a certain extent for those in the intermediate group: employees who have completed an apprenticeship and also hold intermediate secondary school, specialized upper secondary school or university entrance qualifications earned significantly more than lower secondary school-leavers with apprentice training. On the other hand, there are subject-specific income differences among graduates of specialized colleges of higher education and universities, which can be summed up *cum grano salis* as: Graduates in commercial disciplines are better paid than those in engineering/sciences, and engineering/science graduates better than graduates in arts, culture and education.

The other factors influencing earnings likewise have different effects at the different qualification levels. Trade union influence on wage levels (see above), the impacts of

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[12]   Though the results of the study refer to the *Land* of Baden-Württemberg, they differ very little from the figures for western Germany as a whole.

economic growth and of investments in continuing training are greatest in percentage terms in the lowest income group. They still play a significant, though much less pronounced, role for employees who have completed apprenticeship training. As might be expected, trade union influences cease to have any tangible influence on the earnings of the group with the highest qualifications. In contrast to the intermediate and the lowest group, continuing training of graduates evidently does not increase human capital to any appreciable extent. Continuing training for academics serves mainly to maintain the existing level of human capital. It is a reinvestment rather than a net investment in the growth of human capital. There is also a positive correlation between extra earnings in innovative and fast-growing sectors, on the one hand, and the qualification level of employees, on the other. This may be considered a sign that technological change results in a demand for higher qualifications on the employment market.

A 1994 IAB study (Bellmann and Tessaring) drew on twelve cross-sectional models of earnings variables, expressed in logarithmic form, for the years from 1976 to 1987. These are of particular interest for our present purposes. Based on the ordinary least squares (OLS) method, two forms of model were employed in each case. The first, known as a schooling model, rests on three explanatory variables: a standardized school and training time variable (S), a variable for occupational experience (B = age   S   6) and, due to the concavity of the earnings curve (see above), the square of occupational experience, which serves as a kind of correction factor.

$$\ln Y = b_0 + b_1 S + b_2 B + b_3 B^2 + u$$

The theoretical coefficients b_1 and b_2 are positive, while the non-linear term is negative. The training variable S is specified as follows:

- without qualifications = 10.0 (years)
- university entrance qualifications only (Abitur) = 13.0
- apprenticeship without university entrance qual. = 12.125
- apprenticeship plus university entrance qual. = 15.125
- specialized college of higher education degree = 15.0
- university degree = 18.0

Table 6 (p. 239) gives the coefficient estimates, the correlation coefficient (R^2), the standard error (SE) and the respective sample sizes in 12 regression models. The semi-logarithmic estimate approach has the advantage that the coefficients can be interpreted directly as returns on education and training. According to this approach, the rate of return on each additional school/training year varies between 5.7 and 6.1 per cent, and on each additional year of occupational experience between 1.8 and 2.1 per cent, not counting the negative correction factor. The authors point out (p. 50) that the respective returns on schooling are below previous estimates in some cases and in their vicinity in others (Clement and Weißhuhn 1982; Gerlach 1987).

The problem with these earnings functions is the low correlation coefficient. Given the sizeable sample, the coefficients are of course highly significant. Taking all years together, however, just 32 per cent of the spread in the dependent variables is explained by the aggregate spread in the independent variables. We must ask whether the remaining standard error is really that high and the indeterminable residue really accounts for 68 per cent of the sample, or whether there are not other important determining factors which have been omitted from the model. For this purpose, we would need to take a closer look at the properties of the estimated residues. We might consider distinguishing between vocational fields (trade/technical, commercial/administrative occupations, or industry versus craft trade occupations). Other distinctions could be drawn between slow and fast growing sectors, between urban and rural regions, and between enterprises in different size categories.

The second approach is a dummy variable model in which the earnings variable otherwise remains unchanged. The two magnitudes describing the influence of occupational experience are constant. The S variable is subdivided into five 0-1 variables, depending on

the training path (D_1 = apprentice training without university entrance qualifications, D_2 = apprenticeship training with university entrance qualifications, D_3 = university entrance qualifications only, D_4 = specialized college of higher education degree, D_5 = university degree). If the person in question belongs to one of these five groups, the relevant variable is given the dummy value 1 (for "yes") or, if not, the dummy value 0 (for "no").[13] However, it follows from the results given in the IAB study that the introduction of additional explanatory factors (seven compared with three) does not bring any improvements in the R^2 or the standard error over the schooling model, so that the latter is actually preferable for econometric reasons.

The earnings differentials calculated from the dummy variable model are likewise a measure of the returns per additional training year. The added returns of an apprenticeship as compared with no qualifications are put at an average 7.2 per cent. They remained constant between 1976 and 1987, unlike those for academic training paths. The additional returns of a degree obtained from a specialized college of higher education as compared with apprentice training alone rose from 8.5 per cent (1976) to 10.3 per cent (1987). Similar increases were also found for university graduates, although the absolute returns were inexplicably halved compared with those obtained by graduates from specialized colleges of higher education (1976: 3.9 per cent; 1987 4.9 per cent).

The findings from the models therefore illustrate two points. Dual training is a beneficial investment for employees, too. However, the extent of these benefits is falling increasingly short of those obtained from higher education training paths. The earnings of employees with longer training periods rise significantly faster than those of employees with shorter training periods. To this extent, the perspectives of the ZEW and IAB studies are comparable, although the approaches and methods are very different.

3.3 Individual costs and individual benefits of continuing vocational training[14]

In Section 2.2.2 we examined the costs and benefits of continuing training to enterprises. The findings described there should not give the impression that private individuals do not finance any continuing training investments of their own. Individuals in Germany often show an acute interest in their own career development. This is reflected in their spending and above all in the leisure time they devote to continuing training.

The scale of continuing training undertaken by private individuals has been well documented in regular representative statistical surveys carried out every three years since 1979 as part of the Continuing Training Reporting System (Kuwan 1996)[15]. However, information on the money spent and time invested is rather fragmentary. Initial attempts to confront this issue were made in the late seventies and early eighties (Müller/Schradin 1985). To gauge the burden of costs incurred in self-financed continuing training, BIBB asked private individuals about their continuing training expenses for the first time in interviews covering 1992. It goes without saying that benefits are a major motivating factor in this context. The willingness of private individuals to invest money and leisure time ultimately depends on the benefits they expect to reap from their efforts.

The study was based on a definition of continuing training which encompasses courses and seminars both at special training institutions and in-company as well as less formal and purely informal types of continuing training. The latter category includes:

- induction training at the workplace and other in-company programmes designed to promote skills;
- technical school training, distance learning, distance study;

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[13] The equation used to obtain the estimate was $\ln Y = c_0 + c_1 D_1 + \ldots + c_5 D_5 + c_6 B + c_7 B^2 + v$

[14] Cf. for the following: von Bardeleben et al 1996

[15] The report contains a complete review of all six surveys conducted since 1979.

- courses on television and radio, self-organized learning with textbooks, video and audiocassettes;
- attendance at lectures, conferences and trade fairs.

There are numerous ways in which expenses may be refunded for training outside the workplace (refunding), e.g. by employers and employment offices. These refunds are deducted from individual expenses in the costs model (cf. Figure 6, p. 232). The survey aimed, first, to establish the direct costs, i.e. expenses directly associated with the continuing training measure as such (course and event fees, spending on learning materials, travelling expenses, board and lodging, cost of child care where applicable, and all other costs directly associated with participation in continuing training programmes). The survey also looked at indirect, or opportunity, costs. Unlike direct costs, indirect costs entail no expenses, but arise in the form of lost earnings (e.g. unpaid leave or reduced working hours for continuing training purposes, but not the hypothetical earnings of someone who was previously unemployed) and the loss of leisure time. The leisure time lost consists of that time spent exploring the market, the time invested in the actual training programme, travelling time, preparation and follow-up and, in some cases, paid leave.

However, the yardsticks used to convert the loss of leisure time into fictitious costs are ultimately based entirely on random decisions. Even the net income earned from employment, which would be a plausible choice, does not provide a suitable measure here. Either the individual may not consider taking paid employment during leisure time - unless it is moonlighting - or may regard it as a consumer good rather than a loss of leisure time. For this reason, the BIBB survey was limited to recording the amount of leisure time lost and no attempt was made to place a monetary value on it.

Neither was it possible to apply any rules for evaluating the benefits. While it is quite clear that the "profitability" of continuing training is determined by the benefits, the input encompasses not only the time and money invested, but also the physical and mental exertion associated with learning. Private individuals, just like companies, are willing to subject themselves to continuing training only if it yields overall "rewards". But these rewards depend on whether the training is a consumer good and the benefits are to be found in actual consumption, or whether it has been chosen for career, i.e. economic, reasons.

Economic benefits may arise in many different ways: continuing training may serve to refresh knowledge, to adjust to new developments, to secure promotion and raise status, or else to avoid unemployment. Another consideration is that the benefits are normally not yet visible at the actual time of training. Those who opt for continuing training *hope* it will secure them promotion or save them from unemployment. Whether these objectives are actually attained emerges at a later stage. It is therefore objectively impossible to isolate the economic benefits of continuing training from other benefit factors. For this reason the survey was limited to presenting the respondents with a list of benefits and asking them to rate their importance in qualitative terms.

In 1992, the employees questioned spent an average of 225 hours outside working time on their personal continuing training. There were huge differences between individual inputs, as might be expected. In western Germany, just over 22 per cent of the sample polled invested more than the average of 225 hours, compared with approx. 50 per cent in eastern Germany. Figure 7 (p. 233) provides an overview of the estimated costs. The average costs per capita were DM 1427 in the west and DM 1928 in the east. After deducting the refunded expenses, the individual financial burden of continuing training was DM 1053 and DM 848, respectively. If we extrapolate these figures for Germany as a whole, this produces an estimated total of DM 9.8 billion, including DM 7.7 for western Germany and DM 2.1 billion for eastern Germany. Figs. 11 and 12 look at how the sample in the survey assessed the benefits and how far they believed they had attained their objectives.

4. PRIORITIES OF TRAINING COST AND BENEFITS RESEARCH IN OTHER COUNTRIES

4.1 Preliminary remarks

In-company training is essentially the main alternative to school training. In countries with a shortage of skilled labour, the ideal solution would often be to intensify in-company training. At least, this would make it easier to bring the results of training processes into line with the qualifications required by enterprises. However, enterprises are often deterred by the (perceived) costs. An obvious consequence, particularly in countries with a tradition of school-based training, would be to analyse the costs and benefits to enterprises. Paradoxically, this practice is rare. Interest focuses on the benefits accruing to holders of qualifications. It would go beyond the scope of the present study to examine each EU Member State separately. The objective must be to take specific examples and to describe how these countries approach cost and benefit analyses.

While German cost-benefit research attaches major importance to the results obtained from representative empirical surveys of enterprises and private individuals, other EU Member States concentrate more on modelling the monetary benefits for the holders of qualifications and, building on these, on (econometric) estimates of the returns on training investments.

This different perspective is, of course, associated with the institutions which dominate the education and training systems in these countries. They are rooted in tradition and culture, and embody structures which have developed in the course of history. Enterprise-based training systems in which state-recognized occupations are trained throughout the country exist only in Germany and Austria and, to a lesser degree, in Denmark and the Netherlands. Having largely ignored the vocational training of its labour force for many years and considered the teaching of skills outside the higher education system a training responsibility for employers, since 1986 the United Kingdom has switched on a grand scale to a modular training system in which the module contents make no distinction between different addressees or between initial and continuing training.

France operates a more or less rudimentary apprenticeship training system where trainees learn basic vocational skills in an extension of semiskilling, and a system of vocational schools (lycées). Initial and continuing training are financed through a stringently regulated system. School-based training systems are dominant in the other Latin countries, notably Italy. The previous distinctions between school-based training, occupational work and continuing training are becoming increasingly blurred in Spain.

If we are to illustrate the cost and benefit issues of initial and continuing training in the EU Member States and the relevant research requirements in a manner which is accessible to outsiders, we would really have to begin by describing the national institutions. But this would go beyond the terms of reference of this study. Furthermore, it is very difficult for people from other countries to appreciate the significance of national institutions and approaches without direct exposure to them. The points made below concentrate on what is realistically possible, looking at current issues confronting each of the selected Member States, taking up interesting approaches to research, new methods and models with a view to revealing certain prototypes.

4.2 Austria[16]

The basic features of the Austrian training system are similar to that in Germany. However, there are marked differences in young people's educational patterns. While approx. two thirds of the relevant age cohorts, including many with university entrance qualifications, undergo training under the dual system in Germany, the proportion in Austria is approx. 45 per cent. Apprenticeships are mainly a means of training young people with basic school-

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[16] Cf. for the following discussion: Stepan, Ortner and Oswald 1994; Lassnigg and Steiner 1996, pp. 22 ff.

leaving qualifications. The intermediate and higher vocational school system is far more widespread than in Germany, both in technical and trade occupations and in the commercial field.

In recent years, two surveys of costs (for 1990 and 1995) incurred in in-company training were performed along similar lines to the German cost model. The following points refer to the 1995 survey. Like the full and partial costing methods, the latest Austrian model distinguishes between gross costs Type I and Type II. Type I is identical with the German full costing method, while Type II concentrates more on marginal costs than the German partial costing method, which encompasses the cost elements relevant to decision-making. However, the difference between this and the partial costing method is minimal.

Gross costs, Type I:
- labour costs (remuneration, voluntary social contributions, other payments to apprentices)
- material costs per apprentice
- costs of full-time trainers
- costs of part-time trainers
- costs of capital goods
- administrative costs

The gross costs, Type II, arising when an additional apprentice is engaged, comprise the first three items. It is instructive to compare costs between the two countries (using the GDP deflator to adjust them to 1991 prices and converting them to Austrian schillings). In Germany, the personnel costs for apprentices are more than 10 per cent lower than in Austria. All other costs, however, are two to three times higher. In total, German costs established according to the full costing method are 31 per cent higher than Austrian gross costs, Type I.

Unlike the German net costs model, the returns side involves two modes of calculation, substitution returns and equivalence returns:

- The substitution returns are based on the extra work input which would be required if no apprentices were available. The full-time equivalents are calculated for two categories of employees, unskilled/semiskilled and skilled workers, and multiplied by the respective wages and salaries.

- The equivalence returns accord with the German returns model. The apprentices' productive working time, subdivided according to ancillary and skilled work, is multiplied by a performance factor, and the product obtained by the wages for ancillary and skilled workers. The performance factor for ancillary work remains constant at 100 per cent, while that for skilled work depends on the year of training.

There is a very low correlation between the two types of returns (r = 0.23), leaving considerable room for doubt about the usefulness of the terms employed. The substitution returns are almost 25 per cent higher than the equivalence returns on average, and this although, for lack of information, the substitution returns were assumed to be zero for many enterprises. It may be that a large number of respondents misunderstood the substitution concept. This would make the equivalence returns a more valid measure.

The Austrian equivalence returns are almost 20 per cent higher than those in Germany (after adjustment for deflation and conversion to Austrian schillings). Balancing the costs according to the full costing method (Germany) and the gross costs, Type I (Austria), against the equivalence returns leaves German net costs of 144 000 Austrian schillings compared with approx. 68 000 Austrian schillings in Austria, a difference of 113 per cent.

Austrian society considers apprenticeships much less prestigious and of markedly lower status than qualifications from an intermediate, let alone a higher, vocational school. Strata-specific unemployment risks indicate that Austrian enterprises, too, value employees with school/university training higher than those who have completed apprenticeships. The labour market statistics are highly indicative in this context. The overall unemployment rate as of

mid-1997 was 5.8 per cent. The risk of becoming unemployed for those with only compulsory schooling and no vocational qualifications was just less than 10 per cent. This compares with a little over 5 per cent for those who had completed an apprenticeship, 4.2 per cent and 3.6 per cent, respectively, for holders of qualifications from intermediate and higher vocational schools, and 2.8 per cent for university graduates .[17]

4.3 United Kingdom

Upon completion of compulsory schooling in the United Kingdom, school-leavers can choose between certificates under the National Vocational Qualification (NVQ) system and General National Vocational Qualifications (GNVQs) obtained exclusively through school-based training at Colleges for Further Education. The qualification levels at these colleges are equivalent to NVQ levels 1 to 3. The following remarks refer solely to the NVQ system, which is much more differentiated and of greater quantitative significance. The NVQs (SVQs in Scotland) introduced by the British government in 1986 are a modular system of vocational qualifications valid throughout the country (Reuling 1996, 1997, in preparation; Richter 1996). Vocational training under the German dual system ranks on a par with NVQ level 3, tending towards level 4. Levels 1 and 2, which account for the bulk of trainees in the United Kingdom, do not exist in Germany.

The certification of knowledge and skills obtained in formal learning processes and by way of work experience is the means chosen for not only for the initial training of young people but also for the training of (employed and unemployed) adults. The NVQ system thus draws no distinction between initial and continuing training. The background to this reform was a training system which, prior to 1986, had been inadequately geared to the needs of the market, was excessively complex and ridden with inconsistencies. Besides, only a small proportion of the British workforce had any vocational training at all. Even today, just one in two employees in the labour force as a whole holds a recognized qualification. This compares with just above two thirds of 19-year-olds. Apart from the NVQ system, the traditional semi-skilled vocational qualifications have been retained, as of course has university and polytechnic-level training (Department for Education and Employment 1996; Steedman, Mason and Wagner 1991).

The NVQ system is based on a framework of functional elements covering the entire employment system, which is subdivided horizontally into a large number of job areas (currently 794) and vertically into five degrees of difficulty from the least (level 1) to the most demanding (level 5). The functional elements are packaged in modules in response to the requirements of the labour market. Level 3 in this system more or less corresponds with the level of training of the German dual system.

The core of the NVQ system is a decentralized certification procedure. A distinction is drawn between qualifications, a collective term with a standardizing effect between different disciplines, and modules, a system element. Qualifications in the British sense are therefore not comparable with Germany's training occupations. In formal terms, every qualification is a cluster consisting of a defined number of modules which are in demand on the labour market and therefore have a market value. Unlike German training ordinances, NVQs provide for the examination and certification not of learning objectives but of the results of these objectives, or the competencies required by employers. The examination, which is the responsibility of "accredited" training providers, determines whether or not the candidate is competent, or able to act in a work situation.

The measurement requires a system of performance criteria and examination guidelines. Given this approach to vocational training, it is unimportant, at least in principle, how the knowledge and skills are taught, at what learning sites and over what period they are obtained and accumulated.

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[17]   *AMS, Arbeitsmarkt & Bildung in Österreich*, Vienna, August 1997, pp. 2 ff.

The value and benefits of the NVQs to employers and their holders crucially depend on whether there are any reliable indicators to ensure examination standards are comparable throughout the country. After all, enterprises examine their own employees. Indicators are, of course, substitute variables for facts (in this case: competence) which cannot be observed directly. Experience to date suggests that the system tends to atomize the indicators. This makes the examination system complex and costly, so that small and medium-sized enterprises hardly resort to NVQs.

Since they are a very recent introduction, it is by no means easy for NVQs and GNVQs to gain public acceptance in Britain (Geb 1997). Euphoric verdicts by employers and reports of success from holders notwithstanding, the response in the press has been cautious to critical. A typical argument is that all aspiring trainees should definitely ask themselves three questions: What training opportunities exist? What do I want to do afterwards? How credible is the system to employers or when applying for admission to university? These questions in particular indicate that the benefits of the system to people in employment have yet to be proven conclusively (Sloane, Battu and Seaman1997).[18]

The decentralization immanent to the NVQ system and the abolition of most of the former industrial training boards, which fell victim to deregulation, have made it more difficult to find reliable data on corporate training budgets. As in Germany and Austria, the only solution is to question specific enterprises. A number of surveys have been carried out in the past few years, by IFF Research in 1993 (IFF Research 1996) and by the Industrial Society in 1994 and 1996 (Industrial Society 1996). While the IFF study looked at spending on training by employers as a whole, the Industrial Society carried out a representative survey of its affiliates. The results of the latter survey are summarized below.

In 1996, approx. 400 companies from a random sample of just under 3800 responded to a questionnaire from the Industrial Society. Average spending on initial and continuing training amounted to 521 ECU. The average in the manufacturing trade was 572 ECU, and in the service sector 399 ECU. This represented a slight rise in overall spending compared with the previous survey in 1994, although it had fallen in per capita terms. The apparently contradictory finding, according to the Industrial Society, is due to the more economic use of enterprise training budgets. This has been achieved, the Industrial Society claims, by cutting administrative costs and introducing more advanced training methods. Information technology resources in particular had improved the results of enterprise training.

The study also reveals that the employers polled are in the process of concentrating their training efforts on their "more productive" workers and that part-time and temporary employees in particular have an increasingly remote chance of being included in further training programmes. The Confederation of British Industry has issued an explicit warning to its members about the consequences of this policy, which it believes will lead to the devaluation of human capital among an important contingent of the labour force.

Unlike the Industrial Society, the IFF distinguishes in its study between enterprises in different sectors and of different sizes. This revealed that not only all big companies but also nearly all medium-sized and even a large proportion of small enterprises had offered initial and further training in one form or another. Most companies, it is true, concentrated on on-the-job training. Many also took advantage of the opportunities for open learning. Open learning is a term used to describe training outside the workplace which is not organized by the enterprise, but where trainees, supported by their employer, choose their own learning environment (e.g. evening classes, distance learning, learning software). Open learning is more popular in larger enterprises. It is a method favoured by some 90 per cent of big companies (more than 2500 employees), 60 per cent of medium-sized and 20 per cent of small enterprises. The study also revealed that one in two employees had attended further training for an average of four days per year.

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[18] Cf. also Section 4.7 below.

Further training costs are broken down as follows:

- costs of wages for participants
- fees for trainers
- costs of training centres
- administrative costs
- costs of equipment and materials
- travelling expenses and meals
- training fees minus subsidies.

This list is limited to items in the gross costs account. The survey clearly did not ask about the returns from on-the-job training or saved opportunity costs which may arise after completion of training. Given the takeoffs induced by the NVQ system, returns as a means of cutting the cost of enterprise training are likely to become an increasingly prominent issue in British training research.[19]

Extrapolating the results of the survey for the UK as a whole, we obtain overall spending on training of 15 billion ECU. Of this total, 11 billion ECU were spent on further training outside the workplace. The costs of trainers and administration accounted for 14 per cent of the total, and continued payment of wages during training time for approx. 33 per cent. If we divide the total by the total number of persons employed throughout the UK, this produces estimated per capita spending of 830 ECU per annum. Surprisingly, per capita spending by bigger companies (500 or more employees), at 700 ECU, was well below that by smaller companies. Small enterprises spent an average of 1050 ECU per capita, compared with 770 ECU for companies with 200 to 499 employees.

4.4 France[20]

Initial training in France centres not on enterprises but on schools (lycées), leading to the vocational or technical version of the *baccalauréat*. A form of apprenticeship training does exist on a modest scale, combining enterprise training with school instruction at a *Centre de Formation des Apprentis*. The French government has made occasional attempts to introduce a dual system modelled on the German pattern.[21] But these efforts never met with success. On the one hand, employers resisted moves to shift the burden of costs onto their shoulders and, on the other, an apprenticeship does not enjoy sufficiently high status among school-leavers. For these reasons, cost and benefit issues of in-company initial training do not arise in France.

There are now three forms of vocational baccalauréat. The oldest, the CAP, is geared to specific occupations. A second version (BEP), introduced in 1970, seeks particularly to encourage the spread of basic vocational training, while the academically more demanding *Bac Pro* was introduced in 1985 to give vocational training an higher social status. Vocational school attendance varies between two and four years, depending on the subject.

The French vocational training system is centrally controlled. It is financed through a system without parallel in the EU. All private enterprises with more than ten employees pay a training levy currently amounting to 1.5 per cent of their annual wage and salary bill. This total was calculated, in theory at least, to allow 0.9 percentage points for continuing training of the staff, 0.4 percentage points for induction training and reintegration, and 0.2 percentage

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[19] Cf. survey carried out on behalf of the European Commission: *The economic dimension …, 1996*, p. 26, and the empirical studies cited there. The EC report refers, among other things, to a comparison of costs between the United Kingdom and Norway done by P. Elias et al.: "Vocational education and training in Britain and Norway". In: L. M. Lynch (ed.), *Training in the Private Sector. International Comparisons*, Chicago 1994. The returns from apprentice and semi-skilled training in the UK were much higher than those in the Norwegian school-based training system.

[20] Department for Education and Employment 1996, pp. 68 ff.

[21] Most recently Edith Cresson, Prime Minister at the time.

points for training leave to which employees are entitled by law. The training levy paid by enterprises with ten or fewer employees amounts to 0.15 per cent. The focus of these provisions then is on continuing vocational training. In addition to this, an apprentice tax of 0.5 per cent of the gross wage bill is paid by all employers in industry, commerce and the craft trades. Actual spending on training by French enterprises is higher than that stipulated by law. In 1993, the last year for which figures are available, it stood at 3.5 per cent of gross wages and salaries (Jeger 1997).

Companies are required to provide proof of their training expenditure. Eligible spending includes not only the costs of training their own employees, but also the costs of plant and equipment supplied to other vocational training institutions. If actual expenditure is below that stipulated by law, the balance must be paid into a central vocational training fund.

In terms of participation in continuing training, this financing system has produced the results which the French parliament sought to achieve. A labour force survey by the National Statistical Board (INSEE) provided individual information not only on the education, employment and continuing training of each employee but also on their place of work. A comparison of the 1993 results with those for 1989 revealed the following (Goux and Maurin 1997). Approx. 25 per cent of those polled in 1993 said they had taken part in continuing training programmes between 1989 and 1993. This compares with just under 11 per cent in the years from 1973 to 1977.

The INSEE study further sought to establish whether differences in enterprises' continuing training activities also result in different wages and salaries. The findings were very instructive: if the earnings effect of training is estimated according to a Mincer-type[22] ordinary least squares model, a technique commonly applied on an international level, the rate of return calculated from the enterprise continuing training coefficient is 4.5 per cent. The authors of the study concluded that the model's assumption of causality between continuing training and higher wages did not bear up to scrutiny. The wage differences between people who underwent continuing training and those who did not could be divided into two groups. One consisted of differences arising from the fact that companies which actively pursue continuing training are those which pay higher wages. The second was associated with employees' "trainability". Companies tended to offer continuing training mainly to their better paid employees, believing the success rate to be higher with them. The causality was therefore not from right to left, as assumed in the equation, but from left to right. Having incorporated their own findings in an extended model, the authors concluded that the real return on continuing training, i.e. higher incomes causally attributable to prior continuing training, was (virtually) zero.

Moreover, continuing training received in other enterprises between 1989 and 1993 did not produce any wage increments in the current job. Changing employers was therefore not a profitable proposition for employees with a continuing training record. Since in-company continuing training had no significant influence on the wages paid by the enterprise offering the training, its main purpose was to raise employees' loyalty. The likely explanation is that enterprises seek to ensure their spending on continuing training is an investment in specific human capital (as defined by Becker), which has no utility value elsewhere. The difference between the higher performance of those with continuing training and the unchanged wages they receive is the enterprise's return on its investment in human capital.

4.5 Spain

Spain's school-based training tradition incorporates various levels from no schooling to primary education, secondary education, basic and higher vocational training (levels 1 and

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[22] The model was: $\ln w_{i, 1993} = X_{i, 1989}b + Z_i c + u_i$. i stands for the individual, lnw the natural logarithm of the hourly wage, X for the matrix of personal features and Z the (O, 1) dummy variable for continuing training received between 1989 and 1993 in the enterprise where the individual was still employed in 1993. Continuing training in other enterprises is not included here.

2), training at specialized colleges of higher education (*escuela universitaria*) and universities. For some years, this system has been "fraying at the seams". The traditional training path of school-leaving qualifications (possibly) with supplementary specialized training in schools/courses, followed by the start of employment and occupational experience and eventually continuing training, retraining and upgrading training for promotion purposes is breaking down as previously distinct stages merge. The dividing line between initial and continuing training is becoming increasingly blurred, and alternating stages are now becoming more and more common. Some young people take part in work experience programmes while still at school. In later years, too, there are school pupils who also work and employees who also attend school. This boils down to a "spontaneous", i.e. uncontrolled, dualization of education and training processes.

The trend towards complex training patterns which do not follow any systematic design is vividly illustrated by a retrospective longitudinal study of youth and young adults (up to 31 years of age) carried out in and around Barcelona in 1991 (Planas 1996). The main purpose of the study was to structure the training processes found according to different career paths. This classification reflects a polarization of career development routes resulting from the selection mechanisms and the precedents set at school. Spanish people with extensive school education are the group most likely to take part in continuing training, and those with no school qualifications are the least likely to do so. The respondents were asked how useful training had been in advancing their careers. No attempt was made to estimate the returns on the investment in human capital, but the benefits were assessed in qualitative terms.

The career path analyses showed that the sample polled fall into three main groups labelled A to C and each incorporating several subgroups:

- The salient feature of Group A (22 per cent of the sample) is that they dropped out of school or have the lowest level of training. Their initial earnings are in the low to middle range. Their employment patterns reveal no changes, or follow a static course, interrupted by prolonged periods of unemployment. There is a pronounced desire for alternative employment or a different occupation.

- Group B (22 per cent) comprises people who have completed compulsory schooling or have equivalent vocational qualifications (= first level of vocational training), some including more advanced courses. Initial earnings are in the middle to low range and employment patterns either static or frequently changing, but without conspicuous periods of unemployment. Here, too, there is a widespread desire for better work or a different occupation.

- Group C (24 per cent) comprises holders of university entrance qualifications without university degrees who may have completed short courses of higher education, and people with higher (level 2) vocational training. Most of the respondents in this group had taken a number of continuing training courses, and some had several years' occupational experience. Their initial earnings are mostly in the middle, and sometimes in the higher range. The subsequent career fortunes of most of this group show an upward trend. They are not normally interested in alternative employment or a different occupation.

These different training and employment patterns suggest the hypothesis that earnings differentials and differences in lifetime incomes are the consequence of a stringently segmented labour market. The first labour market is made up of "good jobs" with higher pay for the human capital supplied, good working conditions and a low unemployment risk (Peralta and Sánchez 1997). The second labour market is dominated by "bad jobs" (low income, poor working conditions, instability). The processes determining wages are therefore very different from one market to the other. Roig and Moreno tested this hypothesis against

biographical data for 2265 Spanish employees outside the agricultural sector. The sample had been weighted previously to compensate for strata-specific overrepresentation.[23]

The problems of drawing empirical distinctions between submarkets have long been familiar, so we do not need to expand on them here. There have been numerous attempts in the international literature to find empirical solutions to the segmentation of the labour market. All of them were unsatisfactory to a greater or lesser extent. Even cluster analysis, which would seem to be a particularly promising approach, failed to find objectively sustainable dividing lines between the submarkets. This led Roig and Moreno (1997) to select a switching approach which dispenses with explicit a priori segmentation. Employees are allocated to one of the two submarkets implicitly be means of latent (unobservable) switching variables. This allocation is rather an endogenous consequence of the estimation process.[24]

The estimates obtained are compatible with the duality hypothesis for the Spanish labour market. The fact of belonging to one of the two segments is not a random product. Individual features, especially those which have a bearing on human capital and productivity, determine the "ease" of access to the first labour market and thus also wage levels and lifetime earnings.

Lassibille (1997) chose a similar method in terms of the questions it implies to explain wage differences by gender and private-public sector distinctions.[25] The problem here, too, is one of drawing clear dividing lines (a selectivity bias). The approach is based on an essay by Heckman (1979) in which the author showed that a sample selection bias is synonymous with a model specification error. The explicit variables, in a manner of speaking, take up the influences of the missing variables, so that their coefficients are distorted.

The sectoral earnings functions are - as usual - of the Mincer type. However, before the coefficients are estimated, correction factors are established as a measure of the probabilities of sectoral choices by the individuals in the sample. These are subsequently incorporated in the earnings determination equations as additional explanatory variables alongside the training-specific variables. According to this approach, the individuals have a choice between no employment, employment in the public sector, employment in the private sector and self-employment. Table 7 (p. 240) shows the ultimate added returns on human capital investments as a percentage.

The differences in the estimated returns are extremely high in some cases. Basic vocational training (level 1) for women is claimed to produce added returns of 2.9 per cent in the public sector and 35 per cent in the private sector, while the correlation coefficients of the earnings functions are just 0.34 and 0.19 (!), respectively. It is difficult for anyone who is not familiar with Spain to gauge whether these estimates are plausible. The suspicion that they are not is supported to a certain extent by another study (San Martin Lizzaralde 1997).[26] This showed that a statistically established connection between education and earnings exists only after

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[23] A similar switching approach to the analysis of mismatch problems in the Spanish labour market is taken by Beneito, Ferri et al. (1997). On mismatch problems cf. also Section 4.7 below.

[24] The Roig/Moreno model is based on three equations, one each for the coefficient function of the earnings levels, expressed as logarithms, in segments 1 and 2. The explanatory variables, which are identical in both segments, stand for personal features such as gender, marital status, education, indicators of over-, under- or matching education for the respective job, etc. They are a measure of the ability of the employed to gain a foothold in the first labour market or of them being forced to accept the bad jobs in the second labour market. A third function (switching equation) serves to identify the latent switching variable (y_n) in whiich the tendency of the nth individual to be placed in the first labour market is expressed by a positive y value, and a tendency to be placed in the second labour by a negative y value. All coefficients are estimated simuntanously using maximum likelihood methods. The y estimates are positive for the various stage-based training variables, i.e. they tend significantly towards the first labour market. The y estimates are negative for the variable "female", the square of occupational experience and the frequency of job changes. The problem with this approach, however, is that the statistics supporting almost all explanatory variables in the function for the second labour market are either inadequate or non-existent.

[25] Cf. also Garen 1984

[26] The equation used was $\ln W = a_0 + b_1 S + b_2 X + b_3 X^2 + b_4 Z + u$. S stands for the year of schooling dummies (S = 1,..., >17), X for cumulative occupational experience, and Z for the remaining regressors. The estimated correlation coefficient is 0.46 for a sample of 1994 people.

completion of secondary education (12 years or more). For people below this level the return on training is virtually zero. After completion of secondary level education, each additional year of education and training yields a return of 6.7 per cent.

4.6 Netherlands

Two training systems exist side by side in the Netherlands, a full-time school system with two to four-year courses (MBO = *Middelbaar Beroepsonderwijs*) and a dual apprenticeship training system (*Leerlingswezen*) very similar to the German model with one to three-year training in enterprises and part-time vocational schools. Until recently each of these systems had its own training programmes. Attempts have been made of late to standardize at least the learning objectives, albeit within the context of the two systems. These moves are based on a new Vocational Training Act (v. Lieshout 1997, Reuling 1991). Unlike the German system centring on qualifications in recognized training occupations, which makes no distinctions between training levels except for stage-based training in a small number of occupations, the Dutch system incorporates four different levels of training: ancillary worker training, basic training, skilled worker training, and expert or middle management training.

The parallel existence of school-based and dual training systems raises a number of regulatory problems. Instead of providing initial training themselves, enterprises can recruit employees with MBO qualifications, which are based on learning objectives representing minimum standards (as in Germany), and provide them with continuing training in accordance with specific enterprise requirements. This would make it easy for companies to place the burden of costs on other shoulders. It is a priority of Dutch vocational training policy to prevent such undesirable developments. Research interest therefore focuses not on isolated comparisons of returns from specific types of education and training, but on the economic benefits of complete educational routes in general education and initial vocational training. The OSA-Report published in 1994 is indicative of these priorities.[27]

Information on the costs of the Dutch training system is sparse. The total costs of in-house and external training by enterprises are known to have been NLG 3 billion in 1990. It is also known that the labour market administration costs for the apprentice system add up to some NLG 260 million per annum. However, no details are available on associated spending by enterprises. The OSA-Report[28] suggests it is likely to be higher than public subsidies.

Analyses of returns on human capital investments distinguish between individual and social, or macroeconomic, returns. The individual benefits of an additional qualification is the discounted difference between expected and current income. The higher earnings are expected to be in future and the lower they were in the past, the greater the willingness of individuals to invest in their human capital, and vice versa (Nelissen and Stancanelli 1997). The overall social returns are calculated by aggregating costs and benefits for all groups in society (individuals, enterprises, the state).

In its estimation of returns on education and training, the OSA-Report assumes firmly established patterns of regular initial training and does not consider subsequent continuing training. The return is a measure of the added benefits obtained by tagging on a further stage to the established route. For example, the added net return from full-time schooling or dual training (MBO) is estimated with reference to the vocational preparation stage (VBO). The return estimates are then assessed. A return below 2 per cent is considered unattractive, so that additional investments in the training level in question are to be avoided. Rates of return of three per cent are normal, while higher rates point to profitable investments in human capital.

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[27] Organisatie voor Strategisch Arbeidsmarktonderzoek (OSA). The report states: "For the government it is important that the costs for education stay in line with the benefits. The expected rate of return is therefore taken into consideration when decisions are made about investments."

[28] OSA-Report, loc cit.. p. 1.

The OSA-Report distinguishes between approx. 35 different educational paths, considering technical, commercial and social care disciplines. The estimates of individual net returns range from -4 per cent to 8 per cent; estimated social returns from -4 per cent to 6 per cent. For example, the MAVO -> MBO route (junior general secondary education -> full-time school or dual training) has proven to be unprofitable. The added return for women is in the region of 1 per cent, and for men it is negative. The MAVO -> HAVO route, that to senior general education, performs much better, yielding returns of 4 per cent for men, 7 per cent for women and 5 per cent for society as a whole. However, MBO training is worthwhile personally and generally (returns of 3, 6 and 5 per cent, respectively) for holders of an LBO (lower vocational education) certificate.[29]

4.7 A look at outstanding issues and conclusions

The Maastricht Conference of the Applied Econometrics Association (AEA) produced a large number of papers on the economics of education and training in the context of the issues confronting knowledge-based societies. It seems reasonable to assume that the extensive body of material presented at that conference is a representative cross-section particularly of research outside Germany. It is neither possible nor necessary to present lengthy reviews of specific papers beyond those addressed above. A brief description of the main issues will have to suffice.

Most studies presented at the AEA conference are based on the following premises:

- Private rates of return are higher than social rates of return: negative repercussions of the expansion in education and training (retraining, social transfers) are borne by the general public. Infrastructure investments in the education system are mostly financed by the state, but the benefits from the use of this infrastructure accrue to individuals.

- Rates of return fall as the level of education and training rises. The returns on higher education are, as a rule, lower than the returns on higher secondary education.

- Due to the allocative effects of the labour market, the returns on education and training depend in the longer term on movements in the supply and demand situation for specific qualifications.

- Rates of return fall as a country becomes more developed.

Research often focuses on estimating returns according to the Mincer approach, which is extended, refined or modified in some other way depending on the requirements of the country from which the data was obtained. Particular attention has been given to models addressing the individual benefits of investment in human capital and - on a more specific note - the negative effects of imbalances between the supply of and demand for qualifications. Prolonged shortages of jobs increase the readiness of the up-and-coming generation to train for higher qualifications, invariably leading to mismatches in the form of general overeducation. Market forces do not tend to produce a balance here. The longer a shortage of jobs persists, the more people are prepared to accept work below their qualifications. This in turn leads to frequent job changes without anything bring done to correct the mismatch.[30]

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[29] Odink, Gelderblom, de Koning and van Winden (1997) criticize about traditional mincer models that (alluding to Gertrude Stein's famous saying, "a year is a year is a year") all education and training years are weighted equally. The same level of education, they object, can be attained in various ways. Then there is the impact of continuing training, which itself depends on the previous level of education. And finally, repeated classes and instances dropping out from school need to be considered separately. This study, too, is based on the OSA Panel.

[30] Cf. G. Forgeot, J. Gautié: *Insertion professionelle des jeunes et processes de déclassement.* The authors calculated overdeucation indicators for France and used them as a tool to study mismatch processes between 1986 and 1995.
A good overview of the mismatch literature is provided by J. Hartog, *On Returns to Education. wandering along the Hills of ORU Land.* ORU is an abbreviation for over-, required, undereducation. The adaptation of the Mincer earnings function in its generalization is: $Ln\ W = XB + c_1\ OVER + c_2\ REQ + c_3\ UNDER + u$. Here, too, $Ln\ W$, are the wages/salaries expressed in logarithmic form, and the data matrix X contains the human-specific explanatory variables.

Sloane, Battu and Seaman drew on a large body of data to examine the effects of overeducation on the earnings, career success and mobility of British skilled workers. They concluded that overeducation is not necessarily a waste of effort for the employees concerned. However, the earnings benefits were lower than those obtained from qualifications which match the job held.[31]

Two works deal with issues of mismatches in the Netherlands. The first is mainly empirical, while the second has a methodological/theoretical bias. In 1995, Borghans and Smits investigated the consequences of overeducation for people with higher vocational education (HVE) employed in positions which underutilize their specialized knowledge.[32] The analysis drew on data from the Netherlands HVE Monitor in which 30 000 HVE graduates from 1994 provided information about their occupational experience one and a half years later. This indicates that HVE graduates who began working life in positions below their qualification levels earn less than those who found jobs commensurate with their training.

However, mismatches occur not only in levels but also in subjects. Here, too, the employees affected earn less, but the loss of income is not as great as that resulting from overeducation. When the number of graduates seeking employment exceeds the supply of suitable jobs, there is not only a growing willingness to accept work below one's qualifications. Even those graduates who find suitable employment suffer considerable losses of income.

Van Eijs and Heijke developed a model linking the suboptimum allocation of skilled manpower with gaps in the transparency of the labour market.[33] They sought to attain two objectives: first, to develop a theoretical model which reveals and demonstrates by empirical means the implications of mismatches for the economics of education and training, and second, to estimate and assess the losses of human capital resulting from misallocation. These losses occur through increased induction costs to compensate for gaps in skills.

Apart from papers assessing the returns of education and training investments for people in employment, some of the studies presented at the Maastricht Conference are of major methodological interest. Belzil and Hansen drew on Swedish individual data to develop a non-stationary dynamic programming model (with backward-recursive equations) to examine the theoretical implications of the choice between continued schooling and employment. The duration of schooling is no longer an exogenous variable, as in the simple Mincer-type models, but is determined endogenously in the equation system.[34]

Ballot et al.[35] chose an intriguing model application. The authors applied the macroeconomic theory of endogenous growth to corporate growth. They carried out a comparative analysis applying Cobb-Douglas production functions to data on Swedish and French companies. According to this model, human capital has a direct impact on gross added value, whether due to high workforce productivity, more innovative decisions or better work organization. R&D spending (= technological capital) is a source of innovation and added value. It follows from this approach that corporate growth results from the growth of human and technological capital. Apart from these direct effects, indirect effects result from the additional endogenous growth factors unleashed from a certain level of intangible capital assets. The more human capital there is in a company and the greater its technological expertise at the same time, the easier it is to achieve learning by doing and ensure transfer of knowledge among its own employees, reducing the need for investment in formal training.

5. CONCLUSIONS

Readers will have noted that many studies from non-German-speaking countries rest on the benefits of human capital and training to people in employment. There are a large number of

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[31] P.J. Sloane, H. Battu, P.T.Seaman: *Overeducation, Undereducation and the British Labour Market.*

[32] L. Borghans and W. Smits: *Underutilisation and Wages of HVE-Graduates*

[33] P. Van Eijs and H. Heijke: *The Implications of a Mismatch between Occupation and Education.*

[34] C. Belzil, J. Hansen: *Estimating the Returns to Education from a Non-stationary Dynamic Programming Model.*

[35] G. Ballot, F. Fakhfakh, E. Taymaz: *Firm's Human Capital, R&D and Performance: An International Comparative Study*

essays addressing this theme, but the results are hardly comparable due to the different methodologies applied and the different ways in which the estimates were obtained. Even in countries with a comparable level of development, the estimates are so varied that this fact alone is bound to raise doubts. We would contend that a satisfactory answer to how high the individual returns of education and training *really* are in developed countries has yet to be found. We would be taking a step in this direction if an international group of researchers from various countries (e.g. the United Kingdom, France, Germany, the Netherlands, Spain and Italy) were to agree on a single cost-benefit model and apply it to standardized data from simultaneous surveys. The approach to the differentiation of educational routes developed in the Dutch OSA-Report seems to be promising and worth emulating.

With a few exceptions, hardly any studies have been conducted of the returns on investments in corporate human capital. This is in part because human capital, in business usage, is a diffuse term. Enterprises use *training investment* as a selling point, but it never figures as a separate category in their accounts. This would entail capitalized cost-benefit accounting spread over a number of years and considering depreciation and reinvestment.

But companies do not behave in this way. First, the commercial law provisions for drawing up balance sheets do not permit the capitalization of intangible assets, and second, the costs of training are written off in full in the year they arise, just like wages/salaries and consumption of materials. In other words, corporate accounts do not treat initial and continuing training as investments. It would be a sizeable step forward if companies were to draw up a human capital account as a separate accounting subsystem and introduce evaluation rules. This could provide an effective steering instrument for enterprise managements. So far, initial and continuing training bring the lowest benefits in the year in which they cause the highest costs. It follows from this that the use of accumulated knowledge and experience is free of charge in later years.

The social benefits of human capital, too, have been a subject of only marginal interest to date. The all too frequent practice has been simply to compare investments by the state in the education and training infrastructure with additional tax revenues. Here too, at least in Germany, we have the problem that public-sector accounting has reduced the education budget to expenditures and receipts, ignoring accruals on the investment.[36]

Another problem is that social returns models of the education system are always incomplete if they fail to consider the secondary effects of rising education standards among the workforce as a whole. The expansion of education is something which Schumpeter (1912)once called an investment of the dynamic investor. The value added of this investment conceals an innovation which destroys older and technically less innovative capital assets at a stroke. In the case of education expansion, this innovation has also been accompanied by depreciation. Existing knowledge and experience must be *written off*. These write-offs make their impact on the economics of education and training in the form of retraining programmes, early retirement, support for the unemployed and other social transfers. The costs are a burden on the community as a whole and must be subtracted from the social returns. In many cases these are likely to be very low if not negative.

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[36] The German Federal Statistical Board is currently carrying out a survey of all spending on general and vocational education as a contribution to OECD statistics. The project deliberately avoids the term *training investment*. It rather seeks to estimate *training expenditure.*

APPENDIX: FIGURES AND TABLES

Figure 1:

Factors determining corporate growth and employment
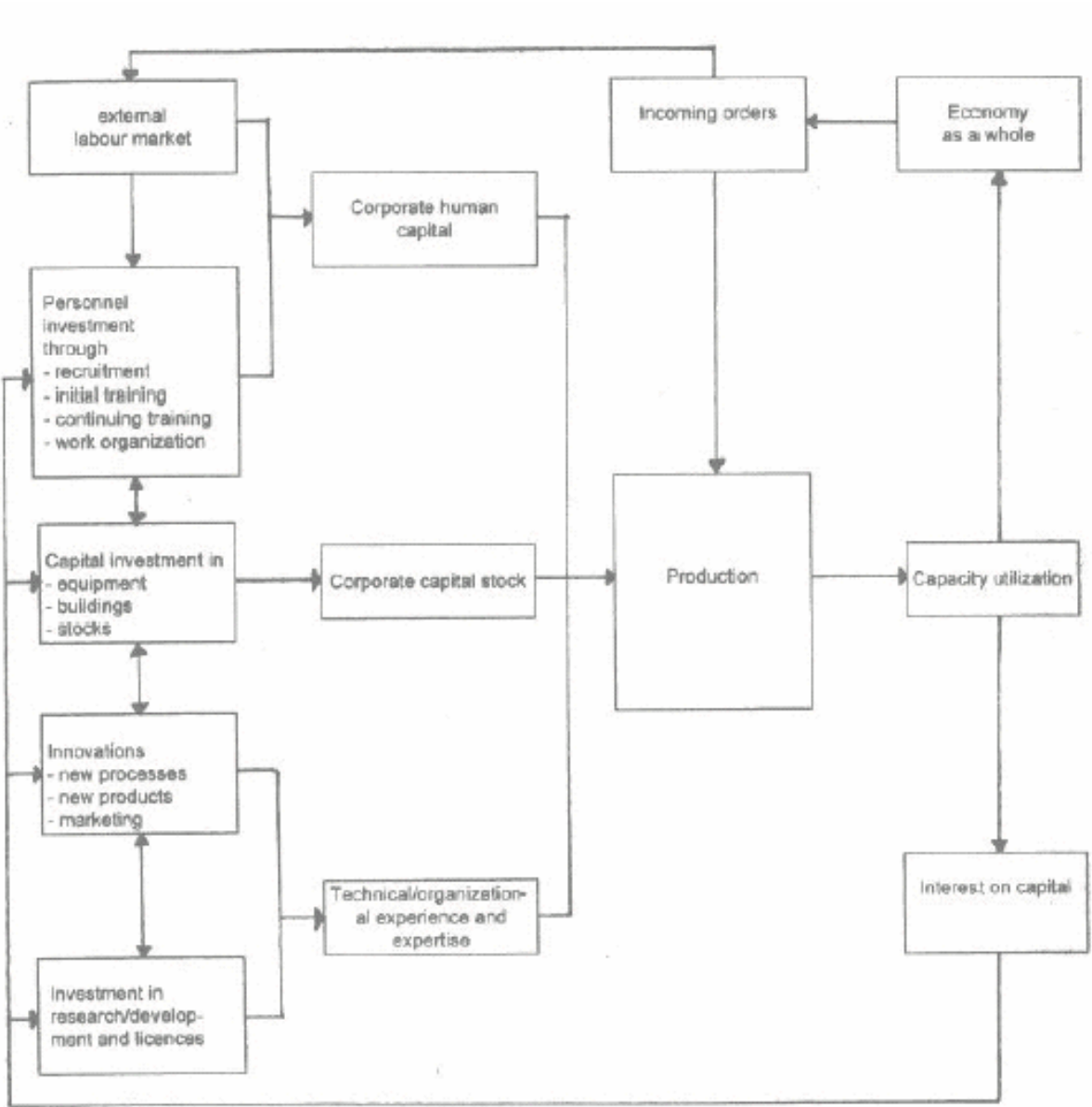
Figure 2:

Total gross costs, returns and net costs in 1971, 1980 and 1991 (*full costing method*)

West Germany

Average figures per trainee and year

Percentage rise in net costs and returns

Returns

Net costs

29.573 DM

17.043 DM

11.711 DM

6.948 DM

6.753 DM

17.862 DM

2.561 DM

10.289 DM

4.387 DM

□ Returns

■ Net costs !

1971   1980   1991
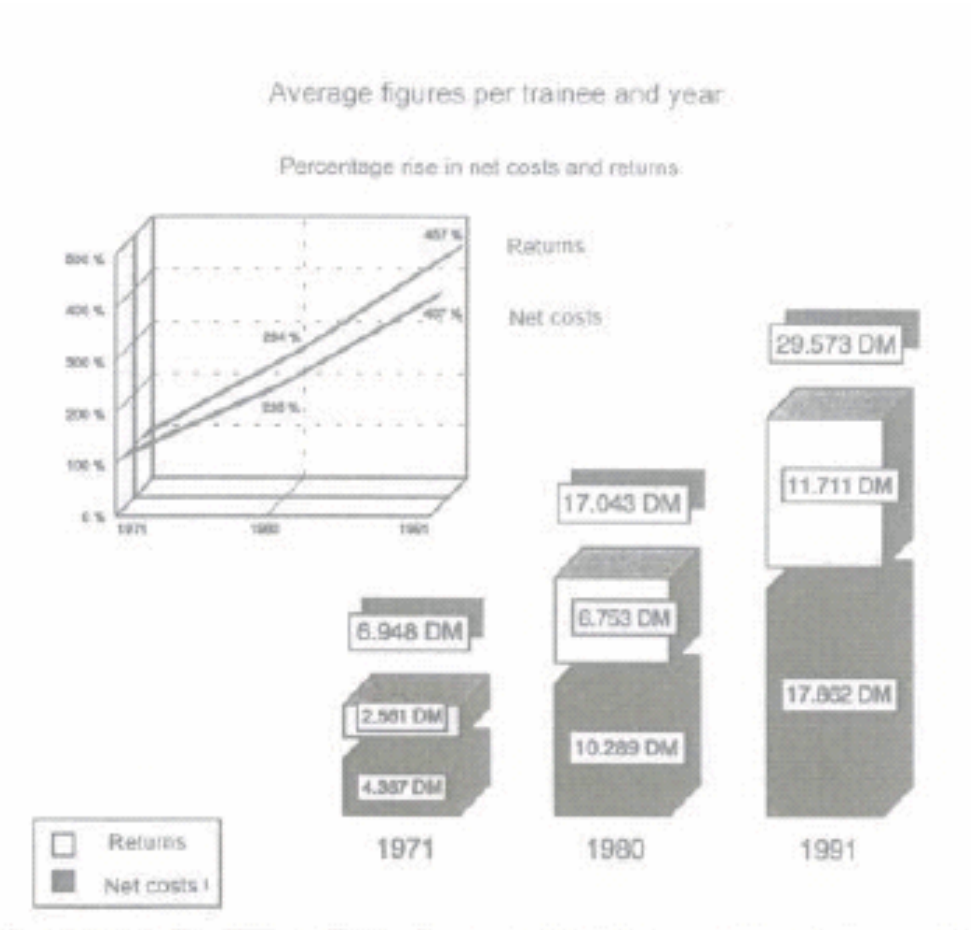
Source: Federal Institute for Vocational Training

Figure 3:

Cost types in in-company vocational training

GROSS COSTS

| Personnel costs for trainees | Personnel costs for trainers | Capital and material costs | Other costs |

Personnel costs for trainees:
- Trainee remuneration
- Mandatory social payments
- Social payments (collective agreement and voluntary)

Personnel costs for trainers:
- Full-time trainers — Workplace, Training workshop, In-company training
- Part-time trainers — Workplace, Training workshop, In-company training
- External trainers

Capital and material costs:
- Workplace (cost of tools, practice materials)
- Training workshop (Depreciation of machinery, plant and equipment; cost of premises, energy, cleaning, repairs, materials)
- In-company training (Where special training premises exist: depreciation of equipment and furnishings; cost of premises, energy, cleaning, repairs)

Other costs:
- Cost of teaching materials
- Chamber for registrations and examinations
- Cost of working/protective clothing
- Cost of external courses
- Cost of training administration
- Other personnel costs in the workshop

☐ Costs with relevance to decision-making
▨ Costs without relevance to decision-making

Source: Federal Institute for Vocational Training

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Figure 4:

Employment situation of persons with apprentice qualifications in the first five ears after completion of training, West Germany
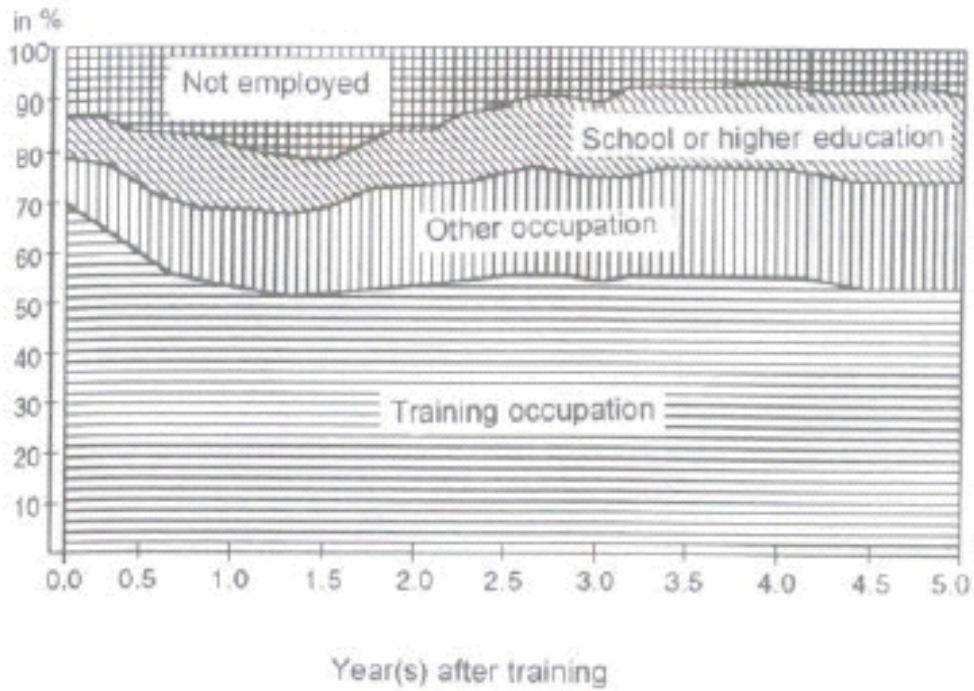
Source: Federal Institute for Vocational Training, Bonn, 1993

Figure 5:

**Estimated net earnings as a function of occupational experience and highest
vocational qualifications, Baden-Württemberg, 1991**
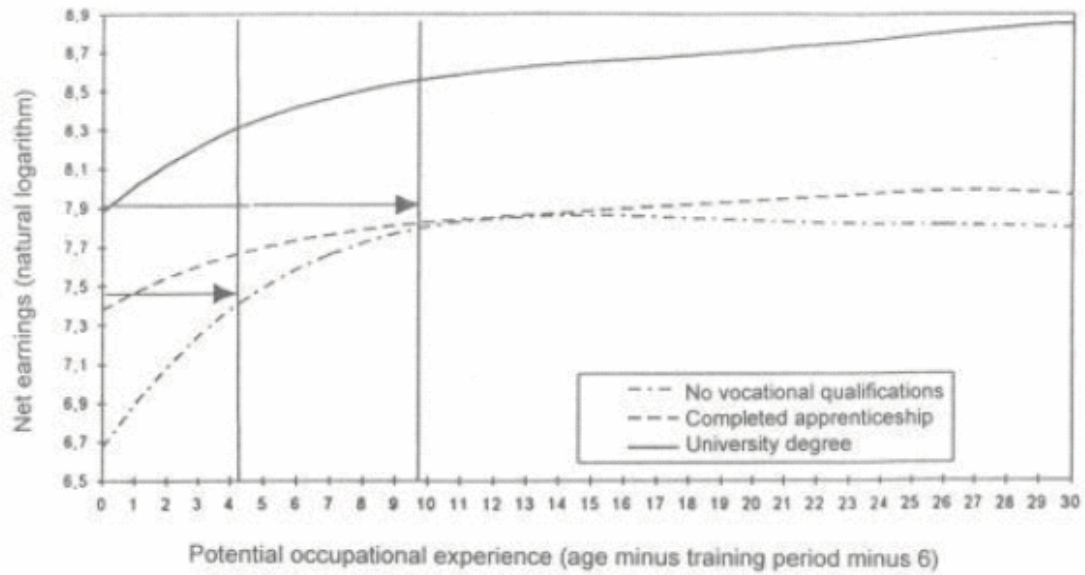
Source: Pfeiffer 1996, p. 9

**Individual costs of continuing vocational training
- costs and types of refunding -**
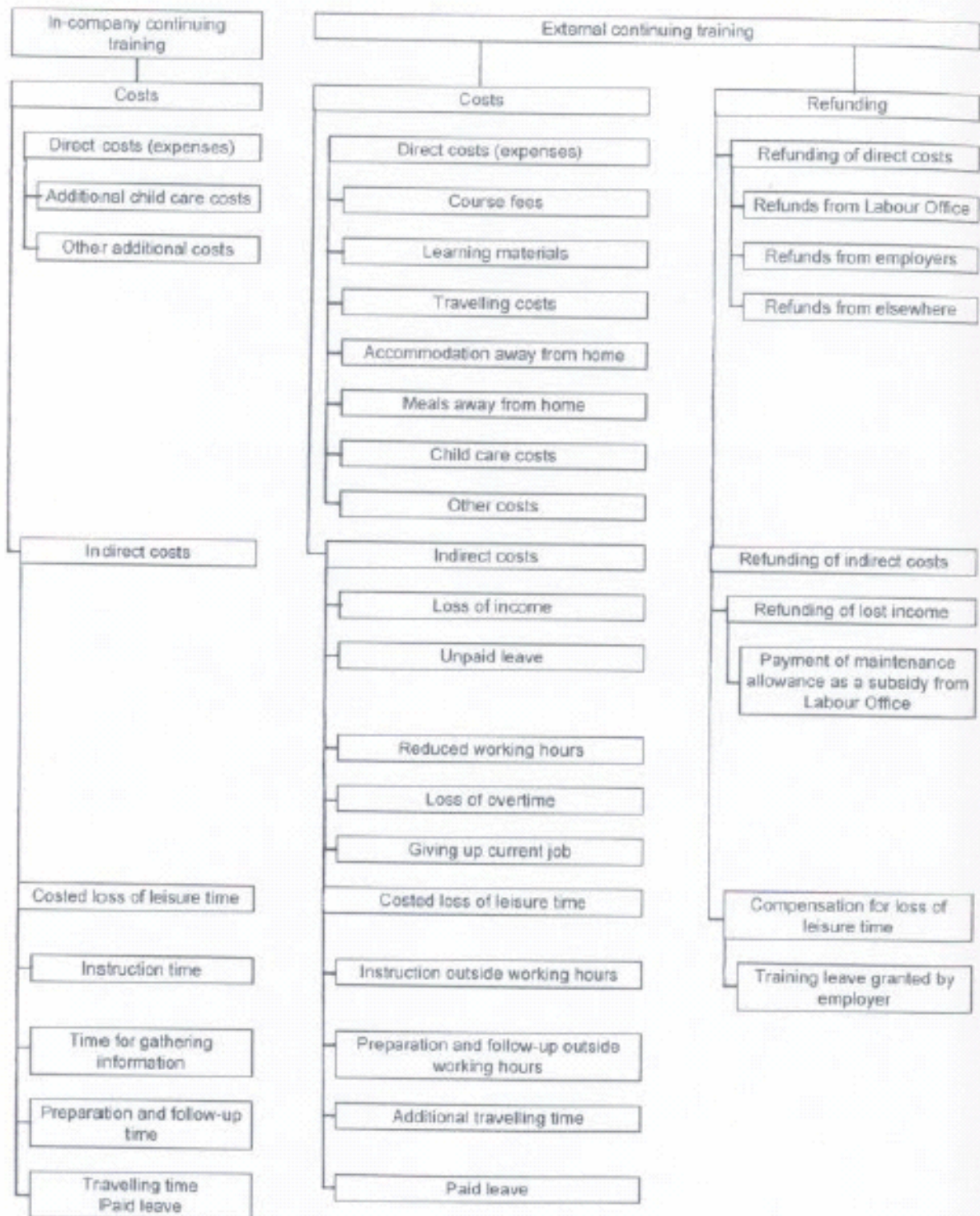
**Individual costs of continuing vocational training before and after refunds
West Germany 1992**

Average costs per participant and year

WEST — 1.427 DM; Refunded costs 375 DM; Costs after refunds 1.053 DM; External continuing training 997 DM; In-company continuing training 55 DM

EAST — 1.928 DM; Refunded costs 1.081 DM; Costs after refunds 848 DM; External continuing training 774 DM; In-company continuing training 74 DM

Source: Federal Institute for Vocational Training

Table 1:

Average enterprise training costs per trainee and year in industry and commerce, subdivided according to trade/technical and commercial, occupations (*Full costing method) - West Germany 1991*

Cost types	Overall average in industry and commerce		Average by occupations			
			Trade/technical occupations		Commercial occupations	
	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (GC)	31.824	100.0	30.737	100.0	32.388	100.0
Returns	11.315	35.5	10.258	33.3	11.863	36.6
Net costs	20.509	64.4	20.479	66.6	20.524	63.3
Personnel costs for trainees *of which:*	15.930	50.0	13.898	45.2	16.985	52.4
Trainee remuneration	11.313	35.5	9.943	32.2	12.024	37.1
Mandatory social payments	2.359	7.4	2.179	7.0	2.452	7.5
Social payments (collective agreement and voluntary)	2.089	6.5	1.628	5.2	2.329	7.1
Costs for trainers *of which:*	12,018	37.7	12,011	39.0	12,021	37.1
Full-time trainers	1,821	5.7	4,017	13.0	682	2.1
Part-time trainers	10,093	31.7	7,970	25.9	11,194	34.5
Capital and material costs Other costs *of which:*	1,236 2639	3.8 8.3	2,603 2,225	8.4 7.2	527 2,853	1.6 8.8
Teaching materials	165	0.5	159	0.5	168	0.5
Fees to respective chamber	238	0.7	252	0.8	231	0.7
Working/protective clothing	86	0.2	217	0.7	18	0.0
External courses	747	2.3	139	0.4	1,063	3.2
Training administration	1,23	3.8	930	3.0	1,374	4.2

Source: Federal Institute for Vocational Training

Table 2:

**Average enterprise training costs per trainee and year in craft trade sector,
subdivided according to trade/technical and commercial occupations
(*Full costing method) - West Germany 1991***

Cost types	Overall average in industry and commerce		Average by occupations			
			Trade/technical occupations		Commercial occupations	
	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (GC)	24,889	100.0	25,410	100.0	22,131	100.0
Returns	12,536	50.3	12,112	47.6	14,785	66.8
Net costs	12,352	49.6	13,298	52.3	7,346	33.1
Personnel costs for trainees *of which:*	11,323	45.4	11,339	44.6	11,237	50.7
Trainee remuneration	8,283	33.2	8,294	32.6	8,220	37.1
Mandatory social payments	2,010	8.0	2,009	7.9	2,013	9.0
Social payments (collective agreement and voluntary)	907	3.6	912	3.5	880	3.9
Costs for trainers *of which:*	10,889	43.7	11,235	44.2	9,062	40.9
Full-time trainers	200	0.8	238	0.9	0	0.0
Part-time trainers	10,673	42.8	10,978	43.2	9,062	40.9
Capital and material costs	657	2.6	752	2.9	155	0.7
Other costs	2,019	8.1	2,085	8.2	1,676	7.6
of which:						
Teaching materials	89	0.3	89	0.3	85	0.3
Fees to respective chamber	264	1.0	273	1.0	215	0.9
Working/protective clothing	160	0.6	179	0.7	62	0.2
External courses	194	0.7	204	0.8	144	0.6
Training administration	1,280	5.1	1,301	5.1	1,170	5.2

Source: Federal Institute for Vocational Training

Average enterprise training costs per trainee and year in six selected industrial and commercial occupations
(*Full and partial costing methods*)) - West Germany 1991

Cost types	Constuction mechanic		Industrial mechanic		Wholesale and foreign trade clerk		Retail clerk		Bank clerk		Industrial clerk	
	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (full costing method) (GC)	33,360	100.0	39,273	100.0	28,113	100.0	26,337	100.0	32,768	100.0	30,111	100.0
Returns	7,789	23.3	10,841	27.6	13,899	49.4	15,524	58.9	10,258	31.3	15,920	52.9
Net costs (full costing method)	25,571	76.7	28,432	72.4	14,214	50.6	10,813	41.1	22,510	68.7	14,191	47.1
Personnel costs for trainees *of which:*	15,812	47.4	15,385	39.2	14,552	51.8	14,815	56.3	18,960	57.9	15,618	51.9
Trainee remuneration	10,570	31.7	10,705	27.3	10,520	37.4	10,962	41.6	12,970	39.6	11,026	36.6
Mandatory social payments	2,415	7.2	2,429	6.2	2,124	7.6	2,199	8.3	2,606	8.0	2,281	7.6
Social payments (collective agreement and voluntary)	2,668	8.0	2,091	5.3	1,750	6.2	1,489	5.7	3,189	9.7	2,146	7.1
Costs for trainers *of which:*	11,326	34.0	16,837	42.9	11,358	40.4	9,393	35.7	10,416	31.8	12,852	42.7
Full-time trainers	8,224	24.7	11,462	29.2	946	3.4	1,454	5.5	2,220	6.8	1,689	5.6
Part-time trainers	2,894	8.7	5,373	13.7	10,337	36.8	7,829	29.7	8,140	24.8	11,092	36.8
Capital and material costs	4,011	12.0	5,174	13.2	786	2.8	5995	2.3	1,153	3.5	172	0.6
Other costs *of which:*	2,211	6.6	1,877	4.8	1,417	5.0	1,535	5.8	2,239	6.8	1,469	4.9
Teaching materials	280	0.8	110	0.3	94	0.3	154	0.6	235	0.7	117	0.4
Fees to respective chamber	380	1.1	176	0.4	240	0.9	223	0.8	176	0.5	175	0.6
Working/protective clothing	371	1.1	281	0.7	32	0.1	81	0.3	0	0.0	2	0.0
External courses	94	0.3	17	0.0	257	0.9	232	0.9	847	2.6	128	0.4
Training administration	826	2.5	491	1.3	795	2.8	844	3.2	981	3.0	1,047	3.5
Gross costs (*Partial costing method)*	29,640	-	33,409	-	16,981	-	17,664	-	23,647	-	17,972	-
Net costs (*Partial costing method*)	21,852	-	22,567	-	3,082	-	2,141	-	13,388	-	2,052	-

Source: Federal Institute for Vocational Training

Table 4:

Average enterprise training costs per trainee and year in six selected craft trade ccupations (*Full and partial costing methods*)
West Germany 1991

Cost types	Motor mechanic		Electrical fitter		Joiner		Hairdresser		Specialized salesperson in food trade		Office clerk	
	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (full costing method) (GC)	20,765	100.0	23,973	100.0	24,402	100.0	22,425	100.0	23,992	100.0	23,867	100.0
Returns	13,451	64.8	10,562	44.1	13,281	54.4	10,915	48.7	17,091	71.2	13,704	57.4
Net costs (full costing method)	7,314	35.2	13,410	55.9	11,121	45.6	11,510	51.3	6,901	28.8	10,163	42.6
Personnel costs for trainees *of which:*	10,575	50.9	10,308	43.0	11,417	46.8	8,523	38.0	10,827	45.1	11,440	47.9
Trainee remuneration	7,317	35.2	7,437	31.0	8,541	35.0	6,251	27.9	8,115	33.8	7,940	33.3
Mandatory social payments	2,029	9.8	1,875	7.8	1,885	7.7	1,869	8.3	1,899	7.9	2,259	9.5
Social payments (collective agreement and voluntary)	1,119	5.4	884	3.7	863	3.5	309	1.4	691	2.9	1,122	4.7
Costs for trainers *of which:*	7,668	36.9	11,705	48.8	10,067	41.3	10,800	48.2	12,047	50.2	10,494	44.0
Full-time trainers	86	0.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Part-time trainers	7,578	36.5	11,696	48.8	10,067	41.3	10,376	46.3	12,047	20.2	10,494	44.0
Capital and material costs	472	2.3	380	1.6	950	3.9	628	2.8	103	0.4	158	0.7
Other costs *of which:*	2,049	9.9	1,580	6.6	1,970	8.1	2,473	11.0	1,014	4.2	1,776	7.4
Teaching materials	111	0.5	153	0.6	18	0.1	99	0.4	25	0.1	70	0.3
Fees to respective chamber	400	1.9	231	1.0	216	0.9	196	0.9	181	0.8	214	0.9
Working/protective clothing	435	2.1	185	0.8	117	0.5	101	0.4	52	0.2	54	0.2
External courses	244	1.2	124	0.5	129	0.5	216	1.0	20	0.1	65	0.3
Training administration	806	3.9	887	3.7	1,380	5.7	1,603	7.1	736	3.	1,373	5.8
Gross costs (*Partial costing method*)	12,381	-	11,389	-	12,955	-	10,446	-	11,208	-	12.000	-
Net costs (*Partial costing method*)	- ,070	-	827	-	- 325	-	- 469	-	- 5,882	-	- 1,703	-

Source: Federal Institute for Vocational Training

Summary of cost indicators for continuing training, West Germany 1993

	Costs by programme / event of continuing training	Costs per employee	Costs per participant	Costs per participant-hour	Costs as percentage of gross wages and salary bill
Full and part-time continuing trainers	2,324	243	403	12	0.4
In-company training	18,470	862	1,826	60	1.3
External training	8,561	375	3,116	71	0.6
Information sessions	3,770	70	525	65	0.1
Retraining	23,450	38	2,322	26	0.0
On-the-job learning	-	256	-	21	0.3
Self-regulated learning	-	62	-	21	0.1
Other costs	159	19	32	1	0.0
Total	14,633	1,924	2,275	-*	2.8

Source: R. Weiss, *Arten, Strukturen und Entwicklungen der Weiterbildungskosten*, p. 149

Table 6:

Earnings function estimates for men in full-time employment, 1976 to 1987 (schooling model), West Germany

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Duration of schooling	0.057 (95.62)	0.059 (100.23)	0.061 (103.45)	0.060 (102.95)	0.058 (100.97)	0.058 (103.78)	0.059 (104.39)	0.061 (108.44)	0.061 (104.34)	0.061 (105.03)	0.060 (103.54)	0.059 (104.82)
Occupational experience	0.018 (68.82)	0.019 (72.10)	0.019 (71.33)	0.019 (71.62)	0.019 (72.51)	0.019 (73.04)	0.019 (70.34)	0.019 (68.82)	0.020 (65.59)	0.020 (62.55)	0.020 (61.43)	0.021 (63.74)
Square of occupational experience	- 0.00069 (114.96)	- 0.00070 (117.40)	- 0.00068 (115.49)	- 00065 (115.39)	- 0.00063 (115.10)	- 0.00061 (115.28)	- 0.00059 (111.42)	- 0.00058 (109.41)	- 0.00059 (105.71)	- 0.00056 (100.67)	- 0.00056 (98.88)	- 0.00055 (100.11)
Constant	3.543	3.575	3.611	3.688	3.762	3.806	3.836	3.837	3.884	3.905	3.948	3.963
R²	0.330	0.335	0.334	0.327	0.319	0.321	0.317	0.324	0.323	0.316	0.313	0.313
SE	0.262	0.267	0.271	0.274	0.275	0274	0.278	0.280	0.293	0.297	0.300	0.298
Sample size	97 739	100 517	101 599	105 327	106 693	108 150	107 320	106 353	107 406	107 327	109 129	110 172

Source: L. Bellmann, A. Reinberg, M. Tessaring, *Bildungsexpansion, Qualifikationsstruktur und Einkommensverteilung*, p. 52

Table 7:

Private returns to education, Spain 1990/91

	Women		Men	
	Public Sector	Private Sector	Public Sector	Private Sector
Primary education (vs. less than primary education)	11.4	12.5	9.0	7.8
Secondary education (vs. primary education)	9.8	24.1	5.0	14.5
Basic vocational training (vs. primary education)	2.9	35.0	5.4	21.4
Higher vocational training (vs. basic vocational training)	10.6	15.3	7.4	10.1
Specialized college of higher education (vs. secondary education)	19.5	34.8	7.8	26.8
University (vs. specialized college of higher education)	19.8	12.4	12.6	32.6

Source: Lassibille 1997, table 5

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