

Vitols, Sigurt

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discussion paper



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German Industrial Policy: An Overview

Sigurt Vitols

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Reichpietschufer 50
D-10785 Berlin

Abstract

Despite intense study as an attractive model for adjustment to slower worldwide growth and increasing competition from low-wage producers, the sources of German institutional comparative advantage remain controversial, particularly with regard to the role of the national state. This paper argues that the national state plays a key -- though mainly indirect -- role in supporting the modernization of industry. On the one hand, the national regulation of labor markets has discouraged price competition and imposed a "productivity whip" on companies; on the other hand, through the supply of resources to sub-national and sectoral actors, the federal government has supported the investments in skills, R&D and capital equipment needed for industrial modernization. This support of an institutional infrastructure is particularly important for the large and modern SME sector (the *Mittelstand*). The 1990s illustrate both the continued success of this infrastructure in supporting adjustment and the ultimate dependency of these institutions on strong domestic political support and adequate international demand for high quality, medium-tech products.

Zusammenfassung

Die institutionellen Regelungen in Deutschland wurden als ein attraktives Modell für die Anpassung an das langsamere weltweite Wirtschaftswachstum und den zunehmenden Wettbewerb durch Länder mit Niedriglohniveaus bereits umfassend analysiert. Trotzdem bleiben die Ursachen für den durch seine Institutionen bedingten Vorteil Deutschlands kontrovers, vor allem im Hinblick auf die Rolle der Regierungspolitik. In diesem Diskussionspapier wird die Meinung vertreten, daß die Bundesregierung eine - wenn auch hauptsächlich indirekte - Schlüsselrolle bei der Unterstützung der Modernisierung der Industrie spielt.

Auf der einen Seite hat die bindende Regulierung der Arbeitsmärkte eine Billiglohnkonkurrenz verhindert und wie eine „Produktivitäts-Peitsche“ auf die Unternehmen gewirkt; auf der anderen Seite hat die Bundesregierung durch Subventionierung an Unternehmen Investitionen in Weiterbildung, Forschung und Entwicklung und Kapitalausstattung zur Modernisierung der Industrie gefördert. Diese Unterstützung durch eine institutionelle Infrastruktur ist besonders für den großen und modernen Mittelstand wichtig. Die neunziger Jahre zeigen sowohl den fortdauernden Erfolg dieser die notwendigen Anpassungsprozesse unterstützenden Infrastruktur als auch ihre völlige Abhängigkeit von starker politischer Unterstützung und einer ausreichenden internationalen Nachfrage nach qualitativ hochwertigen Produkten eines mittleren technologischen Niveaus.

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Introduction

While the German political economy and its comparative advantage in the production of high quality, internationally competitive manufactured goods have long been an object of study, a remarkable lack of consensus exists on the key institutional features of the German model, particularly on the role of the national state in industrial policy.¹ One view is that successful adjustment is attributable to the high capacity of industrial companies to coordinate through tight intercorporate linkages, particularly with banks; according to this view, the state has played only a secondary role in subsidizing the costs of adjustment (Esser, Fach, and Dyson 1983). A second interpretation is that successful industrial development is based on the development of thriving regional economies in which local and regional government are the key state actors (Herrigel 1989; 1995). Other perspectives focus on the role of para-public institutions in supporting restructuring (Katzenstein 1987; 1989) or on corporatist labor regulation and its constraint of price-competitive strategies (Sorge and Streeck 1988; Streeck 1992; 1997). Finally, an increasingly popular view among German policymakers is that German success in the 1970s and 1980s came despite "over-regulation"; in the increasingly competitive environment of the 1990s this success is contingent upon a reduction of the role of national government. An understanding of the key institutions and their role in influencing adjustment is important not only in terms of understanding the potential for "transferability" but also in judging the problems of the 1990s and the need and ability for changes in industrial policy.

The view developed in this article is that the national state is a key actor in German industrial policy, although mainly in an "enabling" role through the support of institutions and policies with a generalized impact on industry as a whole. While the national government has in a number of instances played a "developmental" role, this type of industrial policy intervention is the exception rather than the rule; relatively little of targeting of sectors and large companies ("national champions") commonly practiced in countries such as Japan and France in the postwar period has been exercised in Germany. Similarly, the "negotiated adjustment" model of state bargaining with banks and other important actors over industrial restructuring (Zysman 1983) has been limited to a few sectors and firms in crisis in west Germany.² Nevertheless, German industrial policy deviates from a "laissez-faire" mode of adjustment in two

¹ This paper is forthcoming in a special issue of the *Journal of Industry Studies* on Modell Deutschland in the 1990s.

² The major examples of negotiated adjustment include the coal, shipbuilding and steel industries and the electronics firm AEG (Hart 1992).

significant types of intervention. The first intervention is support of corporatist labor market regulation which, a-la Meidner (1974) and Streeck (1992), constrains companies exposed to international competition from pursuing price-competitive strategies based on lower wage costs. The second type of intervention is state support for a complex institutional infrastructure which helps a broad spectrum of companies respond to pressure from international competition and the "labor constraint" by providing them with the skills, financial and technology resources needed to pursue quality-competitive strategies. This industrial policy infrastructure, which relies heavily on decentralized institutions such as industry associations and local chambers of commerce and banks, is particularly important for the large and highly productive SME sector (the *Mittelstand*), which faces a set of scale disadvantages vis-à-vis larger companies. While many of these institutions have long historical roots, their industrial policy functions have generally been substantially upgraded in the 1970s and 1980s in response to slower economic growth.

Since the 1992/3 recession, the regulatory role of the state in labor markets and the costs of the industrial policy infrastructure have been increasingly criticized for allegedly creating a competitiveness problem for companies, which in turn has caused an employment problem. However, it is argued here that there is little evidence that these institutions have led to a deterioration in the competitiveness of west German industry; furthermore, these institutions have played a crucial role in the modernization of east German industry. While the current unemployment level of 4 million is a matter of serious concern and has the potential effect of undermining political support for state regulation and funding for industrial policy, a strong case can be made that this employment problem is in large part attributable to the unification shock and to the deflationary monetary and fiscal policy currently pursued to meet the convergence criteria for membership in the European Monetary Union. The reduction of unemployment would thus be better served by an expansion of demand for high quality goods in western Europe, which is still Germany's largest market, and through the rapid development of the economies of central and eastern Europe.

1. State Regulation and the "Labor Constraint" on Price Competition

One of the major features of the German political economy is the strength of regulatory constraints on employers in the remuneration, use and dismissal of labor. This "labor constraint" includes binding industry-wide agreements over wages and working conditions, a high level of mandated or state-provided social security benefits and substantial constraints on employee dismissals.

The first major component of the labor constraint is the extensive set of legally binding sectoral collective bargaining agreements between unions and employers' association. The Collective Bargaining Law of 1953 provides for the registration of agreements with the Labor Ministry and for the arbitration of disputes; currently over 30,000 collective bargaining agreements are registered. Furthermore, as first recognized during the Weimar Republic, labor law provides for the extension of these collective bargaining agreements to all employers in a sector (*Allgemeinverbindlichkeitserklärung*); when employers accounting for at least 50% of the employees in an industry belong to an employers' association, collective bargaining agreements between the union and this association may be declared legally binding by the Labor Ministry on all companies in the sector (Kahn-Freund 1981).

These agreements are negotiated for the most part between sixteen industrial unions and sectoral employers' associations. Agreements negotiated between the engineering employers' association (*Gesamtmetall*) and the metalworkers' union (*IG Metall*) alone cover about two fifths of manufacturing employment. In most years, the wage increase agreed in this sector sets a pattern taken over with little variation by other sectors. An estimated 90 percent of all employees in industry are covered by such collective bargaining agreements; in contrast with the experience in most other industrialized countries of weakening union influence, this proportion did not decrease during the 1980s (Markovits 1986; Müller-Jentsch 1986; OECD 1991).

A second component of the labor constraint is the great degree to which nonwage costs are determined by legally mandated or publicly provided "fringe benefits." Unemployment benefits and state pensions, which are financed through mandatory contributions, are generous in comparative perspective. Social security contributions as a percentage of income in Germany are the highest among major OECD countries.³ Minimum service levels are set and fees regulated for health insurance, which is also co-financed by employer and employee. Since the early 1960s, employers have also been required to provide and fully finance a minimum of 100 percent of net pay for six weeks in case of illness (Kittner 1991). About 77 percent of labor costs in manufacturing are accounted for by wages and legally mandated contributions and fringe benefits.⁴

An indicator of the strength of the labor constraint on employee compensation is the low level of wage dispersion in Germany, which reflects low variation in wage rates across firms in industries and moderate wage gaps between semi-skilled and skilled workers on the one hand and production and non-production workers on the other hand. Employees in the lowest earnings decile received 65 percent of the earnings of the fifth decile as compared to 61

³ Based on OECD data as cited in the Financial Times, 8 October 1996, p. 15.

⁴ Own calculations from *Statistisches Bundesamt* data on labor costs in industry.

percent for Japan, 59 percent for the UK and 40 percent for the US (Streeck 1996: Table 2). It is striking that Germany is the only OECD country that actually experienced a decrease in wage dispersion in the 1980s (OECD 1993).

The labor constraint is especially important for small and medium sized firms (the *Mittelstand*), which in Germany is both relatively large and has a much smaller labor cost gap relative to large firms than in other industrialized countries. In the mid-1980s, firms with less than 500 employees accounted for 58 percent of employment in manufacturing in Germany compared to 40 percent in the UK, 35 percent in the US and about half in France. Wages in small firms in Germany are only about 10-15 percent lower than in large firms compared to 20-25 percent lower in the UK and France and 30 percent in the US.⁵

Germany also has among the highest wage and benefit levels in the world; in 1994, hourly labor costs in industry were estimated at DM 43.07 compared to DM 36.01 in Japan, 27.97 in the US and 22.05 in the UK (Kroker 1995: 707). In conjunction with high labor costs, the labor constraint imposes a "productivity whip" on companies, particularly export-oriented producers. As a result of these constraints, less productive firms are forced to modernize or go out of business (Meidner 1974).

A third component of the labor constraint is the strong legal rights granted to works councils in the representation of employees at the shop-floor level. Works councils were legally mandated during the latter part of World War I, strengthened during the Weimar Republic and, after discontinuation during the National Socialist regime, were reinstated with extended rights in the Works Constitution Act of 1952. These works councils have wide-ranging information, consultation, and co-determination rights, including rights in the areas of introduction of new technology and workplace organization, hiring and firing, and overtime and short-time work (Müller-Jentsch 1995).

The ability of works councils to influence industrial adjustment were considerably extended in the 1972 revision of the Works Constitution Act; this reform granted works councils the right to be informed of impending mass layoffs and to negotiate social plans (*Sozialpläne*) regulating mass layoffs. This allowed works councils to play a stronger role in the enforcement of the 1951 Dismissal Protection Act (*Kündigungsschutzgesetz*), as amended in 1969, which requires employers to prove the economic necessity of layoffs and to justify these layoffs according to social criteria. Works councils are allowed to appeal to the regional labor office to hold up large-scale layoffs. Social plans cover employer obligations for retraining, for redeployment to other plants or subsidiaries of the firm, for severance pay and for early retirement pensions.

⁵ Estimates based on Acs (1993) and Loveman (1991) as well as own calculations from Statistisches Bundesamt and US Census of Manufacturing data.

As a result of these rights, works councils can effectively constrain employers from quickly reducing the workforce through restructuring or during downturns in demand. The expense and legal barriers to layoffs are a large disincentive to employers from following this route. Furthermore, when presented with employers' plans for mass layoffs, works councils often develop alternative restructuring plans involving fewer layoffs and/or upgrading of skills. This constraint encourages the long-term attachment of employees to firms and investment in firm-specific skills; median job tenure in Germany is 7.5 years compared to 4.4 years in the UK and 3 years in the US (Abraham and Houseman 1993; Buechtemann 1991; OECD 1993: Ch. 4).

These three components of labor regulation constrain the extent to which employers can follow price-competitive strategies. This pressure is especially great for SMEs, which in other countries overcome some of their disadvantages vis-à-vis large firms from their lower labor costs and greater flexibility with regard to the use of labor (Averitt 1968; Doeringer and Piore 1971). Most of these firms are too small to support specialized departments for training and R&D and lack access to long-term capital markets; thus the labor constraint produces high demand for an institutional infrastructure capable of generating a supply of the resources needed for high quality production to compensate for the scale deficiencies of SMEs. This labor constraint also encourages cooperation among larger companies by helping keep labor costs "out of competition" between these companies (Vitols 1995a).

2. Public Support for Industrial Finance

A key case for analyzing the nature of industrial policy is state influence over the credit allocation process. One of the most important levers used by developmental states is the channeling of credit to specific sectors; throughout much of the postwar period interest rate policy and quantitative lending controls were used extensively by developmental states such as France and Japan to influence industrial development (Johnson 1982; Zysman 1983).

In west Germany, with the exception of reconstruction, state targeting of credit to specific sectors has been limited to low interest loans and loan guarantees for financing restructuring plans in the shipbuilding and steel industries.⁶ Nevertheless, public policy has deviated from a "laissez-faire"

⁶ A crucial part of postwar reconstruction was the allocation of Marshall Plan funds as loans for the reconstruction of key sectors including energy, iron and steel, transportation and housing; this sectoral targeting, however, was terminated in the mid-1950s (Pohl 1973). Public loans and loan guarantees in shipbuilding and steel were largely one-off deals provided to support viable rationalization plans (Strath, 1987; Vitols 1996). Low interest loans and loan

attitude towards industrial finance in three ways. First, the state has actively supported the development of the banking system's capacity to supply long-term finance to a broad spectrum of companies. Second, the state has supported two types of banks, the public savings banks and cooperative banks, which constitute an alternative to the large joint-stock banks and focus on *Mittelstand* lending. Finally, the state has encouraged stability in the financial system in order to foster long-term investment.

2.1. Long-term Refinancing Mechanisms

The German state has created a number of institutions and programs in order to boost the banking sectors' capacity to supply long-term finance. A number of public and quasi-public banks (currently 18) are authorized by legislation to carry out special functions in the public interest; many of these special-purpose banks are charged with long-term lending. For long-term lending to industry ("industrial finance"), the most important of these banks are the Bank for Reconstruction (*Kreditanstalt für Wiederaufbau*, *KfW*), the German Bank for Settlements (*Deutsche Ausgleichsbank* or *DtA*) and the Industrial Credit Bank (*Industriekreditbank* or *IKB*).

The Bank for Reconstruction was founded in 1947 to disburse the bulk of the Marshall Plan allotment for Germany; through its power to allocate scarce capital it became the center of reconstruction planning (Shonfield 1965). By the mid-1950s, with reconstruction well underway, the *KfW* moved away from direct lending to specific targeted sectors towards providing long-term refinance to banks with established relationships with companies (*Hausbank*); the *Hausbank* generally carries the liability in the case of loan default and thus has an incentive to screen loan applications and monitor loans carefully. The most important of these programs is the *Mittelstand* program which provides long-term finance to companies without access to capital markets at rates comparable to those available to publicly-listed companies; loans are generally made at fixed interest rates with a maturity of ten years.⁷

KfW loans accounted for about 5% of total long-term bank loans to industry in the late 1960s. With the economic crises in the wake of the two oil shocks, however, the importance of *KfW* lending rapidly expanded. By the late 1980s the *KfW* accounted for about 18% of long-term loans to industry and an estimated 45 percent of manufacturing firms with annual revenues less than DM 5 million and between 20 and 25 percent of firms with revenues between DM 5 million and DM 100 million received loans from the *KfW* lending has

guarantees, however, have been used extensively to support restructuring in eastern Germany after unification (Deeg 1994).

⁷ The *KfW* also has been charged with providing loans for housing, regional development, export finance and with lending to developing countries.

expanded further in the past few years due to its heavy involvement in financing in east Germany.

The *Industriekreditbank AG* is a quasi-public bank specializing in long-term lending to the *Mittelstand*.⁸ In the early postwar years the *IKB* was given the responsibility to pass on *KfW* loans to *Mittelstand* companies; in practice it has tended to focus on manufacturing firms with between 100 and 500 employees. The bank was also authorized to issue bonds to refinance its lending activities. Initially there was a division of labor between long-term lending by the *IKB* and short-term lending by the banks to smaller businesses; this division of labor gradually broke down as the other banks developed long-term lending skills and as the *KfW* made its refinancing facilities available to all banks. The stock of *IKB* loans has fluctuated between 8-10% of all outstanding long-term loans to manufacturing during the 1970s and 1980s. While approximately a third of these loans are refinanced by other special credit institutes (primarily the *KfW*), the "true" addition of the *IKB* of this sectors' lending to manufacturing can be estimated to be around 6% of long-term loans. As in the case of the *KfW*, lending activity has expanded greatly in the 1990s due to credits to firms in east Germany.⁹

The *Deutsche Ausgleichsbank (DtA)* was originally founded in 1950 (at the time with the name *Lastenausgleichsbank*) to compensate displaced persons and to support their integration into west German society. With the end of reconstruction the main function of the *DtA* shifted to supporting the founding of or changing of ownership of small firms.¹⁰ The most important programs for supporting start-ups are the Business Start-up Loan programs (*Existenzgrundungsprogramme*) and the Equity Capital Assistance program (*Eigenkapitalhilfe-Programm*). The Business Start-up Loan programs provide long-term (up to 10 or 15 years) fixed-rate loans amortization-free in the first years; a variety of programs are available to guarantee portions of these loans where the *Hausbank* cannot take over 100% of the liability for the loan. The Equity Capital Assistance Program provides an equity-like loan for start-ups; the loan lasts 10 years, requires no collateral or amortization and no interest payments for the first few years. Almost half of all business startups in Germany receive financial support from a public program, the most important of which are administered by the *DtA* (Braun 1989). In the late 1980s *DtA*

⁸ It was originally founded in 1924 (with the name *Bank für deutsche Industrieobligationen*) by industry in order to collect the funds to fulfill reparations obligations under the Dawes Plan on a self-organized basis. In 1931 its focus shifted to providing long-term loans to industry, a function which was reaffirmed in the 1949 restructuring of the bank.

⁹ The *IKB* has developed a broad array of consulting, corporate finance and export financing services for its customers. It has become somewhat of a spokesperson for industry, and with its extensive research services provides branch reports, general policy-oriented reports for business and "benchmarking" services for its customers.

¹⁰ The *DtA* is also involved in financing for displacements caused by public construction and for administering the portion of Marshall Plan funds set aside for loans for environmental protection investments.

programs accounted for about 2% of all outstanding long-term loans to industry; since then DtA new loan activity has tripled due to heavy involvement in supporting startups in east Germany.

The special credit institutes play a significant role in long-term finance for industry, accounting for slightly over one-quarter of all long-term loans to manufacturing.¹¹ They are also important sources of long-term credit for small firms in the service sector. In addition, they have played an important role in "teaching" banks how to lend long-term, particularly the private banks which have historically focused on short-term lending (Tippelskirch 1988; Weber 1954).

Other than refinance through the special credit agencies, the state has also supported the expansion of the banking sectors' long-term lending capacity through promoting long-term, mainly fixed-interest household deposits at banks; these deposits receive special tax incentives and are also exempted from minimum-reserve requirements. Longer-term (i.e. one year or longer) deposits have increased from 17 percent of total household bank deposits in 1950 to 41 percent in 1990. The state has also promoted the banking system's access to long-term refinancing on capital markets through the issuance of bonds (Vitols 1995b).

While this long-term lending role was initially resisted by many banks, the banking system has undergone a dramatic transition from providing mainly short-term credits to industry for trade and inventory ("commercial credit") before World War II to supplying long-term loans for plant and equipment ("industrial finance"). The proportion of long-term loans (i.e. loans with an original maturity of four or more years) to nonbanks provided by the large joint-stock banks expanded from four percent in 1950 to 59 percent in 1993. Long-term lending by the credit cooperative sector also expanded dramatically, from 7 percent of total loans to nonbanks in 1950 to 70 percent in the mid-1990s. Long-term lending was more significant in the public savings bank sector in the early postwar period due to loans to local government; nevertheless, long-term lending also expanded significantly for this group from 36 percent to 80 percent of total lending in the same time period.¹²

Through this dramatic transition, the banking system has been able to more than meet most of the expanding demand of industry for long-term capital. Whereas longer-term (i.e. one year or more) liabilities of industrial companies have expanded from 57 percent of total industrial liabilities in 1950 to 72 percent in 1992, longer-term bank loans expanded from 11 percent to 33 percent of total liabilities.¹³

¹¹ Own calculations based on Annual Reports and figures from the Deutsche Bundesbank.

¹² Own calculations based on Deutsche Bundesbank data.

¹³ Own calculations based on Deutsche Bundesbank flow of funds data.

2.2. Alternative Banking Sectors for the *Mittelstand*

A second public contribution to the modernization of industry is state support for smaller banks focusing on finance for smaller firms. While the role of the large universal banks (particularly the "Big Three" Deutsche Bank, Dresdner Bank and Commerzbank) in providing finance to large companies is well known (Shonfield 1965; Zysman 1983), less familiar is the critical role that the public savings banks and cooperative banks play in providing long-term finance to SMEs (Deeg 1992).¹⁴ These local banks, which are too small to individually provide the full range of services provided by the large joint-stock banks, are dependent upon a complex associational structure for access to specialized financial services and training in order to meet the demand of *Mittelstand* firms for sophisticated services and long-term credit.

The state has promoted the modernization of both the public savings banks and credit cooperatives through the development of a "three tier" associational structure. The more than 600 public savings banks and 2,500 credit cooperatives on the local level are supported by institutions on the upper level regional and national tiers. These upper tier institutions provide local banks with the training needed by lending officers for long-term lending, information on market trends, and specialized financial services such as export finance, liquidity management and advisory and brokerage services. This three tier structure helps smaller banks overcome the scale disadvantages of small size (through the aggregation of demand at the upper tiers) while maintaining their comparative advantage in nearness to customer and local economy.

This infrastructure is especially important since smaller companies face a "double disadvantage" relative to large companies regarding access to specialized services and long-term finance. On the one hand, SMEs have a greater demand for external finance given the "lumpy" nature of large investment projects which exceeds companies' capacity to internally finance these investments up front. On the other hand, smaller companies lack direct access to stock markets since the costs of issuance are high and few non-bank investors are interested in the low liquidity provided by limited securities issuance. However, the strength of the "labor constraint" puts great pressure on the German *Mittelstand* to invest in new equipment at levels approaching large companies; in the late 1980s, new capital expenditures as a proportion of value added by manufacturing firms with between 10-99 and between 100-499 employees were approximately 90 percent and 80 percent, respectively, of the rate of investment in large firms. The greater dependence of smaller firms on

¹⁴ The public savings banks were originally established by municipal governments in order to deal with public finance and promote savings among the poor; however, in the twentieth century they became increasingly involved in local economic development and SME finance (Deeg 1992). The credit cooperatives originated from a "self-help" movement among craft and agricultural producers in the mid-1800s to provide finance for modernization in the face of increasing competition from larger firms (Kluge 1991).

bank lending can be seen in their different capital structure compared to larger firms. Whereas in the late 1980s 8 and 4 percent of the liabilities of large firms are accounted for by total and by longer-term bank loans, respectively, 32 percent and 19 percent of the liabilities of smaller enterprises were accounted for by the same types of funding sources (Deutsche Bundesbank 1992).

2.3. Policies for Long-term Financial Stability

A final factor relating to the financial system which can be described as industrial policy in the broad sense is the high priority the state has given to stability in financial markets, particularly in those segments concerned with long-term finance. One aspect of this is strict prudential regulation of the banking sector including long-term lending. The second aspect of this is the encouragement of corporatist arrangements for stabilizing capital markets.

While most financial regulatory systems involve some kind of prudential banking standards, the German regulatory system in the postwar years has been distinguished by its emphasis on quantitative, universally applicable prudential standards. During reconstruction, bank regulators developed strict standards for liquidity and capital adequacy. Liquidity standards require that long-term (four year or more) and medium-term (one to four year) loans be covered by adequate amounts of medium- and long-term deposits, bank bonds and capital. Capital standards define fixed ratios of capital that must be available as a "cushion" to absorb unexpected losses through defaults on loans.¹⁵

This strict prudential regulation has helped prevent the occurrence in Germany of the speculative bubble/banking crisis cycle experienced in most advanced industrialized countries in the 1980s and 1990s. Excessive bank lending in countries such as the US, Japan and the UK was possible through the use of short-term money market funds by aggressively expanding banks with inadequate levels of capital to finance longer-term corporate and real estate lending. Conversely, reliance on short term funds and low levels of capital rendered these banks vulnerable to liquidity crises (mass runoffs of short-term funds) and solvency crises as these speculative bubbles burst. The consequences of such crises are sharp cutoffs in the provision of new loans ("credit crunches") which interrupt the investment cycle in industry (Vitols 1996).

In addition to strict prudential regulation, the state has also encouraged financial stability through the Central Capital Market Committee (*Zentraler Kapitalmarktausschuß*), a corporatist body including representatives of different

¹⁵ Allen (1990) has extensively analyzed the importance of *Rahmenbedingungen*, or framework regulation, in the German financial system. Other framework regulations control risk through exposure to large loans, to individual customers, and "insider" loan risk.

banking sectors and regulating access to the German bond market. This body was established in 1957 by the Finance Ministry to ration new securities issues at a time when interest rates appeared to be rising to dangerous levels; the timing, size and interest rate of issues were determined by the committee in order to smooth out the demand for long-term capital. This body has been also called upon by the state to stabilize bond markets during periods of international financial instability in the 1970s and 1980s (Pohl 1992).

3. State Support for Industrial Research and Development

A second key industrial policy area for the state is involvement in industrial R&D and innovation. As in the area of industrial finance, the role of the German state in this field can be generally characterized as neither developmental nor laissez-faire. While the federal government in the 1960s and early 1970s established large projects focusing on the development of a small number of key technologies,¹⁶ since the mid-1970s there has been a major shift in research and technology policy towards increasing the innovative capacity of industry as a whole, particularly for smaller firms (Reinhard and Schmalholz 1996).

Total R&D expenditure in Germany as a percentage of Gross National Product increased from 1.3 percent in 1962 to a postwar peak of 2.9 percent in the late 1980s, when it was comparable to Japan's and roughly a percentage point higher than non-defense R&D in the US and UK (BMBF 1996: 531; National Science Foundation 1994). The state played a key role in this expansion, both in its support of an external, public and quasi-public R&D infrastructure and in its programs for boosting the internal innovative capacity of firms.

3.1. A Public R&D Infrastructure

One key part of this effort is state support for a public and quasi-public technology infrastructure at the applied end of the R&D chain. The Fraunhofer Society, which is an umbrella group for about 40 research institutes, is intended to fill the gap between basic and company-based industrial research. While most research is performed under contract with industry, the research

¹⁶ Up into the mid-1970s federal technology policy was dominated by the direct support of key development projects at a small number of large firms, mainly in nuclear power, aerospace and data processing; the later two efforts had mixed success (Schmitz et al. 1976; Grande and Häusler 1994). In the mid-1970s, about 80 percent of the Ministry of Research and Technology's (BMFT) industrial research funding went to fifteen large companies (Ziegler 1989).

infrastructure of the Fraunhofer institutes is publicly funded (Meyer-Krahmer 1990).¹⁷

A second component of this technology infrastructure is the dense set of sectoral and local associations. Both industry associations, which are responsible for promoting the interests of companies in a sector as a whole, and professional associations, which represent engineers in a specific field or sector, play an active role in developing and diffusing new technologies with general applicability. In addition to publishing professional journals, providing further training for engineers, and providing services such as quality certification, many of these associations have annual meetings and working groups focusing on common technical problems, possible solutions and research priorities.

The development of these priorities has important implications for steering co-financed research sponsored by the AiF (*Arbeitsgemeinschaft industrieller Forschungsvereinigungen*), an umbrella organization of over 100 of these associations. The AiF was founded in 1954 by the Federal Economics Ministry and the German Association for Industry. The federal government matches funds spent by industry on R&D on a fifty-fifty basis and turns over this money to associations for general medium-term research addressing the common problems of the sector (Forschungsvereinigungen 1992; Lütz 1993). While the total proportion of private sector R&D performed or coordinated by these institutes was low in overall terms (less than 2% in the 1980s), these institutes were quite important in some sectors, particularly in small-firm dominated sectors. These institutes accounted for one-third of R&D in the leather, textile and clothing industries in the mid-1980s (Häusler 1989: 37).

These sectoral associations, as well as a dense set of chambers of commerce and industry (*Industrie- und Handelskammern*) and chambers of artisans (*Handwerkskammern*) funded by compulsory fees for all companies, play an active role in technology transfer and technology advisory services. Finally, two quasi-public agencies help diffuse new technologies and production techniques. The Curatorium for Economic Rationalization (*Rationalisierungskuratorium der Wirtschaft*), which was founded to support the reconstruction of the economy after World War II, organizes further technical training for managers and provides audits and consulting services for firms on the implementation of new services. The REFA Association for Work Organization and Company Development (*REFA-Verband*) performs time-

¹⁷ Germany is also one of the biggest promoters of basic research; with 20 percent of total world expenditures on basic science, it takes second place behind France (with 20 percent) and ahead of the US (with 16 percent) and Japan (with 12 percent) (BMBF 1996: 25). In addition to the basic research performed in the university system, the state also supports basic research through the Max-Planck Society, which is an umbrella organization for about 60 specialized research institutes focusing mainly on different areas of physics, biology, chemistry and medical research. About four-fifths of its budget comes from the federal and regional governments (Meyer-Krahmer 1990: Chapter 3).

motion studies and job organization evaluations; in effect is a "neutral" third party which helps ease labor relations problems regarding the introduction of new technologies.

These external institutions for applied research and technology advisory services are extensively used by German firms. The most frequently used of these institutions are industry associations; 43 percent of manufacturing firms reported having used such associations for technology transfer or advice. Other frequently used institutions include the chambers (33 percent of companies), the Curatorium for Economic Rationalization (17 percent), polytechnic institutes (22 percent) and the universities (20 percent) (Reinhard and Schmalholz 1996).

3.2. Financial Incentives for *Mittelstand* R&D

The federal government has also implemented a number of technology programs to increase the internal innovative capacity of industry as a whole. Starting in the mid-1970s the federal government has redirected its set of R&D financial incentives away from the "direct" subsidy of key projects at large firms toward the "indirect" support of a broad spectrum of firms. In order to help overcome the disadvantages smaller firms face vis-à-vis larger firms, these programs often are limited to *Mittelstand* companies (Schrumpf 1986/87: 255).

Two of the most important of these indirect programs are the "R&D Personnel Costs Subsidies Program" of the Federal Economics Ministry and the "Promotion of Research Personnel Growth Program" of the Federal Ministry for Research and Technology. Both are aimed at supporting human capital formation in R&D in small firms by reducing the costs of R&D personnel. Between 1979 and 1988 almost 20,000 firms were supported under the first program; 6,000 firms were supported under the second program between 1984 and 1987. In all almost 40 percent of all *Mittelstand* companies in manufacturing benefited from these programs. New programs for the indirect support of *Mittelstand* R&D have shifted away from the support of innovation in individual firms towards the promotion of cooperation between firms (Kuntze and Hornschild 1995).

Another set of programs which have received greater priority since the mid-1970s are also aimed at a broad spectrum of firms but are tied to the promotion of specific kinds of innovations (so-called "indirect-specific" programs). The indirect-specific strategy allows a limited amount of funds to be used to achieve narrow aims while at the same time minimizing state involvement. The delegation of administration and monitoring tasks to industry experts both reduces the mistrust of companies and frees the state from having to build up its own capacity for executing these tasks.

Indirect-specific programs have both fairly specific goals and involve applied technology used in a broad array of sectors. These programs include Mikroelektronik (for promotion of the use of microelectronics), Fertigungstechnik (for the improvement of manufacturing technology), Informationstechnik (information technology), Materialforschung (materials research), Bioverfahrenstechnik (biotechnology) and 100 MW-Wind (100 Megawatt Wind). The Federal Ministry for Research and Technology has heavily involved industry associations and other non-public organizations for the governance of these programs. Thus the first such program, Sonderprogramm Mikroelektronik was implemented only after a number of years of piloting in heavy consultation with the VDI (Association of German Engineers) and other interest groups; a special institute, the VDI-Technologiezentrum, was established in Berlin in 1978 to administer grants for the program and to provide consulting services to firms. Similar arrangements have been followed for the other projects, e.g. a special quasi-public institute was established in Karlsruhe to administer the program Fertigungstechnik. While indirect-specific projects have remained relatively small as a percentage of total public funds for civil R&D, they have been considered a very successful means for achieving specific goals within a short period of time (Ziegler 1989).

These programs have helped support the development of the internal R&D capacity of industry; industry-financed R&D has increased from 0.6 percent of GDP in 1962 to 1.8 percent of GDP in 1989.¹⁸ Especially impressive is the distribution of the R&D effort across firm size categories; firms with less than 100 employees spent considerably more on R&D as a percentage of total sales than the industrial average (5.6 percent versus 4 percent, respectively) (SV 1996: table 9).

4. Public Policies for a Skilled Labor Force

While labor market policies are generally not seen to be an industrial policy instrument of the same status as financial and technology policy, these policies play a key role in supporting the competitiveness of German industry. As reviewed in the second section, labor market regulation creates a labor constraint limiting the employers' flexibility in the remuneration and dismissal of labor and constituting a potential competitive disadvantage for industry. Public policies towards labor, however, have mitigated the potential negative effect of this labor constraint in two ways. First, the upgrading of the training system in the 1970s and 1980s has increased the skill level of the labor force, thereby promoting flexibility in the use of labor within the firm ("functional flexibility") in the context of incremental innovation and technological change. Secondly, a

¹⁸ Own calculations from BMBF (1996: 531).

number of public programs including short-term work subsidies and early retirement pensions have the effect of mitigating the potentially negative effects of these constraints given the cyclical fluctuations and structural change typical of manufacturing. Both of these policies have been aimed at affecting a broad spectrum of industrial firms.

4.1. A Public Vocational Training System

Vocational training is a publicly regulated "dual" system mixing practical company-based training and theoretical instruction in specialized vocational schools.¹⁹ Apprenticeships last between two- to three-and-a-half years according to the type of apprenticeship. Since the passage of Vocational Training Law (*Berufsbildungsgesetz*) of 1969, training standards for apprenticeships are bargained between unions and sectoral employers' associations and declared binding by the Federal Agency for Vocational Training (*Bundesinstitut für Berufsbildung*). An apprenticeship contract binds the employer to provide adequate training; teenage apprentices may only be trained according to officially-recognized standards. The supervision of training programs and administration of final exams are done at the local level by the Chambers of Commerce and Industry and the Chambers of Artisans and general training standards. The training system is in effect a public resource offering low-cost opportunities for employers (including the *Mittelstand*) to participate and have access to skilled labor (Streeck et al. 1987).

In contrast with countries such as the US and UK, where apprenticeship training has fallen into neglect, the German training system has been modernized and both the demand for and supply of apprentices has expanded. During the 1970s and 1980s, training standards were upgraded in occupations accounting for 96 percent of training places (Casey 1991: 213). Particularly notable has been the expansion of the supply of training places by employers not only in the traditional craft and maintenance occupations but also in white collar and production occupations. Production occupations have been transformed from semi-skilled to skilled status and formal apprenticeship has become the normal port of entry for production workers in many industrial sectors.

The demand for training places has also expanded greatly in the last two decades. The widespread acceptance of the training system eases the problem

¹⁹ The principle of combining theoretical with practical instruction is also carried through into university studies. Engineering students for example are required to perform a number of one- to three-month supervised practical projects in companies; the bachelors thesis (*Diplomarbeit*) typically applies theory to the solution of a practical problem of a specific company. Engineering students are often employed by that company after completion of their studies; this has become one of the main forms of technology transfer in Germany.

of the school-to-work transition for youth, creates a set of generally-acknowledged skills standards and credentials, and increases the predictability of career paths and the incentives for high performance early on. Whereas the use of unskilled and semiskilled workers increased during the most "Fordist" period in German industry in the 1950s and 1960s (Berghahn 1986), the proportion of the age cohort between 16 and 19 undertaking formal apprenticeships increased to 54 percent in 1980 and 75 percent in 1990. Furthermore, an increasing proportion of school leavers with the academically-oriented *Abitur* degree seek training positions (Wagner 1995).

The theoretical knowledge that production workers have and their understanding of general production flow and work processes increases their flexibility in reassignment, in the introduction of new technology, in recognizing flaws in production and immanent machine breakdowns, and in performing maintenance tasks. This highly skilled flexible manual workforce has eased incremental innovation and enabled a high degree of autonomy in production (Prais and Wagner 1983; O'Mahoney, Wagner, and Paulsson 1994; Beuschel, Gensior, and Sorge 1988; Streeck 1989).

4.2. Labor Market Policies

While the training system increases the flexibility of workers within the firm, labor market policies help mitigate the costs of long-term worker attachment given cyclical and structural change. The two most important of these are short time work subsidies and early retirement pensions.

Short-term work subsidies date back to the Weimar Republic and were substantially upgraded with the Work Promotion Act of 1969 (Kühl 1982). Public funds are provided to supplement the wages of workers who have been reduced to part-time work due to temporary decreases in demand ("short-time work subsidies"). In practice manufacturing benefits most from these short-time work subsidies due to the highly cyclical nature of demand for its products. In contrast with countries like the US, German industry adjusts to short-term decreases in demand to a greater extent through reducing the average hours worked than through reductions in the number of workers (Abraham and Houseman 1993). Short time working subsidies were used heavily during the 1974/5, 1980/2 and 1992/3 recessions, reaching as high as 25 percent of workforce in industries such as coal and steel (Linke 1993). Short-term work subsidies, as well as other active labor market policies, are administered by a decentralized system of local and regional labor offices (Pfuhmann and Spiegl 1987).

Furthermore, substantial public subsidies have been provided to support early retirement for workers. After 1973, under certain conditions men at age

63 and women at 60 could receive an early retirement pension (*vorgezogenes Altersruhegeld*) without loss to their regular pension after the normal retirement age. Starting in the early 1980s workers were allowed to receive a pre-retirement pension (*Arbeitslosenaltersruhegeld*) at the age of 58 if an unemployed or young person is hired as a replacement. Early retirement programs have helped maintain a balanced age structure in traditional sectors; even sectors with substantial employment declines have been able to hire youth and train them according to updated standards (Semlinger 1991; Schäfer 1988).

5. On the Future of the German Model

In the second quarter of 1992 the "unification boom" suddenly ran out of steam and the German economy plunged into recession. While the valley of the recession was reached relatively shortly thereafter in the first quarter of 1993 with real GDP 2 percent below the previous year's figure, the recovery since then has been modest; GDP barely grew one percent in 1995 and decreased slightly in the first quarter of 1996. After a slight dip in 1994, unemployment continued to climb during 1995 and hit the 4 million mark in the beginning of 1996, the highest level in the history of the federal republic.²⁰

This latest crisis has triggered with greater intensity criticisms of the German model that had been heard in the wake of previous recessions. These criticisms include the cost disadvantages German industry faces and the lack of innovative capacity of German industry in responding to markets in both traditional industries and new "high tech" industries. These constitute competitiveness problems for industry, which in turn allegedly contribute to the employment problem Germany is currently facing (DIW 1995a).

The first major criticism boils down to the claim that German industry has a major cost disadvantage relative to foreign competitors. This criticism, which is made most strongly by the business community and the ruling conservative-liberal coalition, attributes this cost disadvantage to the over-regulation of labor markets and high taxes. Powerful unions have led to high wages, over-regulation adds to these costs through inflexibility in the use and motivation of labor, and an overly-generous safety-net leads to an even more rapid increase in nonwage costs and a high level of absenteeism (Kroker 1995).

²⁰ Calculations from Deutsche Bundesbank *Saisonsbereinigte Wirtschaftszahlen*.

The second major criticism is that German industry lacks innovative capacity to respond to new markets. One variant of this criticism is made mainly by the business community and the ruling conservative/liberal coalition and focuses on the stifling effects of regulation on the development of high tech industries; this includes over-regulation of financial institutions, which leads to a lack of venture capital for high-tech start-ups, over-regulation of substantive areas such as biotechnology research and environmental protection, and general legal and bureaucratic barriers to the establishment of new businesses. Thus Germany has a relatively weak share of world trade in high tech areas such as information technology, biotechnology, and aerospace. The problem of over-regulation, according to this variant, contributes to the employment problem by stifling employment generation through new sectors not only in hi-tech but also in the service sector (Mayer 1996).

Another variant of the "weak innovative capacity" of German industry criticism, which is made mainly by trade unions and the social democratic party, blames the lack of innovative capacity of companies on the management and internal structures of companies themselves (Jürgens and Naschold 1994). Furthermore, companies have a tendency to "over-engineer" due to the dominance of technically-trained managers within companies; as a result, not enough attention is paid to production costs or to simplify product lines. This has left German companies vulnerable to products which offer fewer options but considerable price savings.²¹

Considerable evidence exists, however, that these claims are incorrect or should be moderated; the neglect of cyclical and temporary conditions contributing to the current German crisis leads to the exaggeration and misidentification of "the problem." Contradicting the claim of regulatory-induced excess costs are recent studies which show that costs faced by businesses are not exceptionally high in comparative perspective. High hourly labor costs in Germany are more than compensated for by higher levels of productivity; thus unit labor costs are lower than in the US, Japan and UK. Business taxes are also not unusually high once factors such as very rapid depreciation allowances are taken into account (Köddermann 1996).

In addition, the fact that west Germany has not lost overall world market share contradicts the claim that Germany has a generalized competitiveness problem due to weak innovative capacities (DIW 1995a). While problems may exist in certain traditional and high-tech sectors,²² Germany is highly competitive internationally in a number of high tech industries such as

²¹ This threat has been posed by Japan in particular; for example, the Lexus is competing for the same class of customers that Mercedes and BMW has, and Japanese machine tool producers are competing with companies such as Deckel and Maho by offering products at one half to one third of the price of German goods.

²² See for example the analysis by Jürgens and Naschold (1994) of the innovative problems of the German machine tool industry.

pharmaceuticals and optics (DIW 1995b). Furthermore, the methodology of studies which focus on world trade shares overstate the high tech problem because Germany has one of the largest markets for high tech products and thus absorbs domestically most production (DIW 1995a).

Since competitiveness problems cannot be the major cause of the employment problem, the explanation of the current crisis must shift to the weakness of aggregate demand for German products. This weakness has been caused in large part by the extreme deflationary effect of the federal government's and European Union member countries' attempts to meet the Maastricht Treaty's inflation and public debt criteria for monetary union. These criteria require that the government budget deficits amount to no more than 3 percent of GDP, that outstanding government debt be no higher than 60 percent of GDP, and that inflation be no greater than 1.5 percent of the level in the three best performing member states. These criteria are forcing governments to cut spending and raise taxes and central banks to follow restrictive monetary policies at a time when anti-cyclical policies would boost demand in Germany's domestic and major export markets. The collapse of markets in central and eastern Europe have also weakened aggregate demand for German products. The employment problem would thus be more effectively addressed by loosening monetary and fiscal policy in the European Union (Carlin and Soskice 1996) as well as by stimulating economic growth in central and eastern Europe (Schumacher 1996).

Of greater concern, however, is the political effect the widespread popular perception that continuing high unemployment is attributable to a competitiveness problem caused by high taxes, high wages, and an inflexible labor force. As part of its offensive to cut unemployment in half by the year 2000, the majority coalition is proposing large tax cuts and a major deregulation of the labor market. If the major cause of unemployment is weak demand, however, these changes are unlikely to improve the employment problem; furthermore, these changes run the danger of reducing the incentives for employers to follow quality-competitive strategies on the one hand and reducing funding for crucial parts of the public infrastructure supporting such strategies on the other hand.

References

- Abraham, Katherine G. and Susan N. Houseman** 1993: *Job Security in America: Lessons from Germany*. Washington: Brookings.
- Acs, Zoltan, and David Audretsch** eds 1993: *Small Firms and Entrepreneurship: An East-West Perspective*. Cambridge: Cambridge University Press.
- Allen, Christopher S.** 1990: Democratic Politics and Private Investment: Financial Regulation in the Federal Republic of Germany and the United States. Research Report #2. Washington: American Institute for Contemporary German Studies.
- Arbeitsgemeinschaft industrieller Forschungsvereinigungen** 1992: *Aufgaben, Anliegen, Arbeitsweise*. Köln: AiF.
- Averitt, Robert T.** 1968: *The Dual Economy. The Dynamics of American Industry Structure*. New York: Norton.
- Berghahn, Volker R.** 1986: *The Americanization of West German Industry, 1945-1973*. Cambridge: Cambridge University Press.
- Beuschel, Werner, Sabine Gensior, and Arndt Sorge** 1988: *Mikroelektronik, Qualifikation und Produktinnovation. Ergebnisse von Fallstudien*. Berlin: Edition Sigma.
- BMBF** (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie) 1996: *Bundesbericht Forschung 1996*. Bonn: BMBF.
- Braun, Dirk** 1989: *Die öffentliche Förderung von Existenzgründungen in Baden-Württemberg*. Konstanz: Hartung-Gorre.
- Buechtemann, Christoph** 1991: 'Employment Protection and Deregulation: The West German Experience.' In *Employment Security and Labor Market Behavior: Interdisciplinary Approaches and International Evidence*, edited by C. Buechtemann. Ithaca, N.Y.: ILR Press.
- Carlin, Wendy, and David Soskice** 1996: 'Micro Strengths, Macro Weaknesses: Assessing the German Economy in the 1990s.' *National Institute Economic Review* forthcoming.
- Casey, Bernard** 1991: 'Recent Developments in the German Apprenticeship System.' *British Journal of Industrial Relations* 29 (2):205-22.
- Deeg, Richard** 1992: Banks and the State in Germany: The Critical Role of Subnational Institutions in Economic Governance unpublished PhD thesis in Political Science at MIT. Ph. D., Political Science, MIT, Cambridge, Mass.
- Deeg, Richard** 1994: Banking on the East: The Political Economy of Investment Finance in Eastern Germany. Discussion Paper FS I 94 - 303. Berlin: Wissenschaftszentrum Berlin.
- Deutsche Bundesbank** 1992: 'Longer Term Trends in the Financing Patterns of West German Enterprises.' *Monthly Report* 44 (10):25-39.
- DIW** 1995a: 'Hat Westdeutschland ein Standortproblem?' *DIW Wochenbericht* 62 (38):653-61.
- DIW** 1995b: 'Technologische Leistungsfähigkeit der westdeutschen Wirtschaft trotz einzelner Schwachstellen unterschätzt.' *DIW Wochenbericht* 62 (33):571-8.
- Doeringer, Peter, and Michael Piore** 1971: *Internal Labor Markets and Manpower Analysis*. Lexington, Mass.: Lexington.

- Esser, Josef, Wolfgang Fach, and Kenneth Dyson** 1983: 'Social Market and Modernization Policy: West Germany.' In *Industrial Crisis*, edited by K. Dyson and S. Wilks. New York: St. Martins.
- Grande, Edgar, and Jürgen Häusler** 1994: *Industrieforschung und Forschungspolitik. Staatliche Steuerungspotentiale in der Informationstechnik*. Frankfurt: Campus Verlag.
- Hart, Jefferey** 1992: *Rival Capitalists: International Competitiveness in the United States, Japan and Western Europe*. Ithaca: Cornell U. Press.
- Häusler, Jürgen** 1989: Industrieforschung in der Forschungslandschaft der Bundesrepublik: ein Datenbericht. MPIFG Discussion Paper 89/1. Cologne: Max-Planck-Institut für Gesellschaftsforschung.
- Herrigel, Gary** 1989: 'Industrial Order and the Politics of Industrial Change: Mechanical Engineering.' In *Industry and Politics in West Germany. Toward the Third Republic*, edited by P. Katzenstein. Ithaca, NY: Cornell.
- Herrigel, Gary** 1995: *Industrial Constructions: The Sources of German Industrial Power*. Cambridge: Cambridge University Press.
- Johnson, Chalmers** 1982: *MITI and the Japanese Miracle. The Growth of Industrial Policy, 1925-1975*. Stanford: Stanford University Press.
- Jürgens, Ulrich, and Frieder Naschold** 1994: 'Arbeits- und industriepolitische Entwicklungsengpässe der deutschen Industrie in den neunziger Jahren.' In *Institutionenvergleich und Institutionendynamik. WZB-Jahrbuch 1994*, edited by W. Zapf and M. Dierkes. Berlin: Edition Sigma.
- Kahn-Freund, Otto** 1981: 'The Changing Function of Labour Law.' In *Labour Law and Politics in the Weimar Republic*, edited by R. Lewis and J. Clark. Oxford: Basil Blackwell.
- Katzenstein, Peter** 1987: *West Germany: Growth of a Semi-Sovereign State*. Philadelphia: Temple University.
- Katzenstein, Peter** 1989: 'Industry in a Changing West Germany.' In *Industry and Politics in West Germany*, edited by P. Katzenstein. Ithaca: Cornell U. Press.
- Kittner, Michael** 1991: *Arbeits- und Sozialordnung*. Cologne: Bund Verlag.
- Kluge, Arnd** 1991: *Geschichte der deutschen Bankgenossenschaften. Zur Entwicklung mitgliederorientierter Unternehmen*. Frankfurt: Fritz Knapp.
- Köddermann, Ralf** 1996: 'Sind Löhne und Steuern zu hoch?' *IFO Schnelldienst* 49 (20):6-15.
- Kroker, Rolf** 1995: 'Deutschland -- Angeschlagene Standortqualität.' *WSI Mitteilungen* 48 (11):705-11.
- Kühl, Jürgen** 1982: 'Das Arbeitsförderungsgesetz (AFG) von 1969. Grundzüge seiner arbeitsmarkt- und beschäftigungspolitischen Konzeption.' *Mitteilung aus der Arbeitsmarkt- und Berufsforschung* 15 (3):251-60.
- Kuntze, Uwe, and Kurt Hornschild** 1995: 'Evaluation of the Promotion of R&D Activities in Small and Medium-Sized Enterprises.' In *Evaluation of Technology Policy Programmes in Germany*, edited by G. Becher and S. Kuhlmann. Dordrecht, Netherlands: Kluwer.
- Linke, Lothar** 1993: Kurzarbeit im Strukturwandel. Eine Analyse in der Bundesrepublik während der achtziger Jahre unter Einbeziehung erster Erfahrungen in den neuen Bundesländern. Discussion Paper FS I 93 - 206. Berlin: Wissenschaftszentrum.

- Loveman, Gary, and Werner Sengenberger** 1991: 'The Re-emergence of Small-Scale Production: An International Comparison.' *Small Business Economics* 3:1-37.
- Lütz, Susanne** 1993: *Die Steuerung industrieller Forschungskooperation: Funktionsweise und Erfolgsbedingungen des staatlichen Förderinstruments Verbundforschung*. Frankfurt: Campus.
- Markovits, Andrei** 1986: *The Politics of the West German Trade Unions. Strategies of Class and Interest Representation in Growth and Crisis*. Cambridge: Cambridge University Press.
- Mayer, Otto** 1996: 'Standort Deutschland -- neue Herausforderung angesichts veränderter Wettbewerbsbedingungen?' *Aus Politik und Zeitgeschichte* (B 26/96):3-13.
- Meidner, Rudolf** 1974: *Co-ordination and Solidarity: An Approach to Wages Policy*. Stockholm: Bokförlaget Prisma.
- Meyer-Krahmer, Frieder** 1990: *Science and Technology in the Federal Republic of Germany*. Essex, UK: Longman.
- Müller-Jentsch, Walther** 1986: *Soziologie der industriellen Beziehungen: Eine Einführung*. Frankfurt: Campus Verlag.
- Müller-Jentsch, Walther** 1995: 'Germany: From Collective Voice to Co-Management,' in *Works Councils: Consultation, Representation, and Cooperation in Industrial Relations*, edited by J. Rogers and W. Streeck. Chicago: University of Chicago Press.
- National Science Foundation** 1994: *Science Indicators*. Washington: GPO.
- OECD** 1991: *Employment Outlook 1991*. Paris: OECD.
- OECD** 1993: *Employment Outlook 1993*. Paris: OECD.
- O'Mahoney, M., K. Wagner, and M. Paulsson** 1994: Changing Fortunes: An Industry Study of British and German Productivity Growth Over Three Decades. Report No. 7. London: National Institute of Economic and Social Research.
- Pfuhmann, Herbert, and Günther Spiegl** 1987: *Die Bundesanstalt für Arbeit*. Stuttgart: Kohlhammer.
- Pohl, Hans** 1992: *Deutsche Börsengeschichte*. Frankfurt: Fritz Knapp.
- Pohl, Manfred** 1973: *Wiederaufbau: Kunst und Technik der Finanzierung 1947-1953. Die ersten Jahre der Kreditanstalt für Wiederaufbau*. Frankfurt: Fritz Knapp.
- Prais, S.J., and Karin Wagner** 1983: 'Some Practical Aspects of Human Capital Investment: Training Standards in Five Occupations in Britain and Germany.' *National Institute Economic Review* (112):53-76.
- Reinhard, Michael, and Heinz Schmalholz** 1996: *Technologietransfer in Deutschland. Stand und Reformbedarf*. Berlin: Duncker & Humblot.
- Schäfer, Günther** 1988: 'Arbeitsmarktpolitische Maßnahmen zwischen 1980 und 1988 -- Arten, Umfang und direkte Wirkungen.' *RWI-Mitteilungen* 39 (4):353-82.
- Schmitz, Karl, Rainer Riehle, Wolf-Dieter Narr, Claus Koch, and Ulrich Albrecht** 1976: *Der Staat und die Steuerung der Wissenschaft*. Göttingen: Verlag Otto Schwartz & Co.
- Schrumpf, Heinz** 1986/87: 'Kleine und mittlere Unternehmen in der technologiepolitischen Konzeption der Bundesregierung.' *RWI-Mitteilungen* 37/38 (2):239-56.

- Schumacher, Dieter** 1996: 'Mehr Beschäftigung in der EU durch Außenhandel mit Transformationsländern.' *DIW Wochenbericht* 63 (34):557-65.
- Semlinger, Klaus** 1991: 'Workforce Adjustment in a Cooperative Institutional Setting: Germany.' In *Workforce Adjustment Patterns in Four Countries: Experiences in the Steel and Automobile Industries*, edited by P. Auer. Discussion Paper FS I 91 - 4. Berlin: Wissenschaftszentrum.
- Shonfield, Andrew** 1965: *Modern Capitalism: The Changing Balance of Public and Private Power*. London: Oxford Press.
- Sorge, A., and W. Streeck** 1988: 'Industrial Relations and Technical Change: The Case for an Extended Perspective.' In *New Technology and Industrial Relations*, edited by R. Hyman and W. Streeck. Oxford: Basil Blackwell.
- Streeck, Wolfgang** 1989: 'Successful Adjustment to Turbulent Markets: The Automobile Industry.' In *Industry and Politics in West Germany*, edited by P. Katzenstein. Ithaca, N.Y.: Cornell Univ.
- Streeck, Wolfgang** 1992: *Social Institutions and Economic Performance: Studies of Industrial Relations in Advanced Industrialized Countries*. London and Beverly Hills: Sage.
- Streeck, Wolfgang** 1996: 'German Capitalism: Does it Exist? Can it Survive?' In *Modern Capitalism or Modern Capitalisms?*, edited by C. Crouch and W. Streeck. London: Francis Pinter.
- Streeck, Wolfgang** 1997: 'Beneficial Constraints: On the Economic Limits of Rational Voluntarism.' In *Contemporary Capitalism. The Embeddedness of Institutions*, edited by J. R. Hollingsworth and R. Boyer. Cambridge: Cambridge University Press.
- Streeck, W., J. Hilbert, K. van Kevelaer, F. Maier, and H. Weber** 1987: *Steuerung und Regulierung der beruflichen Bildung. Die Rolle der Sozialpartner in der Ausbildung und beruflichen Weiterbildung in der Bundesrepublik Deutschland*. Berlin: Sigma.
- SV** (SV-Gemeinnützige Gesellschaft für Wirtschaftsstatistik) 1996: *Forschung und Entwicklung in der Wirtschaft 1993 mit ersten Daten bis 1995*. Essen: SV.
- Tippelskirch, Alexander** 1988: 'Der Langfristige Kredit im Firmenkundengeschäft.' In *Handbuchz Firmenkundengeschäft. Das Firmenkundengeschäft auf dem Weg ins 21. Jahrhundert*, edited by K. Junker and E. Priewasser. Frankfurt: Fritz Knapp Verlag.
- Vitols, Sigurt** 1995a: Corporate Governance versus Economic Governance: Banks and Industrial Restructuring in the U.S. and Germany. Discussion Paper FS I 95-310. Berlin: Wissenschaftszentrum.
- Vitols, Sigurt** 1995b: German Banks and the Modernization of the Small Firm Sector: Long-Term Finance in Comparative Perspective. Discussion Paper FS I 95-309. Berlin: Wissenschaftszentrum.
- Vitols, Sigurt** 1996: Modernizing Capital: Financial Regulation and Long-Term Finance in the Postwar U.S. and Germany. Dissertation, Department of Sociology, University of Madison-Wisconsin, Madison, WI.
- Wagner, Karin** 1995: Why Does the German Training System Work: The Incentives that Drive the German Apprenticeship System. *Australian Bulletin of Labour*:236-55.
- Weber, Adolf** 1954: *Bankkredit und langfristige Investitionen. Bericht über eine Aussprache führender Sachkundiger*. Berlin: Duncker & Humblot.

Ziegler, Nicholas 1989: *The State and Technological Advance: Political Efforts for Industrial Change in the Federal Republic of Germany, 1972-1986*. Ph.D, Political Science, Harvard, Cambridge, Mass.

Zysman, John 1983: *Governments, Markets and Growth: Financial Systems and the Politics of Industrial Change*. Ithaca: Cornell University Press.