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The Trilemma Revisited: Institutions, Inequality, and Employment Creation in an Era of ICT-Intensive Service Expansion

Anne Wren, Máté Fodor, and Sotiria Theodoropoulou

3.1 Introduction

Iversen and Wren (1998) argued that the transition to a service-based economy presented governments with a “trilemma” (or three-way choice) between the policy goals of employment creation, equality, and budgetary restraint (that is, low levels of government spending). The structure of the trilemma was such that at most two of these potentially desirable policy goals could be pursued successfully at the one time, creating a new and difficult set of distributional choices for governments. In the era of manufacturing expansion in the 1950s and 1960s, the support of egalitarian wage-setting procedures by governments of the left had not necessitated any compromises in terms of employment creation—and indeed, according to the influential Rehn–Meidner model, may even have contributed to the pursuit of this goal (Meidner, 1974; Rehn, 1985). Differences in the economic characteristics of manufacturing and service sectors, however, implied that expansion in private employment in services was likely to require higher levels of flexibility in wage-setting procedures at the bottom end of the earnings distribution and higher rates of wage inequality. For governments that chose to continue to prioritize earnings equality, an alternative route to employment creation did exist—that is, the expansion of employment in public service sectors. However, that choice came with its own distributional cost in terms of higher levels of government spending, implying, *ceteris paribus*, higher levels of taxation and/or government deficits. Hence the trilemma: governments could not

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choose to pursue the policy goals of employment creation, equality, and budgetary restraint simultaneously.

Our argument rested, however, on the assumption that, under pressure from de-industrialization, countries would increasingly be forced to rely on non-traded service sectors, in which the capacity for productivity growth was low, as the principal engines of employment expansion. We pointed out that where countries were able to specialize in the production of high-productivity knowledge-intensive services for international markets, the constraints on policy making associated with the trilemma could be reduced. However, in the period that we analyzed (1970–92), the natural and regulatory barriers to trade in services remained relatively high.

Since that time, as described in Chapter 1, two developments have occurred that have significantly altered the economic environment in which services are produced and traded. First, the revolution in information and communication technology (ICT) which commenced during the 1980s has caused a rapid upsurge in productivity growth in a range of economic sectors in which the uptake of the new technology is high, including knowledge-intensive service sectors such as Finance, Business Services, and Communications. Second, the scope for international trade in services has increased significantly, in part also as a result of the ICT revolution which enabled both the digitization of information and its low cost and instantaneous transport worldwide, and in part as a result of global initiatives to reduce the legal and regulatory barriers to service trade.

We argue in this chapter that in this environment, the constraints on policy making described by Iversen and Wren (1998) may not be as tight as previously understood. The possibility exists for high-productivity, internationally traded service sectors to take over from manufacturing sectors as the dynamic drivers of employment expansion in the post-industrial economy, reducing the need to rely on low relative wages at the bottom of the earnings distribution to facilitate private service employment expansion, and hence the centrality of Iversen and Wren's policy making "trilemma".

We also argue, however, that expansion in these "dynamic" service sectors has distributional implications of its own. In particular, we find that flexibility in wage setting and inequality at the *top* end of the earnings distribution appears to facilitate employment creation in dynamic service sectors. We suggest that this relationship is closely related to the incentives for skill acquisition and innovation, which are created when the wages of highly skilled workers are allowed to deviate from the average, and their relevance to the development of comparative advantage in international service markets. We stress though that while our findings support the hypothesis that high-end wage inequality facilitates dynamic service sector expansion, they do *not* necessarily imply that it is an essential precondition for this type of expansion to take place. This is because public educational investment can act

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as an effective substitute for private investment to facilitate employment expansion in dynamic service sectors in environments in which wages are more compressed (at least given the political will). If this is true, then it suggests that expansion in dynamic service sectors creates a new trilemma of sorts (where governments must again choose between the policy goals of equality, public spending, and employment creation), albeit one in which the implied distributional trade-offs are not quite so stark—for reasons that we discuss.

The remainder of this chapter is laid out as follows. In Section 3.2, we review in brief Iversen and Wren's (1998) argument about the relationship between inequality and employment creation in a post-industrial world; we describe how the ICT revolution and the removal of legal and regulatory barriers to trade in services have impacted on service sector development; and we discuss the implications of these changes for Iversen and Wren's argument. In Section 3.3, we present the results of an empirical analysis of the relationship between inequality, trade, and employment creation which suggests that these relationships vary across different types of service sector. Specifically, we find that in "non-dynamic" service sectors (in which levels of ICT intensity, rates of productivity growth, and levels of international tradedness are typically low), a causal relationship exists between inequality at both the upper and lower end of the earnings distribution and employment creation (indicating support for Iversen and Wren's original hypothesis), while service trade performance is insignificant to employment creation in these sectors (emphasizing that the characterization of these sectors as essentially non-traded is correct). We also find, however, that in "dynamic" service sectors (in which levels of ICT intensity, rates of productivity growth, and levels of international tradedness are typically higher), employment creation is not facilitated by inequality at the bottom end of the earnings distribution: it is, on the other hand, significantly influenced both by the structure of earnings at the top end of the distribution and by service trade performance.

In the second part of this chapter, we examine some of the implications of these findings for policy and for existing socioeconomic regimes. In Section 3.4, we develop the argument that decentralized wage bargaining facilitates expansion in dynamic service sectors in part because of the incentives for private investment in education (at the tertiary level in particular) which are created where the wages of highly skilled workers are allowed to deviate from the average. This is because college-educated labor is an essential input in ICT-intensive sectors, and (as discussed in Chapter 1) most high-productivity, internationally traded sectors are ICT-intensive. We also argue, however, that public subsidies to education can act to compensate for the absence of these incentives in centralized wage-setting environments (in which wage structures are typically more compressed). In Section 3.5 we

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examine these hypotheses empirically. We show that the marginal benefit of public investment in school- and college-based education in terms of employment creation is increasing in the level of centralization of wage bargaining; however, these effects are significantly more marked in service than in manufacturing sectors. Conversely, centralized wage bargaining tends to inhibit expansion in both high- and low-productivity service sectors, but these effects are significantly smaller in the presence of higher levels of public educational investment.

We conclude in Section 3.6 with a discussion of the implications of these findings for existing socioeconomic regimes. We suggest that two effective routes to the development of the appropriate skill profile for expansion in high-productivity traded service sectors may exist: the first “Liberal” route is based on the existence of relatively high wage premia for highly skilled workers and the incentives that this creates for private educational investment; the second “social democratic” route combines more egalitarian wage structures with higher levels of public educational investment. In contrast, we suggest that the policy combination more common in Christian democratic regimes, namely, combining relatively high levels of wage compression with lower levels of public investment in education—in schools and colleges in particular—may be less effective as a basis for competition in high-end service markets.

3.2 Inequality and Employment Creation

3.2.1 *The Trilemma of the Service Economy*

Rehn and Meidner’s model (Meidner, 1974; Rehn, 1985) of the relationship between inequality and employment creation during the period of manufacturing expansion and Iversen and Wren’s subsequent analysis (1998) of the implications of the service transition for that model were described in Chapter 1. However, we review these arguments briefly here for the purposes of clarity. In the “golden age” of manufacturing expansion in the 1950s and 1960s, price and income elasticities of demand for a range of new consumable manufactures were high, as was the capacity for productivity increases in these sectors (the latter as a result of technological advances, Fordist innovations, and the exploitation of economies of scale). Rehn and Meidner showed that in this type of environment egalitarian wage policies could have positive effects on employment. Egalitarian wage-setting institutions linked the wages of workers in less and more productive sectors. This had the effect of raising the wages of workers in less productive sectors out of line with productivity while restraining the wages of workers in more productive sectors. Given

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highly price- and income-elastic demand, the labor-saving effects of productivity increases in the dynamic sectors of the economy were compensated for by expansions in demand (resulting from falling prices and rising real wages) so that the net effect on employment in these sectors was positive. At the less productive end of the market, meanwhile, relatively high wages forced businesses either to innovate to increase productivity or to fail—but the overall impact on the economy was simply a shift in resources toward the more dynamic sectors. This was facilitated by an active labor market policy that ensured constant retraining of workers to assist their transition from declining to expanding sectors. These effects combined to create a positive relationship between equality and employment performance in the industrial economy.

Iversen and Wren (1998) argued, however, that there were grounds to expect that Rehn–Meidner’s predictions would *not* hold in the context of de-industrialization and service sector expansion. De-industrialization has been associated with a decline in the price and income elasticities of demand for the types of mass consumer goods which formed the core of Fordist industrial expansion (resulting from market saturation) (Appelbaum and Schettkat, 1994, 1995). This means that increases in productivity in these sectors are no longer associated with demand expansions which are sufficient in scale to compensate for their labor-saving effects. In contrast, since many consumer services in particular are considered luxury items, demand for these services is relatively price and income elastic. This is unsurprising given the feasibility of home production of these services (e.g., think of cleaning, gardening, waitressing, etc.) (Fuchs, 1968; Kongsrud and Wanner, 2005; Kalwij and Machin, 2007). Critically, however, in *these* types of sectors, the capacity for productivity increases is low: as discussed in Chapter 1, one important insight of Baumol’s (1967, 2007) influential work is that high rates of productivity growth are difficult to achieve in service sectors in which interpersonal interaction is an important component of production, as the quality of the service is likely to decline if less time is provided.

Iversen and Wren (1998) argued that, under *this* set of conditions, the effect of egalitarian labor market institutions on employment would be the opposite of that predicted by Rehn and Meidner. That is, we should expect to see a negative correlation between equality and employment creation. On the one hand, price and income elasticities of demand for consumer services are high; on the other, the scope for productivity increases in these sectors is low. This means that employment expansion in these sectors depends on relatively low labor costs, which allow high price elasticities of demand to be exploited. Egalitarian wage-setting institutions, however, tend to keep wages in these sectors relatively high. They thus have the effect of constraining employment expansion. Hence the trilemma: since egalitarian wage-setting institutions have a tendency to choke off employment in low-productivity service sectors,

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governments that desired to maintain a commitment to equality in wage setting in a context of de-industrialization faced a distributional choice. They might either opt to sacrifice the goal of employment creation in favor of maintaining higher rates of equality among wage earners; or they could opt to create employment directly in public service sectors, thus preserving the goals of employment creation and equality, but at a cost, *ceteris paribus*, in terms of higher levels of government spending and taxation and/or budget deficits. However, at most, two of the policy goals of employment creation, equality, and budgetary restraint could be successfully pursued simultaneously.

In line with this argument, Iversen and Wren (1998) showed that, at least in the period covered by their data (between 1970 and 1992), the egalitarian wage-setting institutions found in coordinated market economies tended to be associated with stagnancy in private employment creation in low-productivity service sectors (Hotels and Restaurants; Wholesale and Retail Trade; Community, Social, and Personal Services; Education and Health). In the social democratic welfare states, this shortfall was compensated for by expansion in public services. In Christian democratic welfare states, in a context of de-industrialization, it was more likely to be associated with lower rates of employment and labor force participation. The Liberal market economies, in contrast, combined high levels of inequality in wage setting with high levels of employment expansion in private service sectors.

As noted in the introduction, however, this set of arguments applies specifically to the expansion of employment in service sectors in which the capacity for productivity growth and international trade are low. In the period that Iversen and Wren studied (between 1970 and 1992), this theoretical and analytical focus was justified. The processes of technological and regulatory change underlying the expansion of trade in high productivity services sectors did not get under way until the 1980s, with the acceleration in service trade lagging these changes. These changes do have important implications for Iversen and Wren's argument, however, as we discuss next.

3.2.2 *The ICT Revolution, Service Productivity, and the Expansion of Service Trade: Implications for the Trilemma*

In the past, service sectors have tended to be characterized as predominantly low-productivity sectors that were essentially non-traded internationally. Both these characteristics of services stemmed from their basis in face-to-face interpersonal interaction. Baumol (1967, 2007) influentially pointed out that high rates of productivity growth are difficult to achieve in areas in which interpersonal interaction is important, as the quality of the service is likely to decline if less time is provided. As described in the introduction, good examples to think through here are waitressing and childcare. While technological

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changes such as the introduction of computers may allow marginal improvements in productivity in these sectors, it is hard to think of substantial increases in “output” per head (meals served, children supervised, etc.) without a decline in the quality of the service. The interactive nature of service provision has also had the effect of creating natural barriers to international service trade. These barriers are particularly high in services that are provided, of necessity, on a face-to-face basis (e.g., haircuts or surgical procedures). They used to exist also, however, in a broader range of services (e.g., business and legal services) that rely on the provision of information from the client to the service provider, and its subsequent return to the client in a processed form.

As described in Chapter 1 though, since the 1980s, the revolution in ICT has increased the capacity for productivity growth and for trade in certain areas in services. It is well established that the new technology has significantly impacted on productivity growth in those sectors in which its diffusion has been most marked (Stiroh, 2002; Triplett and Bosworth, 2004; Jorgenson et al., 2005; Bosworth and Triplett, 2007; Corrado et al., 2007), and the data previously presented in Chapter 1 (in Table 1.2) indicate that knowledge-intensive service sectors have been at the forefront of this process. From the table, we can see that the contribution of ICT capital to the growth of value added in business services, financial intermediation, and post and telecommunications over the past three decades has been highly significant when compared to its contribution in a range of services in which the face-to-face component of provision is more important (e.g., Hotels and Restaurants, Retail Trade, Public Administration, Education, and Health and Social Work, and Other Community, Social, and Personal Services) and in most traditional manufacturing sectors (with the possible exceptions on the manufacturing side of electrical and optical equipment and printing and publishing). Table 1.1 meanwhile shows that these patterns correspond with higher rates of productivity growth in the ICT-intensive services group (Finance, Business Services, and Transport, Storage, and Communication) than in their less ICT-intensive service sector counterparts.

Critically, also, the ICT revolution has had the effect of significantly increasing the capacity for international service trade (Freund and Weinhold, 2002; Blinder, 2006, 2009). The digitization of information and the ability to instantaneously transmit it across the globe have reduced the barriers to trade in more knowledge-intensive service sectors where provision *is* interactive, but the *face-to-face* component of that interaction is less so (e.g., Finance, Business Services, and Communication). In other areas, where face-to-face interaction continues to be essential to provision (e.g., cutting hair, caring for children, performing medical surgery), on the other hand, its capacity to facilitate service trade is clearly less marked.

These technological developments have been accompanied by initiatives to liberalize services trade since the 1980s. In particular, the conclusion of the

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General Agreement of Trade in Services (GATS) in the Uruguay Round of trade talks in 1994 heralded a new commitment to the liberalization of international service markets. In practice, however, the liberalization of services trade continues to lag well behind that for goods trade, and significant legal and regulatory barriers to service trade remain (Adlung and Roy, 2005; Hoekman et al., 2007; Borchert et al., 2010; Hoekman and Mattoo, 2011).

As a result of these developments, as described in Chapter 1, there has been a substantial expansion in services trade worldwide over the past thirty years, although, as Figure 1.3 in that chapter reveals, this expansion has been concentrated in certain service sectors, and specifically, again, in sectors that are relatively ICT-intensive. Thus, Business Services, Finance, and Transport and Communications have all recorded relatively high rates of growth of trade in recent decades, while levels of trade in less ICT-intensive sectors (such as Government and Personal Services) remain relatively low.¹

The opening up of new and relatively unsaturated international markets for knowledge-intensive services appears to offer countries a way out of Iversen and Wren's trilemma. Where expansions in international demand for services are sufficient to compensate for the labor-saving effects of productivity increases in traded service sectors, the possibility exists for a new model of employment creation led by dynamic expansion in these sectors. In this model, the expansion of output in high-productivity, internationally traded service sectors can be expected to have both direct and indirect effects on employment creation. The direct effect is the expansion of employment in the high-productivity sectors themselves. The indirect effect relies on the relatively high levels of income elasticity in the demand for many low-productivity services discussed earlier, which implies that rising real incomes in high-productivity service sectors are likely to be associated with a parallel demand and employment expansion at the low end. In combination, these effects would suggest that today's governments should be less constrained to rely on keeping the relative wages of workers in less productive sectors low to generate employment growth than envisaged in Iversen and Wren's (1998) original model.

The potential theoretically exists, therefore, for high-productivity, internationally traded service sectors to replace manufacturing sectors as the chief engines of output and employment growth in a post-industrial context. This does not necessarily imply, however, that the original prediction of the Rehn–Meidner model, of a positive relationship between equality and

¹ Unfortunately, the available data on trade in services—at the subsectoral level in particular—remains patchy at best. In part, this is reflective of the fact that service sectors were, until recently, regarded as essentially non-traded sectors. The conclusion of the GATS in 1994 created a renewed impetus toward the collection of more complete and detailed data on services trade; however, substantial measurement issues remain. See Lindner et al. (2001), Lipsey (2006), and Cave and Giovannini (2007) for discussions of the issues involved.

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employment growth in high productivity sectors, will continue to hold. In fact, as we discuss next, several arguments in the existing literature suggest that there are grounds to suspect that they might not.

In the Fordist era, successful international competition in the market for consumer durables was closely related to the ability to exploit economies of scale, combined with relative real wage restraint among high-productivity workers. A strong component of the success of the Rehn–Meidner model in this context, therefore, lay in the constraint that solidaristic wage bargaining placed on the relative wages of high-productivity workers: it was this effect that gave rise to the positive relationship between equality and employment creation. As we discuss further below (and in Chapter 1), however, influential arguments in the literature on varieties of capitalism suggest that the development of comparative advantage in high-productivity, knowledge-intensive service sectors is closely linked with capacities for radical innovation, which are in turn facilitated by high levels of flexibility in a range of contractual arrangements (Hall and Soskice, 2001). Importantly, these include the ability to incentivize workers to invest in certain types of skills, and to incentivize highly skilled workers to innovate, by adopting flexible wage-setting practices at the upper end of the earnings distribution in particular.

In addition, the evidence emerging from the economics literature suggests strongly that the new information and communication technologies (ICTs) and college-educated labor are complements in production (Autor et al., 2003; Goos et al., 2010; Michaels et al., 2010; Acemoglu and Autor, 2011). This implies that expansion in high-productivity, ICT-intensive service sectors is likely to be more heavily reliant on a supply of college-educated labor than the expansion in traditional manufacturing sectors which preceded it (which was, in relative terms, more heavily reliant on workers with low to medium skill levels (see Wallerstein, 1990)).² The incentives for individuals to invest privately in expensive higher level skills are higher, however, where the wages of highly skilled workers are allowed to deviate from the average (because the returns to this investment are higher) (see Frederiksson, 1997; Heckman et al., 1998; Heckman and Jacobs, 2010). This again suggests grounds for arguing that inegalitarian wage structures may facilitate high-end service expansion because of the effects that they have on patterns of skill formation.

We explore these arguments and their policy implications in more detail in the second half of this chapter. For now, however, we simply note that both sets of arguments suggest that the positive relationship between egalitarian wage policies and the expansion of employment in high-productivity sectors which emerges from the Rehn–Meidner model need not necessarily apply in the context of expansion in high-productivity service sectors. And indeed, there are some grounds to expect that the reverse relationship might hold:

² See Chapter 1 for more discussion of Hall and Soskice and Autor and colleagues' arguments.

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that is, that relatively high levels of remuneration at the upper end of the earnings distribution will be associated with expansion in high-productivity traded service sectors.

In the next section we examine empirically the implications of the expansion of trade in high-productivity services for Iversen and Wren's thesis, exploring how the relationships between inequality, trade, and employment creation vary across different kinds of service sector.

3.3 Inequality and Sectoral Employment Expansion: Empirical Analysis

3.3.1 Data

On the basis of the preceding discussion, we distinguish analytically between three different types of service sector (see also Chapter 1, Section 1.3, and Tables 1.1 and 1.2 (for data on sectoral productivity growth, ICT investment, and trade)):

1. *Non-dynamic service sectors* (Hotels and Restaurants; Wholesale³ and Retail Trade; and Other Community, Social, and Personal Services) in which levels of ICT investment, rates of productivity growth, and international trade are typically relatively low.
2. *Dynamic service sectors* (Finance and Insurance, Business Services, Transport, Storage, and Communications) in which levels of ICT intensity, rates of productivity growth, and international trade are relatively high.
3. *Welfare service sectors* (Education, Health and Social Work, and Public Administration) which share certain characteristics with the non-dynamic category—low rates of ICT investment, productivity growth, and international trade—but in which high levels of public provision exist in many countries.⁴

³ We note that there is evidence of some differences in the economic characteristics of the wholesale and retail sectors. From Table 1.2 in Chapter 1, we can see that levels and growth rates of ICT investment in the wholesale sector are somewhat higher than in retail. And some data sources also indicate that rates of productivity growth in wholesale have been high in some countries in recent decades. Unfortunately, however, our data does not allow the disaggregation of these two sectors. Therefore we opt to include the aggregated “wholesale and retail trade” sector in the “non-dynamic” category because, in terms of employment creation, the retail sector is the dominant sector within this grouping (accounting for roughly two-thirds of employment in the two sectors on average in the countries in our sample and as much as 75 percent in some). We note also that levels of trade in the combined wholesale and retail trade sector are low. Unfortunately, there are no disaggregated data available on this.

⁴ Iversen and Wren's original analysis of the relationship between inequality and employment creation included private sector employment in all of the “low-productivity” services (Hotels and Restaurants; Wholesale and Retail; Other Community, Social, and Personal Services; Education; and Health and Social Work). Because our data does not allow for the separation of public and private employment, we separated those sectors in which levels of public provision are high in many countries (Education, Health and Social Work, and Public Administration) from other,

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We hypothesize that Iversen and Wren's original findings will hold for non-dynamic service sectors: that is, we expect wage inequality at the bottom end of the earnings distribution to have a positive effect on employment performance (as restrictions on the capacity for productivity growth enforce a reliance on low relative wages to facilitate employment expansion in these sectors), and employment performance to be unrelated to service trade performance (as these are essentially non-traded sectors). In contrast, in the more ICT-intensive dynamic service sectors, in which the capacity for productivity increases and international trade is greater, we hypothesize that the low-end inequality result should not hold (since these sectors have a strong capacity for productivity growth). However, we expect that employment expansion in these sectors could be positively impacted by inequality at the upper end of the earnings distribution because strong incentives for private educational investment exist where the wages of highly skilled workers are allowed to deviate from the average, and also because flexibility in these kinds of contractual arrangements creates incentives for the radical innovation on which competition in many dynamic service sectors is based. Finally, we expect that, unlike their non-dynamic counterparts, rates of employment expansion in these sectors will be significantly influenced by service trade performance.

The *dependent variables* in our analysis are sectoral employment as a percentage of the working age population in our three categories of service sector, and also, for comparative purposes, in manufacturing.⁵ Our two principal independent variables are inequality and trade. In our analysis, we make use of two different measures of inequality. One measure—the d5/d1 ratio—captures inequality at the bottom of the earnings distribution;⁶ the other—the d9/d5 ratio—captures inequality at the high end of the earnings distribution.⁷

In our models of dynamic and non-dynamic service employment creation, our trade measure is the service trade to GDP ratio, as we are principally interested in estimating the effects of expanding service trade on employment performance in these sectors. In the models of employment creation in manufacturing and welfare sectors, however, our “trade” measure is the total trade to GDP ratio. There is clearly no reason to expect that service trade is an important determinant of employment performance in manufacturing

predominantly private, low-productivity sectors. We did this because we expect the dynamics of employment expansion to be significantly different in public service sectors.

⁵ Defining our dependent variable in this way allows us to control for cross-national variation in rates of labor force participation and estimate more accurately the relative capacities of different types of economy to generate employment.

⁶ Specifically, this variable measures the ratio of the earnings of a worker at the 50th income percentile (i.e., a worker in the middle of the earnings distribution) to those of a worker at the 10th (i.e., the lowest) income percentile.

⁷ The ratio of the earnings of a worker at the 90th (i.e., the highest, income percentile) to those of a worker at the 50th.

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sectors. In welfare sectors, levels of trade are very low in relative terms, and initial estimates of our model (not reported here for reasons of space⁸) confirmed that service trade had no significant impact on employment performance in these sectors. On the other hand, trade openness more generally has been hypothesized to have direct effects on the levels of provision of public welfare, as a result of the constraints that the requirements of competitiveness place on public spending (see, e.g., Steinmo, 1994; Alesina and Perotti, 1997; Rodrik, 1997; Garrett and Mitchell, 2001); therefore, it is appropriate to include this variable in the model.

Our dataset covers ten OECD countries⁹ over a period of roughly three decades (1977–2004).¹⁰ Our choice of countries and time period was limited to some extent by data availability. In particular, the paucity of good data on service sector trade restricted the set of countries that we could include in this section of the analysis. However, the sample of countries that we were able to include is certainly adequate for our purposes, and includes representatives of all of the primary socioeconomic regime types that we consider in this volume (Liberal (the United States, the United Kingdom); coordinated Christian democratic (the Netherlands, Belgium, Germany); coordinated social democratic (Finland, Sweden, Denmark); other coordinated (France, Japan)). In addition, our choice of time period allows us to investigate the dynamics of change from what was the most intensive period of the transition toward services in many countries (the 1970s and 1980s) up to the present day.

Figure 3.1 illustrates the relationships between inequality and employment in dynamic and non-dynamic service sectors in our dataset. Panel A shows a clear positive relationship between inequality at the bottom end of the earnings distribution (measured by the $d5/d1$ ratio) and employment levels in non-dynamic service sectors: in contrast, in dynamic sectors (Panel B), there appears to be no relationship between low-end earnings inequality and employment. When employment in dynamic sectors is plotted against inequality at the upper end of the earnings distribution on the other hand (Panel C), there is some indication that a positive relationship does exist (albeit, at least at first glance, a less marked one than is the case for low-end inequality and employment in non-dynamic sectors). While these graphics are illustrative of basic patterns, it is of course impossible to draw any conclusions from simple correlation analysis of this type: the remainder of this section describes our analysis of more complete statistical models of these relationships.

⁸ Available from the authors on request.

⁹ The United States, the United Kingdom, Germany, Finland, Japan, the Netherlands, Belgium, France, Sweden, and Denmark.

¹⁰ Our data is drawn from several sources including the EU-KLEMS Growth and Productivity Accounts (<http://www.euklems.net/>); the OECD and the IMF.

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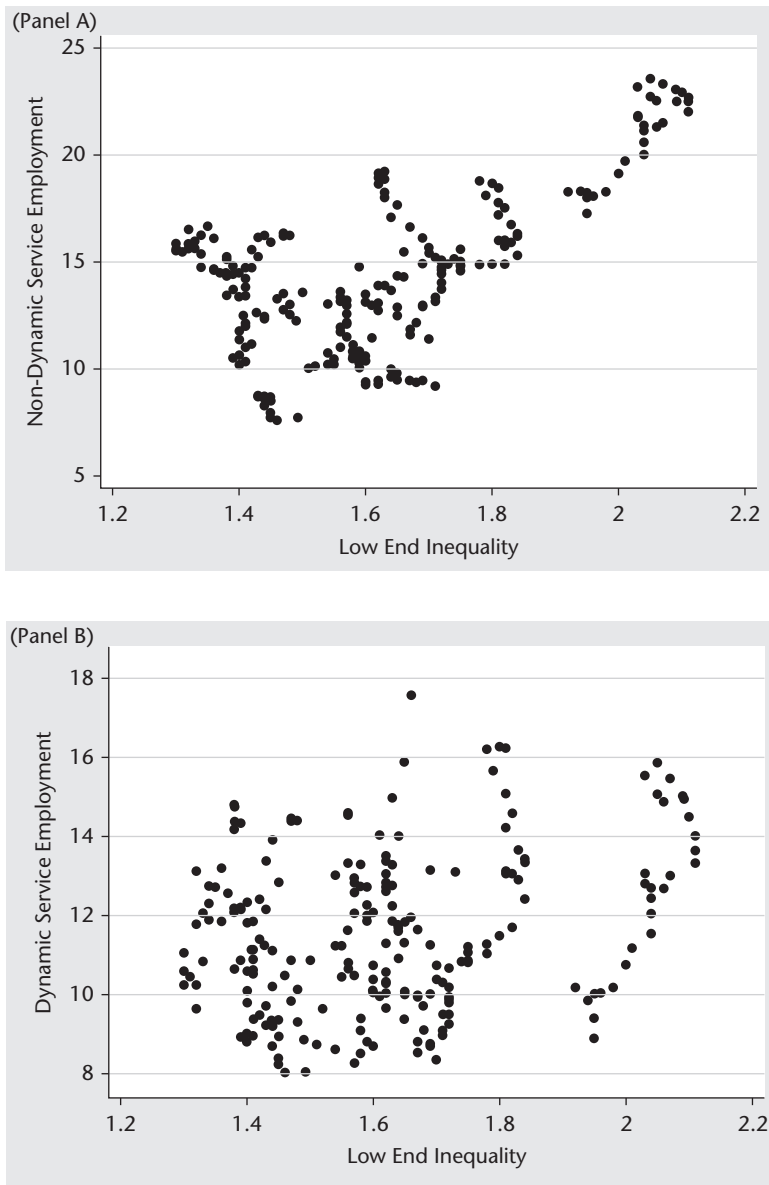


Figure 3.1. Continued

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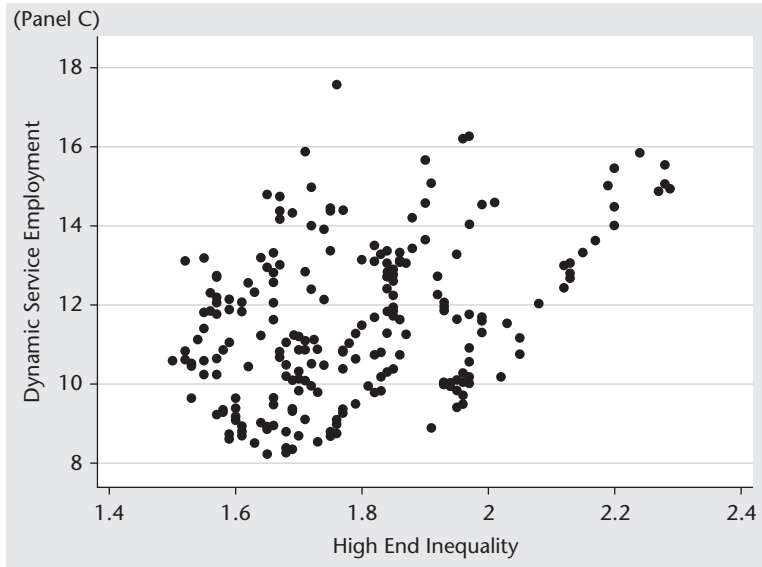


Figure 3.1. (Panels A–C) Sectoral employment and inequality in ten OECD countries (1977–2004)

3.3.2 Methodology

We use an error correction model (ECM) to estimate the effects of wage structures and trade performance on service sector employment. The model can be represented as follows:

$$\Delta Y_{i,t} = \alpha + \beta_1 Y_{i,t-1} + \sum \beta^j X_{i,t-1}^j + \sum \beta^j \Delta X_{i,t}^j + \text{vector of controls} + \epsilon_t, \quad (1)$$

where Y is employment expressed as a percentage of the working age population in the service sector of interest, i is the subscript for a given country, and the superscript j represents a given regressor. The subscript t refers to a given time period.

Using a dynamic ECM model of this type allows us to identify separately the long-term and transitory effects of variations in our independent variables.

Following Baker (2007), we transform the ECM model shown here into an autoregressive distributed lag (ADL) model, without including a lagged dependent variable (LDV). Doing this allows us to correct for the autocorrelation that is present in our data while avoiding some of the “catastrophic” effects identified by Achen (2001) associated with the inclusion of an LDV in the ECM itself. Since this methodological approach is not straightforward, we take some time to justify it in the following two paragraphs, which the nontechnical reader is encouraged to skip.

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LDVs are included as regressors in ECMs to capture the long-run equilibrium between the dependent and independent variables. They are normally also efficient, however, at getting rid of autocorrelation of the type which diagnostic checks show is present in our data.¹¹ In an influential paper, Achen (2001) argues, however, that these variables can have a “kleptomaniac” effect on the regression, taking the influence of all other independent variables away, and “keeping it” for themselves. These effects are expected to be particularly pernicious where disturbances are heavily trended, as they are in our data. A few preliminary regressions run (but not included here) confirm Achen’s concerns about these issues. The fits of the regressions are very good, with extremely high R^2 values. However, our estimates are almost all statistically insignificant. The LDV is negative and significant for the analysis of every single sector (it cannot be positive, as that would lead to a potentially unbounded system) and its value is very close to 0. This means that if we were to transform the relationship between Y and Y_{t-1} into an AR(1)-type structure, the coefficient on Y_{t-1} would be very close to 1. It is quite obvious that employment levels cannot solely be explained by their past values; therefore, we must choose another estimation method, or must refine the current one.

We have chosen to adopt the latter solution, following Baker (2007), who shows, using an ECM-ADL transformation from Hendry and Mizon (1978), that mathematically an ADL model with the LDV is equivalent to one with a proper identification of and control for serial correlation. The correction for autocorrelation takes place as follows: we transform the error term into an AR(1) series, of which the disturbances are assumed serially uncorrelated and homoscedastic. That is,

$$\epsilon_t = \rho\epsilon_{t-1} + \partial_t. \quad (2)$$

Ensuring that ρ is significant is the key to successful elimination of autocorrelation. For the purposes of our analysis, therefore, we transform this ECM model into an ADL, without including an LDV. After having done so, we specify the AR(1) autocorrelation of disturbances, and estimate the models. Following this method allows us to eliminate autocorrelation while avoiding the adverse effects of the inclusion of a “kleptomaniac” LDV. In line with Baker’s recommendations, we use the Prais–Winsten correction applied to Panel Corrected Standard Errors estimation, in order to ensure that autocorrelation is contained and that our methodology is consistent with dynamic panels.

We began our analysis by testing the exogeneity of the principal independent variables and found that while inequality was fully exogenous to the

¹¹ Lagrange multiplier test.

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models of employment creation in non-dynamic and dynamic service sectors, some evidence did exist of recursive causation between employment in welfare services and inequality. We were unsurprised by the discovery of these effects since levels of public employment in these sectors are large in many countries, and public employment has already been established to have a positive effect on equality (at least in coordinated wage-setting environments) (Rueda and Pontusson, 2000). To correct for the endogeneity we faced, therefore, we used a two-stage least-squares approach in the welfare employment model, with total labor force and total employment (in thousands of workers) as instruments for the short-run effect of low-end inequality on employment creation in welfare service sectors. We estimated both the first and second stage least squares using the method described above.

We included a full set of country-fixed effects in the welfare service sector model and a set of period dummies in the dynamic services model. These variables were omitted from the other two models (non-dynamic services and manufacturing) where diagnostic tests suggested that their inclusion would be inappropriate.¹²

3.3.3 Results

The results of our estimation of these models for the four economic subsectors under investigation—dynamic service sectors, non-dynamic service sectors, welfare services, and manufacturing—are reported in Table 3.1.¹³ These results underscore the important differences that exist in the mechanics of expansion in dynamic and non-dynamic service sectors.

Notice, first of all, that our analysis confirms that the typical characterization of services as insulated from the international economy *does* fit the set of non-dynamic private service sectors. As shown in column 2, services trade is insignificant as a predictor of employment performance in these types of services. On the other hand, as we have argued here, it is *not* accurate to categorize dynamic services as sheltered sectors. In fact, as shown in column 1, the effect of service trade performance on rates of employment creation in these sectors is both statistically significant and quite large. According to our estimates, an increase of 0.5 percentage points in the service trade to GDP ratio would result in the creation of around 71,500 new jobs altogether in the countries included in our dataset.¹⁴

¹² Model specifications were chosen with the aim of minimizing the AIC and SIC values (Akaike and Schwartz Information Criteria).

¹³ In Table 3.1 the first figure in each cell is the coefficient estimate, the bracketed figure is the (panel corrected) standard error.

¹⁴ Simulations are not included here for reasons of space, but available from the authors on request.

Table 3.1. The impact of trade and inequality on employment across sectors

	Dynamic services	Non-dynamic services	Manufacturing	Welfare services
$d5/d1 \text{ ratio}_{t-1}$	0.52 (1.34)	3.36*** (1.23)	1.81 (1.44)	4.55 (3.86)
$\Delta d5/d1 \text{ ratio}_t$	0.58 (1.08)	3.24*** (1.21)	0.87 (1.73)	5.62 (3.95)
$d9/d5 \text{ ratio}_{t-1}$	7.46*** (1.64)	3.41*** (2.69)	-10.02*** (2.01)	-2.98** (1.43)
$\Delta d9/d5 \text{ ratio}_t$	3.88*** (1.26)	2.56** (1.94)	-5.38*** (1.72)	-1.91* (1.10)
Trade_t^a	0.37*** (0.06)	-0.02 (0.05)	-0.05*** (0.01)	-0.05*** (0.01)
ΔTrade_t	0.16** (0.08)	0.02 (0.05)	-0.05* (0.03)	-0.04* (0.02)
Growth in sectoral productivity	0.17 (1.59)	-0.37 (1.32)	-2.29 (1.62)	-0.20 (0.71)
Growth in overall productivity	-3.68 (2.68)	-3.51* (1.95)	2.01 (2.71)	-1.69 (1.21)
GDP/capita_{t-1}	0.0003*** (0.00006)	0.0003*** (0.00009)	-0.00007** (0.00003)	0.0001*** (0.00002)
Constant	-6.21* (3.23)	3.33* (1.94)	31.80*** (2.55)	12.49** (6.02)
Dummies	Country	No	No	Year
P	0.60*	0.86***	0.86**	0.75*
R^2	0.89	0.86	0.88	0.98
N	150	174	192	152

^a The trade variables measure total trade for manufacturing and welfare services and services trade for dynamic and non-dynamic service sectors.
 Note: * Indicates significance at 0.10 level; ** indicates significance at 0.05 level; and *** indicates significance at 0.001 level.

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For manufacturing sectors, on the other hand, we find evidence that increases in (total) trade have a negative impact on employment. This result accords with the hypotheses of Leamer, Wood, and others that low-cost competition from the developing world in markets for manufactured goods has a negative impact on manufacturing employment levels in the advanced economies (Leamer, 1984; Wood, 1994, 1995). We also find some evidence (shown in column 4) that trade openness has a negative effect on employment in welfare sectors during this period. This finding appears to support the arguments of those who suggest that increased international trade reduces the capacities of governments in advanced economies to engage in expansive welfare state programs (Steinmo, 1994; Rodrik, 1997; Garrett and Mitchell, 2001).¹⁵

Our results also indicate that, in line with Iversen and Wren's earlier findings, inequality at the low end of the earnings distribution has significant positive effects on employment creation in non-dynamic service sectors. As shown in column 2, the coefficients on the variables measuring the lagged level of, and changes in, the $d5/d1$ ratio (which estimate, respectively, the long-run and transitory effects of a change in inequality at the low end of the earnings distribution) are both significant at the 1 percent level. They are also quite large, indicating that although the changes in these variables from year to year within countries tend to be relatively small, even marginal variations of this type could bring about the creation of hundreds of thousands of jobs. For example, we estimate that, *ceteris paribus*, a 1 standard deviation (0.01) increase in the $d5/d1$ ratio in our sample is likely to be associated with around 42,000 jobs created in non-dynamic service sectors across the countries in our sample within three years.

Critically, however, we find that low-end earnings inequality plays no role in facilitating the expansion of employment in dynamic service sectors or in manufacturing (as shown in columns 1 and 3). Again, these results are in line with expectations. Given their relatively high rates of productivity growth, there is less reason to expect that high relative wages at the bottom end of the earnings distribution should choke off employment in these sectors.

We do, however, find a significant positive relationship between levels of earnings inequality at the *upper* end of the earnings distribution and employment performance in dynamic service sectors. Here, our estimates suggest that a 1 standard deviation (0.01) increase in the $d9/d5$ ratio would result in the creation of around 40,000 jobs across the countries in our sample within three

¹⁵ Note that where total trade is replaced by services trade in this model, the coefficient on the service trade variables are insignificant. This is to be expected since the group of "welfare" services—like those in the non-dynamic services category—continue to be traded only at relatively low levels internationally.

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years. This is an important finding. It suggests that while expansion in high-productivity, internationally traded services may offer countries a way out of the particular set of distributional trade-offs contained in Iversen and Wren's trilemma, the pursuit of this strategy does not necessarily imply a return to the Rehn–Meidner world in which the wage restraint at the upper end of the earnings distribution associated with egalitarian wage policies, formed the basis for competitiveness and expansion in high-productivity sectors. Our results indicate that this logic may still apply in manufacturing sectors, where we find evidence of a relatively strong negative relationship between high-end wage inequality and employment performance (as shown in column 3). However, our analysis suggests that, in contrast, expansion in dynamic service sectors is facilitated where the wages of highly skilled workers are allowed to deviate from the average. As we discuss in more detail below, we interpret this relationship as stemming, in part, from the incentives that wage premia of this type create for investment in college-level education (and indeed for the secondary- and primary-school-based education which are important prerequisites to third level outcomes).

Additional evidence in support of the existence of this supply-side effect is presented in the second half of the chapter, where we show that increases in the level of centralization of wage bargaining (well established empirically to be positively correlated with wage equality (Freeman, 1988; Iversen, 1999; Wallerstein, 1999; Rueda and Pontusson, 2000)) have a negative impact on employment in dynamic service sectors. Given the strength of the relationship between wage-bargaining centralization and equality, one would expect that if wage inequality is an important determinant of employment outcomes, then these outcomes should also be significantly influenced by the structure of wage bargaining. The second part of our analysis thus acts as an effective robustness check for the first (with the attractive feature that wage-bargaining centralization is plausibly exogenous to any model of employment creation (at least in the short term), leaving little room for doubt about the direction of causality in this relationship).

One other point worth noting is that our results indicate that high-end inequality is also associated with expansion in non-dynamic sectors. A plausible interpretation of this finding is that rising real incomes and employment growth in high-productivity service sectors generate parallel expansions in demand and employment in consumer services, because demand for these services is highly income elastic (again, the examples to think through here are personal services, meals eaten in restaurants, and the like). In contrast, we find some evidence that high-end inequality may be associated, over the long run, with reduced rates of employment creation in welfare sectors. This result could be interpreted as providing support for Ansell and Gingrich's (Chapter 6, this volume) hypothesis that

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in institutional environments in which the wages of highly skilled private sector workers are allowed to deviate from the average, the probability of these workers opting for private sector careers (e.g., in dynamic service sectors such as Finance and Business Services) over more stable (but potentially less well paid) careers in public service sectors is greater, creating a supply-side impetus toward employment reduction in welfare sectors.

Finally, we include in each of our regressions a set of controls for the level of wealth in the economy, and for growth rates in overall and sectoral productivity. In line with the hypotheses of Fisher (1935), Clark (1940), and others that many services are luxury items whose consumption increases disproportionately with income, we do find that employment in services expands as society-wide economic wealth increases. In contrast, the proportion of employment in manufacturing sectors declines as societies become wealthier. A set of controls for sectoral and overall productivity growth, on the other hand, provides no evidence of direct effects of sectoral productivity growth on sectoral employment creation but some evidence of significant negative effects of economy-wide productivity growth on rates of non-dynamic service employment creation.

Overall, the fit of all four of our models is reasonably good. We note also that the significance of the AR(1) coefficient, ρ , confirms that while autocorrelation did pose a problem in our data, our estimation method has successfully eliminated the problem. We would like to bring to the reader's attention that some of the coefficients may be slightly biased because of multicollinearity. Some of the independent variables are loosely correlated with one another. However, we could not omit any variables, as diagnostics show that without each regressor the model would be incomplete. Nevertheless, the extent of the expected bias is insufficient to call any of our substantive findings into question. We also note that our principal findings are robust to the inclusion of a range of different explanatory variables and to the use of different estimation methods (such as Arellano–Bond).¹⁶

In sum then, the results that we report in this section provide further support for Iversen and Wren's original hypothesis that high levels of equality at the bottom end of the earnings distribution constrain the expansion of employment in non-traded service sectors in which the capacity for productivity growth is low. In contrast, however, we find that the expansion of employment in *dynamic* service sectors in which the capacity for productivity growth and international trade is *high* is *not* inhibited by the existence

¹⁶ These alternative estimations are not included here for reasons of space but are available from the authors on request.

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of protections on the relative wages of the poorest workers. Rather, employment expansion in these sectors is facilitated where service trade performance is strong and where the earnings of the most highly skilled workers are allowed to deviate from the average. These findings suggest that an alternative route out of Iversen and Wren's trilemma does exist. Successful expansion in international markets for high-productivity, knowledge-intensive services reduces the need to rely either on low wage competition or on public service expansion to generate employment growth. However, this route to service sector development creates its own set of distributional choices given the apparent trade-off between equality at the upper end of the earnings distribution and employment creation in dynamic service sectors.

It is our contention that the relationship between high-end inequality and employment expansion in dynamic service sectors stems in part from the particular incentives for skill acquisition (and innovation) created by high relative wages at the upper end of the earnings distribution. As outlined earlier, and as we discuss in more detail in the next section, an idea that emerges both from Hall and Soskice's "varieties of capitalism" approach and from more recent arguments by Autor and others about the skill requirements of ICT-intensive sectors is that general skills acquired at the college level in particular are critical to competition in knowledge-based services. If this is the case, then it makes sense that expansion in these sectors will be facilitated where the wages of highly skilled workers are allowed to deviate from the average, creating incentives for investment in higher level skills.

We wish to emphasize, however, that this argument does not imply that higher inequality is a *necessary* condition for dynamic service sector expansion. Where private incentives for educational investment are lacking (because of wage compression), we argue that the option exists for the state to step in to provide the educational investment necessary to prevent an undersupply of skills (and indeed, as Iversen and Soskice argue in Chapter 2, strong institutional complementarities exist between centralized wage bargaining and publicly funded educational regimes). Thus, the potential theoretically exists for a successful strategy of dynamic services expansion based on a policy profile that combines solidaristic wage-setting procedures with high levels of public investment in education. We suggest that this is the route that has been successfully pursued in particular in some social democratic regimes over the past few decades.

In the rest of this chapter, we explore these arguments further and analyze their implications for existing socioeconomic regimes, by examining how the institutions of wage bargaining and educational investment policies interact to influence sectoral employment performance.

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3.4 Wage Bargaining, Educational Investment, and Dynamic Service Expansion

A clear implication of both Autor and colleagues' findings on the effects of the ICT revolution (Autor et al., 2003; Goos et al., 2010; Michaels et al., 2010; Acemoglu and Autor, 2011) and Hall and Soskice's arguments (2001) about the relationship between skills and patterns of comparative advantage (alluded to earlier in this chapter and discussed in more detail in Chapter 1) is that investment in school- and college-based education is particularly important to service sector employment expansion. Since the new information and communication technologies (ICTs) and college-educated labor are complements in production (Autor et al., 2003) and since all of the dynamic service sectors are highly ICT-intensive (again, see Table 1.2 in Chapter 1), this implies that expansion in these sectors requires investment not just in college-based education (as argued also by Ansell and Gingrich in Chapter 6 of this volume) but additionally in the secondary, primary, and even preprimary education, which is an important prerequisite to strong tertiary outcomes (Ellwood, 2001; Cuhne and Heckman, 2007; Goldin and Katz, 2008; Heckman and Jacobs, 2010; Fodor, 2011).

More generally, Hall and Soskice have argued that the radical innovation, on which competition in many dynamic service sectors (e.g., Communications, Advertising, and Finance¹⁷) is based, is strongly reliant on "general skills" that are easily transportable across firms, and even sectors. The argument is that school- and college-based educational systems are more effective at providing this kind of general training than apprenticeship-based vocational training schemes which tend to produce skills that are more specific to the firms and industries in which they are acquired (see also Anderson and Hassel, Chapter 5, this volume). In fact, there is considerable overlap in the logic of the arguments of Hall and Soskice (2001) and Autor et al. (2003), at least at the highest skill levels. The set of college-acquired skills which Autor et al. (2003: 5) argue act as complements to ICT—"flexibility, creativity, generalized problem solving, and complex communications"—are highly similar to the general skills (at least at the high end) that Hall and Soskice argue are critical to the capacity for radical innovation, allowing rapid adaptation to changing production processes and markets.

For our purposes, however, the key point is that both sets of arguments underscore the importance of investment (be it public or private) in school- and especially college-based education for successful competition in service markets and the expansion of dynamic service employment. In contrast, referring again to Table 1.2 in Chapter 1, we can see that most traditional manufacturing sectors are considerably less ICT-intensive, implying that

¹⁷ See Hall and Soskice (2001: 39).

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they are less reliant on college-educated labor as a complementary input. In addition, according to Hall and Soskice's argument, competition in traditional manufacturing sectors (e.g., capital goods) is more likely to depend on incremental innovation which tends to rely on workers with the firm- and sector-specific skills that are more effectively acquired through vocational training (and apprenticeship-based training in particular). This is of course not to suggest that all manufacturing sectors display these characteristics. As we can again see from the table, some manufacturing sectors (e.g., printing and publishing, and electrical and optical equipment) are relatively ICT-intensive (albeit less so than the dynamic service sector group), and Hall and Soskice's list of sectors that are reliant on radical innovation includes some high-tech manufacturing sectors such as biotechnology and semiconductors (see Hall and Soskice, 2001: 39). However, it is safe to say that, in general, this set of arguments implies that the skill requirements of dynamic service sectors differ substantially from those of most traditional manufacturing sectors. It is also safe to say that the era of dynamic service expansion differs significantly from the "golden age" of manufacturing expansion in terms of its impact on the demand for different types of workers: the increase in demand for labor at the highest (college educated) level which is associated with dynamic service expansion stands in sharp contrast to the increase in the relative demand for less skilled and semiskilled labor which was engendered by Fordist industrial expansion (on the latter, see Wallerstein, 1990; Iversen and Soskice, 2009; and also Manow, van Kersbergen, and Schumacher, Chapter 7, this volume).

We argue in this section that there may be two institutional routes to the development of the skills profile that successful expansion in dynamic service sectors requires. The first is the "*private sector*" route most commonly observed in Liberal market economies. Here, strong private investment in tertiary education creates excellent general skills at the high end of the skill distribution, which position these countries well to compete in dynamic knowledge-intensive service sectors such as Finance and other Business Services. The economic effectiveness of this educational system, however, rests in part on the existence of significant skill- or qualification-based wage differentials which offer inducements to private individuals to invest in higher education, as well as to make private investments in preparatory education at the secondary level and earlier, to increase the chances of acceptance to elite schools.¹⁸ We contend that this effect explains in part the causal relationship that we find between high-end earnings inequality and the expansion of employment in dynamic service sectors (described in Section 3.3).

¹⁸ See The Sutton Trust "University Admissions by Individual Schools" (2007) for data on the relationship between private school education and admission to elite universities in the United Kingdom.

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In coordinated market economies (CMEs), on the other hand, solidaristic wage policies associated with coordinated wage bargaining tend to reduce the size of skill or qualification-based wage differentials, thus removing much of the incentive for individuals to invest privately in education. Under these circumstances, however, an alternative policy option does exist for governments (at least where it is politically feasible), which is to compensate for the absence of incentives for private investment by expanding public subsidies to education (as argued also by Iversen and Soskice in Chapter 2). This is the route most typically pursued in *social democratic regimes*: here wage compression is high, but public investment in schools and colleges all the way from preprimary and primary to tertiary levels is high also, and even vocational training systems, are predominantly school-based and publicly funded (see Anderson and Hassel, Chapter 5, this volume).

In contrast, we note that in *Christian democratic regimes*, public investment in school and university-based education is often more limited,¹⁹ as are tertiary enrollment levels (Ansell, 2008; Ansell and Gingrich, Chapter 6, this volume), and vocational education typically has a much greater firm-based component (Anderson and Hassel, Chapter 5, this volume). This type of education policy is linked with lower numbers of college graduates, lower concentrations of general skills in the workforce, and a greater proportion of relatively highly skilled workers whose skills are very specific to the industries and firms in which they have been trained: a skills profile that may be more appropriate to competition in traditional manufacturing sectors than in ICT-intensive dynamic service sectors. We return to this point in our conclusions.

To explore these arguments, we advance and test (in the next section) the following three hypotheses:

Hypothesis 1: Public investment in school- and college-based education has a positive effect on service employment creation which increases in size as the level of coordination of wage bargaining increases.

Where levels of flexibility in wage setting are high, and the potential exists to offer relatively high rewards to highly skilled workers, the incentives to invest in private education are also high, so we expect that the marginal effects of public investment in education on service employment expansion may be relatively small. As wage bargaining becomes more centralized, however, restraining the

¹⁹ For example, in the Christian democratic regimes in our dataset, the average levels of public spending on school- and college-based education (as a percentage of GNP) between 1970 and 2000 were as follows: Germany (4.81), Italy (4.47), Austria (5.55), Belgium (5.45). In comparison, social democratic regimes such as Sweden and Denmark recorded rates of 7.85 and 7.45, respectively. As discussed in the Chapter 1, however, there is variation on this dimension within the Christian democratic regimes. Most notably, in the Netherlands, public investment in school- and college-based education has been significantly higher on average over this period (at 6.59 percent of GNP).

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relative wages of workers at the high end of the skills distribution, and thus reducing the rewards to investment in education, we expect the marginal effects of public investment in education to increase. This hypothesis also emerges from the model proposed by Iversen and Soskice in Chapter 2.

Hypothesis 2: Public investment in school- and college-based education has stronger positive effects on employment in services than manufacturing.

This hypothesis stems first from the observation that all of the high-productivity traded service sectors are considerably more ICT-intensive than their manufacturing counterparts (since college education is an important complement to production in ICT-intensive sectors, this implies that the benefits of public investment in school and college-based education will be higher in services); and, second, from Hall and Soskice's contention that general skills acquired in a school- or college-based context are more important to competition in knowledge-intensive service sectors in which competition is based on radical innovation, while many (if not all) areas of manufacturing production rely more heavily on specific skills that can be effectively acquired through vocational training.

Hypothesis 3: Increases in the level of centralization of wage bargaining have negative effects on service employment creation, but the size of this effect is declining in the level of investment in school- and college-based education.

That is, we expect centralization to have negative effects on service employment creation in the first place (as argued by Iversen and Wren) because it tends to increase the relative wages of workers in less productive sectors, thus inhibiting low-end service expansion; and secondly, as we have argued here, because by reducing the relative wages of highly skilled workers, it reduces the incentives for private educational investment. As implied by hypothesis (1), however, we expect the latter effect to be ameliorated where levels of public educational investment are high.

We report the results of empirical tests of these hypotheses in the next section.

3.5 Wage Bargaining, Skill Formation, and Patterns of Employment Expansion: Empirical Analysis

3.5.1 Methodology and Data

Since our analysis is designed to estimate the long-run effects on patterns of economic development of institutions that change only gradually over time, we employ a static model for our analysis. We are interested specifically in estimating the impact of variations in levels of wage-bargaining coordination and public investment in education on patterns of employment performance.

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Since we expect these effects to be at least partially interactive, we include an interaction term in the model, which can be represented as follows:

$$Y_{i,t} = \alpha + \sum \beta^j X_{i,t}^j + \text{vector of controls} + \epsilon_t, \quad (3)$$

where the dependent variables are sectoral employment levels, measured, as before, as a percentage of the working age population, and the key regressors include wage-bargaining coordination, public spending on education, and an interaction term. Our control variables are the growth of real GDP and the level of GDP per capita in the preceding period and a set of period dummies designed to control for changes over time that are not captured by our institutional variables.

Our estimation is based on annual observations from thirteen countries,²⁰ over a period of thirty-one years (1970–2000). We use a measure of the degree of coordination of wage bargaining which is taken from the Golden, Lange, and Wallerstein (2009) database on “Union Centralization among Advanced Industrial Societies.” Golden, Lange, and Wallerstein’s index of coordination (GLW) can take on values ranging from 1 to 5, where a value of 1 indicates that bargaining takes place at a completely decentralized level and a value of 5 indicates that bargaining is completely centralized. Our measure of public investment in education is government spending on education as a percentage of GNP, and includes spending on preschool, primary school, secondary school, and college education. It does not include apprenticeships and other training programs.²¹ To give some indication of the extent to which these institutional measures vary across regime types, the mean level of wage-bargaining coordination in the more decentralized Liberal economies in our sample²² during the period covered was 1.39; in the Christian democratic coordinated economies,²³ this figure was higher at 3.40; and the social democratic coordinated regimes²⁴ were the most centralized of all, displaying an average value of 4.31. High levels of centralization in the social democratic regimes were accompanied by relatively high levels of public investment in education (just over 7 percent on average in these countries), however, while in the Christian democratic-coordinated and Liberal regimes the rate was lower at around 5.5 percent.

We report the results of our estimation of four models. In the first, the dependent variable is employment in predominantly private service sectors

²⁰ The United States, the United Kingdom, Japan, Denmark, Sweden, Germany, Austria, Spain, Italy, Finland, the Netherlands, France, and Belgium.

²¹ *Source:* UNESCO.

²² The United Kingdom and the United States.

²³ Germany, Austria, the Netherlands, and Belgium.

²⁴ Denmark, Sweden, and Finland.

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(incorporating both the dynamic and non-dynamic categories from the analysis in Section 3.3);²⁵ in the second, the dependent variable is employment in dynamic service sectors only (Finance and Insurance, Business Services, and Transport, Storage, and Communications); in the third, the dependent variable, for comparative purposes, is employment in manufacturing; and in the fourth, the dependent variable is employment in “welfare” sectors (Health, Social Work, and Public Administration). The education sector itself is excluded for analytical reasons which we discuss below.

3.5.2 Results

Our primary results are reported in Table 3.2.²⁶ We can see that our estimations suggest the existence of significant interactive effects of wage bargaining centralization and public investment in education in all four subsectors. There are substantial cross-sectoral variations in the size of these effects, however, and the substantive significance of this variation will become clear in our discussion of our simulations of the models below.

Our results are more easily interpreted when considered in conjunction with the simulations which we provide in Tables 3.3 and 3.4. Table 3.3 simulates the effect of increasing public investment in education by 1.37 percent of GNP (the standard deviation of this variable across our entire sample) in different wage-setting environments, and in different economic sectors. Each row therefore reports the expected effects of an increase in public investment in education when the level of wage bargaining is set at the mean for one of our three different regime types—Liberal, Christian-democratic CME (CD-CME) and social democratic-CME (SD-CME). Each column reports on the expected effect in terms of the percentage change in employment in a different economic sector. Table 3.4 reports the results of a similar set of simulations considering the impact of changes in the level at which wages are set²⁷ under different assumptions about the underlying level of public investment in education.

From Table 3.3, we can see, first of all, that across all of the economic sectors, the marginal benefit of public investment in school- and college-based education increases with the level of centralization of wage bargaining, but the benefits of this investment are much more marked in services than in manufacturing sectors. Thus, looking first at column 1, for example, our estimates suggest that in decentralized Liberal wage-setting environments, increases in

²⁵ That is Transport, Storage, and Communications, Finance and Insurance, Business Services, Wholesale and Retail Trade; Hotels and Restaurants; and Other Community, Social, and Personal Services.

²⁶ The standard errors reported in this table (in parentheses) are panel corrected.

²⁷ Again, we consider the impact on a 1 standard deviation increase in the level of wage bargaining—which, in our sample, is an increase of 1.26 points on Golden, Lange, and Wallerstein’s five-point scale.

Table 3.2. The interactive effects of wage-bargaining institutions and educational policy on employment creation

	All private service sectors ^a	Dynamic service sectors ^b	Manufacturing	Welfare services (excluding education) ^c
Bargaining level _t	-7.01*** (1.04)	-2.17*** (0.44)	-2.12*** (0.62)	-0.54* (0.31)
Public investment in education _t	-1.56*** (0.61)	-0.29 (0.23)	-1.28*** (0.40)	1.72*** (0.23)
Bargaining level _t × Public investment in education _t	0.89*** (0.16)	0.28*** (0.07)	0.38*** (0.10)	0.11* (0.05)
GDP/capita _{t-1}	0.0009*** (0.00009)	0.0004*** (0.00002)	-0.00008** (0.00004)	0.0003*** (0.00003)
Growth in real GDP _{t-1}	0.06 (0.11)	0.04 (0.03)	0.06 (0.05)	-0.05 (0.06)
1970s	9.52*** (1.64)	2.63*** (0.46)	3.65*** (0.62)	1.34** (0.61)
1980s	4.88*** (1.05)	1.33*** (0.30)	1.42*** (0.40)	1.45*** (0.38)
Constant	20.38*** (3.63)	7.08*** (1.53)	20.12*** (2.48)	-4.27*** (1.28)
R ²	0.61	0.62	0.43	0.73
N	372	372	372	372

^a Finance and Insurance; Business Services and Real Estate; Transport, Storage, and Communications; Hotels and Restaurants; Wholesale and Retail Trade; Other Community, Social, and Personal Services. ^b Finance and Insurance; Business Services and Real Estate; Transport, Storage, and Communications. ^c Health Services, Social Work, and Public Administration.

Note: * Indicates significance at 0.10 level; ** indicates significance at 0.05 level; and *** indicates significance at 0.001 level.

Table 3.3. Simulated effects on employment of increasing the level of public spending across different regime types^a

Effects of increasing public spending by 1.37 per cent GNP	Percentage change in sectoral employment (% working age population)			
	All private service sectors	Dynamic service sectors	Manufacturing	Welfare services (excluding education)
Level of centralization of bargaining				
Liberal (1.39)	-2.02	1.42	-7.42	25.63
Christian democratic (3.40)	9.18	9.49	0.12	28.66
Social democratic (4.31)	14.24	13.14	3.53	30.03

^a Bracketed figures refer to mean levels of wage bargaining across all time periods all countries with this regime classification in our data set.

Table 3.4. Simulated effects on employment of increasing the level of centralization of wage bargaining across different regime types^a

Effects of increasing level of centralization of wage bargaining by 1.26 points on the GLW scale	Percentage change in sectoral employment (% working age population)			
	All private service sectors	Dynamic service sectors	Manufacturing	Welfare services (excluding education)
Public investment in education (% GNP)				
Liberal (5.79)	-10.69	-7.23	0.73	1.22
Christian democratic (5.61)	-11.61	-7.90	0.11	0.97
Social democratic (7.14)	-3.77	-2.25	5.38	3.09

^a Bracketed figures refer to mean levels of public educational investment across all time periods all countries with this regime classification in our dataset.

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educational investment may actually result in a decline in employment levels in private service sectors broadly defined (an effect which we attribute to the “crowding out” of employment—at low skilled levels in particular—by public sector expansion). As the level of centralization of bargaining increases, however, public investment in education has increasingly positive effects, with the result that, at the levels of centralization most commonly observed in social democratic regimes, a 1 standard deviation increase in educational investment is likely to result in an increase in private service employment of almost 15 percent. This result supports our first hypothesis that the marginal benefits of public educational investment will be greater where the wage compression that results from centralized bargaining reduces the incentives for private educational investment.

It is of interest to note, however, that in the case of dynamic service sectors, increased educational investment has positive effects on employment creation even in highly decentralized environments (see column 2). The size of this effect is small in relative terms, but it does suggest a complementary role for public educational investment even where the incentives for private investment are large (i.e., in decentralized wage-setting environments in which the wages of the highly skilled tend to deviate more from the average). This finding accords with Goldin and Katz’s (2008) thesis that one of the primary causes of increasing inequality in the (decentralized) US case in recent decades has been the failure of the educational system to produce a sufficient supply of college-educated labor to meet the increased demand created by the ICT revolution. Again, our key finding, however, is that the effects of this type of investment are far more significant in centralized wage-setting environments, with an increase in spending of 1.5 percent of GNP predicted to result in an increase in employment in high-end traded service sectors of around 13 percent at social democratic levels of centralization.

Also of substantial interest is the finding that, in line with our second hypothesis, the benefits of public investment in school- and college-based education in terms of employment creation are substantially less marked for manufacturing than for services—although again they appear to increase with the level of wage bargaining (see column 3). Our analysis indicates that in highly decentralized environments, the predominant effect of increasing investment in school- and college-based education is likely to be a shift away from manufacturing employment and toward employment in welfare sectors and high-end traded service sectors (an increase of investment of 1.5 percent of GNP is predicted to reduce employment in manufacturing by roughly 7 percent). At higher levels of centralization, the effect of investment becomes positive; however, it is relatively modest when compared with the kinds of employment effects observed in service sectors.

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Finally, in the welfare sectors we do find evidence of the same kinds of interactive effects observed elsewhere, although in this instance the effect of the interaction is substantially less marked.²⁸ Thus, while the impact of investment does increase slightly with the level of centralization of wage bargaining, even in the most decentralized environments, public investment in education has a substantial impact on the numbers working in Health, Social Work, and Public Administration. This result may capture to some extent the effect identified by Ansell and Gingrich in Chapter 6. That is, subsidies to university education in particular reduce the financial burden on graduates and thus increase the probability that they will forgo more financially attractive careers in the finance and business sectors and opt for relatively secure jobs in health or government.

In general, therefore, our findings are supportive of our argument that flexible wage setting and public investment in education may function, in part, as alternative strategies for the creation of a workforce with the appropriate skills to compete in service sector markets (and hence for the expansion of service sector employment). Where wage setting is highly flexible, as in the decentralized Liberal cases, strong incentives exist for private investment in education, with the result that the additional effects of public investment in education on employment expansion in high-end, traded service sectors are small in relative terms (although we wish to emphasize that they do exist). The predominant effect of increasing public investment in school- and college-based education in decentralized wage settings, however, is likely to be simply a shift in employment toward welfare sectors (i.e., Government and Public Administration, Health, and Social Work—and Education itself) with little corresponding increase in private service or manufacturing employment.

As the level of centralization of bargaining increases (and hence the degree of flexibility in wage-setting declines), however, the incentives for private investment in higher education in particular also decrease and, as a result, the marginal benefit of increasing public investment in education increases. At higher levels of centralization, therefore, we find that public investment in education is likely to result in parallel expansions in employment in welfare sectors and private service sectors. Most significantly perhaps, at “social democratic” levels of centralization, an increase in public investment in school- and college-based education of around 1.5 percent of GNP is predicted to result in an employment expansion in dynamic service sectors of around 13 percent. As we discuss more in our conclusions, this result has important implications for the economic sustainability of the social democratic model in the context of de-industrialization.

²⁸ When the education sector itself is included in the broad welfare grouping the interactive effect becomes insignificant in our analysis and the direct effects of investment in education on educational employment creation (unsurprisingly) dominate.

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We note also that even at the highest levels of centralization, the effects of public investment in school- and college-based education are considerably stronger in service than manufacturing sectors, indicating, we believe, support for the hypothesis that these effects are closely associated with the importance of education of this type to any strategy for competition and employment expansion in a service sector context. We contend, therefore, that this particular set of policy choices over levels of flexibility in wage setting and educational investment is especially relevant to the post-industrial economy.

We illustrate these differences between manufacturing and service sector outcomes in a slightly different way in Table 3.4, which provides a set of simulations of the effects of increasing the level of wage bargaining given different levels of public investment in education (the flip-side of the outcomes shown in Table 3.3). The simulations reported in column 2 are supportive of our third hypothesis and reemphasize the finding of the analysis in the first part of the chapter that centralized wage bargaining (and the wage compression with which it is associated) has a negative impact on employment creation in dynamic service sectors. However, it appears that the size of this effect is significantly smaller in the presence of the higher levels of educational investment which are more common in social democratic regimes. In contrast, in manufacturing sectors, the evidence indicates that increases in the level of centralization of wage bargaining do not have a negative impact on employment creation, although again the effect of an increase in centralization only becomes strongly positive where it is accompanied by high levels of public investment in education (see column 3).

In Chapter 2, Iversen and Soskice argue that centralized wage bargaining impacts positively on competitiveness because the wage compression with which it is associated results in real wage restraint among highly skilled workers, and that this facilitates employment expansion in export sectors as long as public subsidies to education guarantee that the supply of highly skilled labor meets the demand for this labor in export markets. Our findings reported in column 3 appear to support this hypothesis—at least for manufacturing sectors: increases in centralization do have positive effects on manufacturing employment creation, although these effects are rather weak in the absence of high levels of public educational spending.

In dynamic service sectors, in contrast, it appears that something rather different is going on: here, the effect of increased centralization is to *inhibit* employment creation. This suggests that the negative effects of wage compression (in reducing the incentives for investment in higher level skills) may weigh more heavily than their positive effects (in encouraging wage restraint) in determining employment outcomes in these sectors. Again we note, however, that the evidence indicates that this effect can be ameliorated to a significant extent by high levels of public educational investment.

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Finally, our estimates suggest that increases in the level of centralization of wage bargaining are also likely to be associated with expansions in employment in welfare sectors. This result may indicate support for Ansell and Gingrich's hypothesis (see Chapter 6) that the wage compression associated with centralization reduces the incentives for highly skilled workers to opt for jobs in high-end traded service sectors, and instead increases the probability that they will choose more secure career paths in the welfare professions. It may also (as in Iversen and Wren's original trilemma) reflect the decisions of governments to compensate for weak employment performance in low-productivity, sheltered service sectors associated with wage compression directly via public service employment expansion.

In general, our findings indicate that, as hypothesized here and elsewhere in this volume (Iversen and Soskice, Chapter 2; Ansell and Gingrich, Chapter 6), the capacity of an economy to generate employment, as well as the distribution of that employment across different economic sectors, is likely to be significantly influenced by the particular combination of wage bargaining and educational policies which it pursues. In conclusion, we discuss the implication of these findings for the effectiveness of alternative socio-economic regimes in a context both of de-industrialization and the expansion of service sector trade.

3.6. Implications for Existing Regimes: A New Service Economy Trilemma?

Iversen and Wren (1998) argued that where governments were forced, in a context of de-industrialization, to rely on service sectors in which the capacity for productivity growth and international trade was low (*non-dynamic* sectors) to engineer employment growth, they had two potential strategies at their disposal. The first relied on low wage competition and the removal of protections on the relative wages of the poorest workers, to facilitate expansion in private service sectors. The second relied on the expansion of employment in public service sectors, with obvious implications for levels of government spending and taxation. Governments that were unwilling to pursue either of these strategies, on the other hand, would face increasing problems in attempting to generate employment. Hence they faced a three-way distributional choice (or trilemma) between the policy goals of equality, employment creation, and restraint in government spending.

We have argued in this chapter that the ICT revolution, which has significantly increased the capacity for trade and for productivity increases in a range of knowledge intensive services (or *dynamic* service sectors), alters these distributional and policy choices in important ways.

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Our analysis indicates that Iversen and Wren's results on the trade-off between low-end equality and the expansion of employment in *non-dynamic* service sectors do still hold. However, we also find that the expansion of employment in *dynamic* service sectors is *not* inhibited by the existence of protections on the wages of the poorest workers—as one would expect given the high capacities for productivity growth and trade in these sectors. Rather, we argue that employment performance in these sectors is enhanced where countries' institutional and policy configurations encourage the development of strong higher level general skills in the labor force. One route to the development of this kind of skills base (pursued in Liberal economies such as the United States and the United Kingdom in particular in recent decades) is to allow the wages of highly skilled workers to deviate from the average—creating strong incentives for private educational investment. The alternative, however, in environments in which earnings structures are more compressed (so that the incentive for private educational investment is reduced) is simply to increase the level of public educational investment—and this is the route more typically pursued in social democratic regimes.

Hence a new trilemma emerges—and one in which the implied set of policy choices is similar to that contained in the original—that is, governments that are unwilling to sacrifice the goal of equality must undertake public investment in order for the goal of service employment creation to be achieved. In this case, however, the associated set of distributional constraints is likely to be less extreme than those identified by Iversen and Wren. In Iversen and Wren's trilemma, the "public sector route" to service employment expansion was just that: with private service employment creation closed off by high levels of earnings equality, the principal vehicle to employment expansion would be the creation of jobs in the public sector, which would, in turn, need to be financed through government spending and, *ceteris paribus*, taxation or deficits. The arguments presented here, on the other hand, indicate that, when it comes to expansion in high-end internationally marketed services, the "public sector route" implies a reliance on the state for *investment* (in education) but not for direct employment creation. The state invests in education, but (while it may be accompanied by public employment expansion in education in particular) the dynamic driver of employment growth is high-end, internationally marketed private services. Expansion in these sectors, in turn, generates not just private sector employment (both in dynamic sectors themselves and, via an income effect, in income elastic non-dynamic service sectors) but also tax revenues, which can be used to fund public sector investment. As a result, the burden on the exchequer of the pursuit of this particular "public sector" route to service expansion is likely to be less onerous than that implied in Iversen and Wren's "trilemma".

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This is a point of considerable importance when assessing the sustainability of the service sector development trajectory of the social democratic regimes in particular (described in more detail in Chapter 1). It also highlights a point of divergence between our analysis and that of Ansell and Gingrich in Chapter 6. While Ansell and Gingrich emphasize the continued high levels of concentration of service employment in public service sectors in social democratic regimes (arguing that this concentration is explained, in part, by the effect of compressed wage structures and an absence of college debt on the career choices of graduates), we focus instead on the impact of the institutional configurations found in social democratic regimes (and in particular their high levels of investment in school- and college-based education) on their capacity to engineer a parallel (if smaller) expansion in dynamic service sectors (visible also from the expansion in highly skilled employment in these regimes in Figure 1.4 of Chapter 1). It is the latter capacity that is likely to be critical to the long-run sustainability of the social democratic model in an era of de-industrialization, as strong private sector growth provides the resources to finance a relatively large public service sector wage bill.

We note also that our argument leads us to be slightly more optimistic than Iversen and Soskice (in Chapter 2) about the prospects for highly skilled employment creation in Liberal regimes. While we agree with these authors that it is true that flexible wage-setting environments are less effective at restraining the relative wages of highly skilled workers (with negative implications for export competitiveness), our argument emphasizes the point that the existence of wage premia for highly skilled workers also creates incentives for investment in the kind of skills (college education) on which effective competition in global markets for high-end services in particular is based. Since (as we argue in the chapter) these skills are more important to competition in ICT-intensive traded service sectors than their traditional manufacturing counterparts, therefore, we expect that the relative weight placed of the positive effects of decentralization on competitiveness (i.e., its impact on skill formation) compared with its negative impact (i.e., its failure to restrain the wages of highly skilled workers) will be greater in the context of service expansion than manufacturing expansion. In short then, the Liberal institutional environment (combining high levels of decentralization in wage setting with high levels of private educational investment) may form a more effective basis for competition in export markets for high-end services than for traditional manufactures, offering improved prospects for highly skilled employment creation in these sectors as the transition to services progresses.

We also note two grounds for caution here, however. First, our analysis should not be interpreted as indicating that there is no scope for public educational subsidies in a decentralized wage-setting environment. Our findings suggest that public educational investment does still have positive effects

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on employment creation in dynamic service sectors in particular, even in this context—albeit effects that are significantly less marked than in centralized environments. Second, it is important to note that, while the pursuit of the Liberal route to dynamic expansion may not rely on the removal of protections on the wages of the poorest workers (as it did in the original trilemma), it nonetheless comes at a cost of relatively high levels of earnings inequality—this time at the top of the earnings distribution—and is also associated with greater inequities in the distribution of skills (Iversen and Stephens, 2008).

Finally, an implication of the arguments presented here is that the prospects for employment creation under characteristic Christian democratic institutional configurations may be less bright than in the other two cases. In most countries with strong Christian democratic traditions, unlike their social democratic counterparts, solidaristic wage-setting policies have not been accompanied by the high levels of public subsidization of the school- and college-based education that competition in high-end service markets requires. Instead, educational policies in these countries have centered on elite higher educational systems with limited enrollment (as discussed by Ansell and Gingrich in Chapter 6 of this volume), and vocational training systems funded to varying degrees by private firms (as discussed by Anderson and Hassel in Chapter 5 of this volume). This institutional configuration equipped these countries well to compete in markets for manufactures; however, the arguments presented in this chapter raise a question as to its continued effectiveness in a context of service expansion.

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