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GOBALIZATION AND UNCERTAINTY:
EARNINGS VOLATILITY IN SWEDEN, 1985-2003

by

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Abstract

Earnings volatility has been linked it to economic integration only through contradictory conjectures. We assess globalization's role by examining volatility trends in manufacturing, private services, and public services. If trade increases uncertainty, volatility trends should differ markedly across industries since manufacturing, in contrast to especially public services, is exposed to international competition. We analyze earnings trajectories in Sweden 1985-2003, a country and period evincing accelerating trade, finding no indications of greater volatility increases in manufacturing.

A precarious new world

Among the many potential consequences of increased international economic integration – or globalization – economic insecurity has been a recurring concern. A strong link between globalization and uncertainty is a central theme in both public and academic discussion of changes in living conditions in advanced industrial countries during recent decades (see, e.g., Rodrick 1997, Blossfeld et al. 2006). Some observers forecast increasing levels of economic instability, both at the national and at the individual level. In this "doomsday" perspective globalization leads to increasing volatility as economic shocks in one country or region spill over to other parts of the world generating perpetual turmoil. Others counter that although globalization may not be heaven's gate, international integration may actually prevent economic instability since it entails an opportunity to offset regional shocks (see, e.g., Feldstein 2000).

The link between economic integration and earnings volatility is of interest for a number of reasons. First, job and earnings security is generally valued highly in attitudinal surveys (Sverke et al. 2002), and analyses of consumption patterns bear out the negative impact of earnings instability on individual welfare (see e.g. Benito 2006). At the macro level, volatility has also been found to be positively related to poverty and income inequality (e.g. Breen and Garcia Penalosa 2005, Laursen and Mahajan 2006). An increase in economic insecurity would thus be a negative welfare effect of economic integration. Second, the value placed on economic security causes economic insecurity to have ripple effects in other areas. One of these involves the welfare state, as the desire for income security is believed to be one of the driving forces behind the growth in government expenditures on social insurance programs during the post-war period. This is the so-called compensation hypothesis, which exists in two versions. In the first, governments create and expand social insurance programs to offer protection against income risks to which their citizens are exposed (Garrett 1998, Rodrik 1998). In a second version, industries are assumed to differ in their exposure to international fluctuations. Specifically, the public sector is taken to be more protected than the private, tradable, sector, and a large public sector is therefore attractive to governments and voters alike since it acts as an economic stabilizer minimizing economic instability (Rodrik 1998).

These micro and macro repercussions of economic insecurity have generated a literature of two different kinds. There are, on the one hand, individual level studies of earnings dynamics, in which the evolution of individual earnings over time is examined. Although highly informative when it comes to the nature of the uncertainty confronting individuals in various countries, such analyses are silent regarding the factors influencing the development and type of earnings dynamics observed. As discussed further below, although the link between globalization and uncertainty is frequently mentioned it is in this tradition limited to ad hoc conjectures regarding which earnings component (the permanent or the transitory) may

be affected by changes in economic integration, conjectures that often are of a contradictory nature. On the other hand, there are country level analyses inspired by the compensation hypothesis in which aggregate economic volatility is linked to measures of trade and financial openness. While these studies provide direct evidence of the link between economic integration and aggregate economic volatility, they are mute when it comes to the actual impact of globalization on individual level uncertainty.

The purpose of this paper is to bridge this gap in the literature by examining the link between economic integration and individual earnings and employment volatility. Our interest in volatility leads to a focus on capital mobility and – most importantly – trade. That goods are crucial implies that any impact of globalization on volatility is most likely to be evident in the manufacturing sector. In contrast to services, manufacturing firms and their employees are much more exposed to the vagaries of international competition. Particularly public services could, as in the compensation hypothesis, be presumed to be shielded from the turmoil of international markets to a much greater extent. Our working hypothesis is therefore that if economic integration affects volatility, we should see differences in the evolution of volatility between manufacturing and services, in particular public services, during periods of international economic integration. Changes in volatility in manufacturing that also are evident in other sectors are thus much less likely to be related to economic integration.

Our analyses of differences in the development of individual earnings volatility across sectors provide precious little evidence of an impact of economic integration on employment and earnings uncertainty. Hence, while we document an increase in earnings volatility in the manufacturing sector (the 'experiment group'), this change is similar to the development found in the two service sectors (the 'control groups'). This would seem to indicate that increasing economic integration has not in itself altered the extent of economic insecurity.

The paper is organized as follows. We start by briefly reviewing the general theoretical relationship between international integration and economic uncertainty, and then offer some remarks on the specific case we consider: Sweden in recent decades. Following a description of our data and methods we report findings on inter-industry comparisons of changes in volatility at the micro (individual earnings) and macro (aggregate paid hours and layoff notifications) levels. We conclude by suggesting interpretations of our main results and outlining issues for future work.

The erratic economy: globalization and volatility

It is well known that international economic integration has risen after the first oil crises in the mid 1970s, and much has been written on the causes and consequences of this economic transformation.[1] While it is generally agreed that this development is important in various

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[1]   See e.g. Brady et al. (2005) for a review of the wide range of topics examined in connection with economic integration.

ways, there is still substantial disagreement when it comes to what precisely the economic consequences are. With regard to earnings and employment, one can distinguish between three distinct pathways through which economic globalization might have an effect on national labor markets.

First, accelerating integration may promote a more efficient allocation of resources, in turn furthering economic growth and general demand. General labor demand will also be likely to be affected by the international business cycle in proportion to the external openness of a country's economy. In more open economies, enhanced economic integration will therefore heighten susceptibility to international business cycle fluctuations.

Second, specific labor demand, e.g. by industry, will be affected in relation to the degree of import and export penetration in the industry in question. With an increase in import penetration, domestic labor demand will slacken, while domestic demand will rise in industries with increasing exports. These effects may come in two basic forms: wage or employment adjustments. The latter, in turn, can also be of two kinds: employee mobility (either in the form of job mobility, shifts into unemployment, or exits from the labor force) and modification in working hours. Which one of these will dominate depends on both economic and institutional factors. If losses in labor demand at a particular wage level in some parts of the labor market are compensated by a growth in demand elsewhere, job mobility ensues. If demand losses in some places are not fully compensated by growth in other locations, adjustment will take place along one or more of the other routes.

Third, trade might affect the variation of labor demand at given average demand levels. The standard expectation is here that trade may lead to specialization in production according to the logic of comparative advantage. This increases vulnerability to swings in external demand, and hence increases labor demand volatility (e.g. Krugman 1993). It has also been agued that such an effect may be exacerbated by an increased susceptibility to domestic shocks (Traca 2005). On the other hand, it has been asserted that trade may also lead to market diversification in the sense that world markets are larger and more heterogeneous than domestic markets. Downturns in demand from one category of buyers may therefore be compensated by upturns elsewhere, thus reducing overall demand volatility (this point has been made by e.g. Rodrik 1997:55, Garrett 2001:21). As was the case above, such volatility of demand is likely to differ between different sectors of the economy in accordance with their exposure to world markets.

The enhanced integration of industrialized economies has generated a vast literature studying the various consequences listed above. While the question of volatility clearly has received the least attention, this does not mean that studies of changes in earnings volatility are entirely lacking. In a seminal paper, Gottschalk and Moffitt (1994) examined the evolution of earnings inequality in the US using a distinction between permanent and transitory inequality, or between long-run earnings differences and earnings volatility. They argued that

the passionate discussion around soaring earnings differentials implicitly assumed that the increase was entirely due to a rise in permanent variance. Instead, they noted that earnings differentials may be decomposed into a permanent and a transitory component, and claimed that an increase in the variance of the temporary component accounted for a substantial part of the growth in earnings inequality. This assertion was based on the analysis of the development of earnings inequality among white males aged 20 to 59, for whom the growth in the transitory component accounted for more than one third of the rise in earnings inequality in the period 1979-1988.

This finding was said to have significant substantive implications. An increase in permanent inequality (i.e. an increase in the variance of average earnings) could be associated with gradual changes on the labor market such as skill-biased technological change or long-term changes in labor supply. A rise in temporary inequality, on the other hand, would be less congruent with such gradual forces, and would instead be explained by changes in unionization, regulation, and international competition.

The work by Gottschalk and Moffitt was followed by further analyses exploiting the permanent-temporary distinction; see Baker and Solon (2003), Blundell and Preston (1998), Cappellari (2002, 2004), Congressional Budget Office (2007), Dickens (2000), Gangl (2005), Gustavsson (2004), Heider (2001), Moffitt and Gottschalk (1995, 2002), and Ramos (2003). As a general conclusion, the increase in inequality in the Anglo-Saxon countries studied (Canada, UK, and US) seems to have been fueled by roughly equal increases in permanent and temporary inequality, although there is some evidence that there was a reduction in temporal variability in the US in the late 1980's and early 1990's. In contrast, the growth in Italian inequality was almost exclusively due to intensified permanent inequality.[2]

In the context of this paper, Gustavsson's (2004) study is especially noteworthy as it is the only analysis focusing explicitly on Sweden. Following in the footsteps of Gottschalk and Moffitt, he examined the evolution of the permanent and transitory variance components of earnings among native-born males aged 26 to 53 during the period 1960-1990.[3] The results

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[2]   It may be noted that these differences do not seem to be due to sampling choices, as all studies have looked at native males aged roughly 20 to 60 years. (An exception is CBO, 2007, which also looked at women.) Indeed, the results pointing to an increase in temporal volatility may be all the more dramatic given that this is a group who could be expected to display fairly stable employment and earnings patterns. One difference may however be the treatment of persons with extremely high or low incomes.

[3]   In comparison to Gottschalk and Moffitt, Gustavsson (2004) used a more complex model in which he inter alia allowed for cohort and age differences when examining the evolution of earnings variance. According to Gustavsson (2004, fn. 13), in the Swedish case the change in model specification did not affect the conclusions regarding the evolution in the two variance components. It did however affect relative size, with the more flexible model yielding lower estimates of transitory inequality. Baker and Solon (2003) came to a similar conclusion in their analysis of Canadian data.

showed that permanent variance decreased continuously throughout the period, whereas the temporary variance initially grew, then declined, and finally increased again.[4]

There is in other words evidence for increasing earnings volatility in industrialized countries in the period following the first oil crisis. As shown by the studies by Capellari (2002), Gustavsson (2004), and Gangl (2005) there are also cross-national differences indicating that the experiences of the Anglo-Saxon countries, and in particular the US, should not be assumed to be representative of industrialized countries as a whole.

As interesting as these studies showing a rise in insecurity in many modern labor markets are, they tell us relatively little about the causes of this development. As noted earlier, Gottschalk and Moffitt claimed that the distinction between permanent and transitory earnings variance could illuminate the causes of the evolution of earnings inequality, since the two variance components were assumed to respond to different driving forces. Similar remarks have also been made by subsequent authors. However, what these developments actually tell us about potential causes seems somewhat unclear. For instance, Katz (1994), commenting on Gottschalk and Moffitt (1994), noted that (a) the generality of the increase in dispersion (within and between groups, permanent and temporary etc) suggests that there is a common factor (or set of factors) driving the universal rise in inequality (p. 257), and (b) that skill-biased technological change (SBTC) may also affect transitory earnings, not only permanent inequality as suggested by Gottschalk and Moffitt and others (p. 260). Likewise, Haider (2001, pp. 800-801) argueed that international trade may affect the permanent as well as the temporary component. International trade and SBTC could thus be the culprit behind changes in either the permanent or the transitory component, making it difficult to draw firm conclusions.

In addition to these analyses of earnings volatility at the individual level, there are also a few studies on aggregate income data from national accounts. The question has been somewhat different from the one posed in the micro-level studies just surveyed. Rather than focusing on earnings inequality they are concerned with the link between economic integration and income (GDP) volatility *per se*. This line of inquiry was initiated by Cameron (1978) and has been developed by in particular Garrett (1998) and Rodrik (1998). Cameron observed that economic openness was strongly correlated with government tax revenue, something he ascribed to greater industrial concentration leading to higher unionization in turn fostering demands for public expenditure. In contrast, Rodrik (1998) argued that it was

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[4] The continuous decline in permanent variance would seem at odds with the purported increase in skill demand after the 1970's. Gustavsson (2004) ascribed the decline in temporary variance between early 1970's and mid 1980's to the pattern of nationally centralized bargaining prevalent during in the period 1950-early 1980, and the subsequent increase in volatility to the replacement of nationally centralized bargaining with centralized industrial bargaining. This would however seem to beg the question as to why there was an increase prior to the 1970's despite nationally centralized bargaining.

openness combined with external risk (in the form of terms-of-trade volatility) that in itself induced additional government spending, as the latter acts as an economic stabilizer.

Most recently, Kim (2007) pointed out that Rodrik's distinction between openness and external risk is insufficiently appreciated. Openness signifies the degree of exposure to the international economy, e.g. the level of international trade and capital flows. In contrast, external risk indicates the degree of stability in the conditions for openness, e.g. stability in exchange rates and terms-of-trade (the relation between export and import prices). It is the combination of (i.e. interaction between) openness and external risk rather than openness by itself that should generate higher economic volatility. Kim's empirical findings based on time-series data from 175 countries for the period 1950-2002 support this hypothesis. The upshot is that the link between globalization (in the sense of increasing openness to international trade) and aggregate economic volatility is conditional upon the evolution of the terms of trade. A decrease over time in the volatility of the latter may be sufficient to offset the uncertainty increasing impact of a rise in trade volumes. Results from other macro level studies (e.g. Iversen and Cusack 2000) echo this finding of a non-significant effect of openness *per se* on aggregate economic volatility.

These studies have linked explicit empirical measures of international integration to macro level economic insecurity. However, they provide little information when it comes to the micro level developments supposedly linking globalization to welfare state growth. By examining income rather than earnings they may conflate distinct processes for different types of factor income. There is thus substantial evidence that changes in capital income have been a significant component in the widespread growth in income inequality (Atkinson 2003). This would seem to devalue the aggregate evidence, as increases in the volatility of capital income are less likely to generate calls for income protection through social insurance. Likewise, differences and changes in income volatility may be driven by changes in labor force composition. One example here is changes in the age distribution of the labor force. As shown by e.g. the previously mentioned studies of earnings dynamics, age is a crucial determinant for earnings volatility and the neglect of such compositional factors may therefore mar the results. Similar concerns are also raised by changes in the sex composition of the labor force.[5]

Returning to the micro level, it is important to note that apart from the original study by Gottschalk and Moffitt (1994), none of the analyses of the changes in individual earnings instability have systematically examined inter-industry differences.[6] Gottschalk and Moffitt

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[5] Some micro level evidence is instead provided by other scholars, e.g. the impact of economic integration on unionization (Scruggs and Lange 2002) and on public opinion regarding integration and redistribution (Scheve and Slaughter 2006). Nevertheless, these studies do not examine the core proposition *per se*, i.e. that economic integration increases individual economic insecurity.

[6] However, Cappellari (2002) made a distinction between the public and the private sector and found clear differences of earnings dynamics in the two sectors. Private sector earnings were more volatile, and while the transitory component decreased over time in the private sector it grew in the public. Others, e.g. Dickens (2000), also study occupational and/or educational groups.

(1994) found that the growth in transitory earnings instability had been pervasive, occurring in all the industries examined. Nevertheless, there were notable inter-industry differences in the evolution of instability, the increase being greatest in manufacturing and substantially less in for instance services, but they did not explore this finding further.[7] They also examined the evolution of aggregate income by industry using data from the US Bureau of Labor Statistics. As expected, these displayed much less variability than the individual level data from the panel Study of Income Dynamics (PSID), and also showed no evidence of increased instability at the aggregate level. This was interpreted as evidence that the increase in temporary instability primarily had occurred at the individual level.

In sum, simply examining overall trends in transitory earnings variance as in the previous micro-level literature appears to be a dead end when it comes to examining causes, and alternative approaches to probing potential driving forces are therefore desirable. We believe that the inter-sectoral comparative approach we use in the empirical analyses below is a useful step in this direction. Direct measures of trade openness and other aspects of international economic integration are used in the macro-level literature. However, analyses of aggregate data are not sufficient to reach conclusions about the impact of globalization on economic uncertainty at the individual level, which is the crucial concern from a welfare point of view.

Sweden: a small porous economy with strong institutions

In light of the evidence of country differences in earnings volatility reported on above, some general remarks about the Swedish case would appear necessary. Like other small OECD countries, Sweden has for many decades been highly dependent on trade with the outside world. Openness to international trade is thus an old and fundamental trait of Swedish economic life rather than a recent phenomenon. Although large by tradition, trade flows have nonetheless increased further over recent decades, and at a high rate. The value of imports and exports relative to GDP increased by about 50 percent from the 1950's to the 1980's, and then grew even faster in the 1990. The level of Sweden's foreign trade is close to the OECD average unweighted for population size, and considerably higher than the weighted average. In contrast, the growth rate of trade 1950-2000 was close to both the weighted and unweighted OECD mean, indicating that the Swedish growth experience is fairly representative (Heston et al. 2002). With the exception of the 1990's, when exports increased faster than imports, the value of imports and exports was roughly equal throughout this whole

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[7] They discussed the importance of inter-industry mobility, as employee shifts from e.g. low to high variance industries could lead to an increase in overall inequality, but conclude that almost all of the increase in temporal variance is within industries. (Although not commented upon by the authors, the industry specific developments actually amounted to a convergence as the industries with the highest variance experienced the lowest growth and vice versa.)

period. In addition, cross-border mobility of capital emerged as a new feature of international competition in the 1980's, and has increased rapidly.

Sweden's labor market has a number of institutional traits that suggests the following main pattern of adjustment to external shifts in labor demand (for a more detailed discussion, see Korpi and Tåhlin 2006: 149ff). First, since wage determination is highly coordinated across major parts of the economy, adjustment will primarily take place as employment shifts. While wage bargaining has gradually become less centralized in the last two decades, coordination within if not across industrial sectors remains strong for most worker categories. Second, for a number of reasons related to employment security, skill formation, labor market policies, and the evolution of trade patterns (with growing imports balanced or exceeded by growing exports), employment adjustments are likely to be dominated by job mobility rather than long-term unemployment. At least until the economic crisis of the early 1990's, the Swedish institutional structure remained largely intact in these respects. It is conceivable that employment has since become less secure even in economically good times, but it is still too early (in a cyclical sense) to know.

This expected pattern of adjustment to shifts in labor demand in Sweden underlines the importance of using yearly earnings, i.e., the product of wages and hours worked in a given year, rather than wage rates per time unit as the basis for estimates of micro-economic volatility. Institutional constraints (collective bargaining and legislation) on wage adjustments are typically stronger than on employment adjustments, at least in the case of manual workers and lower or mid-level white-collar employees. An increase in economic uncertainty is therefore likely to be transmitted primarily through variations in employment opportunities including job loss and mobility rather than through fluctuating wage rates. The relative importance of wage adjustments is hence significantly lower in Sweden than in countries with uncoordinated wage bargaining (such as the United States and the other Anglo-Saxon countries). Conversely, the scope for employment adjustments is probably larger in Sweden than in labor markets with strict employment security legislation that binds the employment decisions of individual firms even in the face of significant losses in product demand (e.g. in parts of Southern Europe).

Data and methods

As stated above, this paper starts from the assumption that any impact of openness should be more visible among employees in manufacturing than in (private or public) services, because manufacturing is the industry most exposed to international competition. Therefore, comparisons of outcomes across industries (between manufacturing, private and public services) should reveal the impact of openness. If the change in outcome (e.g. earnings volatility) is similar in manufacturing compared to other industries, openness is probably not an important cause.

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The assumption that globalization effects should be more visible in manufacturing than in private and (especially) public services does not imply that the effects are expected to only be visible in manufacturing. There are several conceivable ways that globalization could have an impact on services, either directly or via manufacturing. Some services are thus active in international markets, and this participation rate is trending strongly upward in many countries. Aside from these direct effects, globalization may also affect service employment through effects on manufacturing that ripple through the economy. An increase in employment and earnings volatility in manufacturing jobs may obviously affect labor market conditions in other sectors. For instance, greater oscillations in manufacturing income may increase the variability in tax revenues of central and local government, which in turn may increase the variation in public employment. Further, the demand for private services of different kinds is of course dependent on earnings and profits in other economic sectors. It is hence clear that the labor market effects of an increase in international trade need not be limited to manufacturing jobs.

It is just as clear, however, that the impact of globalization is likely to be much stronger in manufacturing than in services. International trade is still heavily dominated by goods rather than services. Around 80 % of all foreign trade, both Swedish and global, is in manufacturing; since 1980 this share has been roughly stable globally and fallen slightly in Sweden (WTO, International Trade Statistics; Statistics Sweden, Foreign Trade Statistics). Indirect effects of globalization on services, via manufacturing, will be significantly weaker than the direct globalization-manufacturing links. This is true almost by definition: public employment volatility is not caused by tax revenue volatility only and that tax revenue volatility, in turn, is not caused by foreign trade only. As long as each link in causal chains of this kind has an elasticity clearly below one, the empirical association between the chain's endpoints will be quite weak. In sum, there are good reasons to expect that the impact of globalization on employment and earnings volatility will differ markedly between manufacturing and services. This expected difference is all we need as a basis for our analytical strategy. While we fully acknowledge that the sectoral variation is not of an all-or-nothing kind, our comparative logic does not depend on such sectoral differences in kind, only on substantial differences in degree.

We examine this issue using both aggregate and individual level data. We thus study the volatility of earnings using the STAR (Sweden over Time – Activities and Relations) database. This data set contains complete population counts from a wide array of data from official registers, linked by a common personal identifier. The earnings information stems from tax records of yearly individual earnings between 1985 and 2003. The records contain information on a number of different types of income, and we use a definition of earnings that include pay (*löneinkomst*) as well as income from business activities (*inkomst från aktiv*

näringsverksamhet). **8** In line with most of the research cited above, individuals with zero earnings (completely without employment, around 11 percent of the population) and individuals below and above the 5th and 95th yearly earnings percentile, respectively, are excluded.**9**

In our analysis, individual earnings growth is stratified by sex, age, education and industry. Following the previous literature we focus on those between ages 25 and 55, and we define three age groups: 25-34, 35-44, and 45-54 years of age.**10** Education is also divided into three categories corresponding to compulsory education, (upper) secondary, and tertiary education. The division into industries is based on the Swedish Standard Industrial Classification (*Svensk Näringsgrensindelning,* SNI). The SNI (originally from 1969) was updated twice between 1985 and 2003, in 1992 and again in 2002. However, for the purpose of our study these breaks pose no serious problems. The current SNI is a Swedish version of the Classification of Economic Activities in the European Community (*Nomenclature générale des activités économiques dans les Communautés européennes*, NACE). The industry classification according to the original and the two subsequent versions are:

	SNI 1969	SNI 1992 & 2002
Manufacturing	30-39	15-37
Private Services	60-89, 92, 94, 95	50-74, 90-93
Public services	91, 93	75, 80, 85, 99

Since many individuals shift industries during their careers, and our analyses build on information on individual earnings trajectories, two definitions of industry affiliation are used to explore the robustness of the results with respect to industry classification: (1) *First industry* where an individual's affiliation is based on the first employment of each time window, and (2) *Same industry* where only individuals with a constant industry affiliation during each time window represent that category. Both have drawbacks. The first definition

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8   Focusing solely on earnings from work may be problematic if there are sectoral differences in the evolution of e.g. employment unrelated to globalization. Examples are for instance differences in fertility or sickness across industries, differences that might affect the development of earnings volatility. As an alternative to the above measure we also carried out the analyses using a measure of earnings that include pay as well as earnings-based transfers (*arbetsinkomst*). These transfers primarily consist of sick pay and parental leave pay, transfers generally received while on leave. Despite some differences, with respect to the inter-sectoral differences the results from these analyses (not shown) were very much in line with the results reported here.

9   Almost all studies of this kind exclude individuals with zero earnings, and most employ some other form of trimming as well. As alternatives to dropping those below the 5th and above the 95 percentiles, we have also conducted analyses including everyone with positive earnings or winsorizing those below the 5th and above the 95 percentiles. The results from these two alternative approaches (not shown) were very similar to the ones presented here, and the overall conclusions unaffected.

10 For estimations where age is not explicitly used as an independent variable, age balanced datasets are used in order to secure that differences in age structure across industries do not drive any differences.

will contain measurement error: for individuals starting out in one sector and then moving to another, all registered volatility in earnings will be credited the former. In contrast, the second measure suffers from selection bias: individuals who are immobile across industries do not represent the working population as a whole. Contrasting the two definitions as well as varying the length of time to which they apply will provide some indication as to the sensitivity of the results.

We use two broad approaches to examining volatility, drawing on the macro and micro literature respectively. In the literature using aggregate level data, volatility V_t, is generally defined as the standard deviation of log yearly growth (see, e.g. Kim 2007, Rodrick 1998). In other words

$$V_t = SD(X_{t-n}, ..., X_t) \tag{1}$$

where $X_t = \ln(Y_t/Y_{t-1})$ and Y_t is GDP at time t and where n differs across studies.

We use a version of this measure, with n = 4, adapted to individual level data in our analyses of earnings volatility. For each individual i we thus compute a volatility measure analogous to the one above, and then calculate the average volatility within a matrix based on the variables age, gender, education, and sector. The definition of earnings volatility in age group a, educational category e, gender g, and sector s at time t is in other words

$$V_{aegst} = \frac{\sum_{i=1}^{N_{aegst}} SD_{it}(X_{i,t-4}, X_{i,t-3}, X_{i,t-2}, X_{i,t-1}, X_{i,t})}{N_{aegst}} \tag{2}$$

where $X_{it} = \ln(Y_{it}/Y_{it-1})$ and Y_{it} is earnings of individual i at time t. Time is defined from t = 1990 to 2003, which gives us 14 windows of moving averages covering the years 1985 - 2003. The model is relatively flexible, in that it simultaneously allows for separate age group, education, and sex differences in the evolution of industry specific earnings volatility.

Controlling for age, education, and sex in this manner overcomes some of the problems with the aggregate level studies mentioned above, namely changes in volatility driven by changes in labor force composition. In addition, it also allows us to deal with questions associated with inter-sectoral labor mobility. Non-random mobility between industries is one of the major methodological issues in the literature on inter-industry wage differences, where it is feared that selective mobility by individuals with higher (or lower) expected earnings into particular industries may be lead to biased estimates of true wage differentials. Although there is no similar literature on volatility driven mobility, it is not difficult to construct scenarios where selection could factor into industry differences in earnings fluctuations.

One such setting does for instance concern age, as labor market entrants commonly experience more volatility than established workers. In a situation with a declining manufacturing sector and employment protection in the form of "last in, first out" rules, manufacturing employees could become an increasingly grizzled group. This compositional change could tend to deflate manufacturing volatility, and potentially enhance volatility in expanding sectors.

Similar stories could be told with respect to sex and education. Women tend to display greater earnings volatility than men, and the sector specific concentration of women has changed noticeably over time. A quick expansion of the public sector during the 1970's and early 1980's, involving a dramatic rise in female employment, was halted during the 1980's and was followed by a slow contraction. New female entrants to the labor force have instead tended to enter the private service sector, something that could affect the relative volatility of the two sectors. As for education, this tends to be inversely related to earnings instability. Employees in the public sector generally have attained markedly higher levels of educational than for instance those in manufacturing, so this too could affect sector specific volatility. Controlling for age, sex, and education would allow us to examine the importance of any such effects.

As a second approach to analyzing volatility, we augment these relatively simple analyses by applying a version of the standard permanent-transitory model used in many of the previous studies on individual level earnings dynamics. This defines log earnings for individual i at time t, Y_{it}, as

$$Y_{it} = \mu_i + v_{it} \tag{3}$$

where μ_i is an individual fixed effect and v_{it} is an individual specific deviation. The fixed effect is the measure of permanent inequality, whereas the deviation captures the transitory variation around these permanent differences.

As noted above, controlling for age, education, and sex circumvents some of the problems with the aggregate level analyses associated with changes in labor force composition and also allows us to handle some of the potential problems associated with non-random mobility. Nevertheless, the controls may not be sufficient to deal with the mobility problem. Selection may also take place on unobservables, and one such factor germane to our volatility analyses is risk aversion. A Swedish proverb thus states that "the government pie is small but secure", i.e. public sector wages are low but guaranteed. If individuals with a taste for stability would tend to convene in the public sector, this could generate lower volatility than what one would otherwise obtain. Such tastes are here unobservable, yet to the extent that they are enduring they would be captured by the permanent-temporary framework described above.

In our implementation of the model, we again make use the moving windows and then compute the average standard deviation of the transitory and the permanent residual for each window.[11] That is,

$$v_{aegst} = \frac{\sum_{i=1}^{N_{aegst}} SD_{aegst}(v_{i,t}, v_{i,t-1}, v_{i,t-2}, v_{i,t-3}, v_{i,t-4})}{N_{aegst}} \qquad (4)$$

$$\mu_{aegst} = SD_{aegst}(\mu_i) \qquad (5)$$

Finally, volatility in earnings is the combination of volatility in wages and in employment. We do not have access to individual level data on either of these components, but instead explore the importance of volatility in employment for our earnings results using two types of aggregate data: average weekly working hours from the Swedish Labor Force Survey (*Arbetskraftsundersökningen*, AKU) and advance layoff notifications recorded at the National Labor Market Board (*Arbetsmarknadsstyrelsen*, AMS). In the former case, the data span the period 1987–2004 and in the latter the years 1981 to 2006. We again employ the aggregate volatility measure *V*, with n = 4, to examine working hours and advance notifications. We thus examine the standard deviation of log yearly growth in each measure over six consecutive years (i.e., five changes).

Results

Turning then to our analyses of earnings volatility, it should once again be noted that this is a measure of instability in yearly earnings and thus reflects the combined effects of changes in wages, work hours and employment. The results shown here are based on the definition of industry where the first affiliation is ascribed to all the following time points in the five-year observation window. However, with regard to the evolution of volatility in the manufacturing sector relative to the other two sectors essentially the same pattern is reproduced if the alternative definition of constant industry affiliation is used. The substantive conclusions are

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[11] We also have estimated the alternative version of the permanent-transitory model suggested by Moffit and Gottschalk (2002). They pointed out that if the two components are uncorrelated, the variance (Var) of individual earnings at one point in time is the sum of the variances of μ_i and v_{it}. Moreover, the covariance (Cov) of log earnings between a pair of time points sufficiently distant from each other that the deviations are uncorrelated will reflect the permanent component. An alternative measure of the transitory component (T) can then be computed using the simple formula T = Var – Cov. We have again used the moving windows, but this time used the endpoints of the window to calculate covariances, and have again done this separately by age, education, sex, and industry. The length of the windows were here motivated by the fact that we needed time points sufficiently far apart that no effect of a temporary shock remains, and Gustavsson's (2004) results here suggests that a five year window serves as a minimum distance. The results from these analyses corroborated the analyses presented in the paper, and were therefore not included here.

also unaffected when we vary the length of time over which the various measures are defined (n), and we conclude that the results are robust to different definitions of this variable.

Figure 1 shows the evolution of volatility, using the V measure, in the three sectors manufacturing, private and public services. Volatility has here been indexed such that the volatility in the first window has been set to 100. It is clear that earnings volatility has trended upward in all industries, although to a varying degree. The increase is most notable in the private service sector, where there is a steady upward trend throughout the whole period. Manufacturing initially followed suit, but in the mid-1990's volatility stabilized. Like the private services, public services also display a continuous increase but at a much slower pace. Taken together, this clearly speaks against a globalization driven increase in volatility. Although manufacturing volatility has increased, this growth has been outpaced by that in private services. Moreover, the initial difference between manufacturing and public services had largely evaporated by the year 2000.

Nevertheless, as argued above, this gross picture might conceal important group differences. Below we therefore compare volatility changes across industries separately by sex, age and education. Figure 2 shows the evolution of female earnings volatility, again using the V measure, in the three industrial sectors by level of education and age. (The estimates underlying the graphs in Figures 2 to 5 are presented in the Appendix, Tables A1 to A4.) The pattern reveals substantial heterogeneity across demographic groups in the development of volatility over time. Inspection of the nine panels thus show that volatility in some cases rose continuously (and dramatically) throughout the period, while it for other groups remains essentially unchanged. Yet, for our purposes the crucial result is that in none of the cases is there any clear indication of a markedly greater increase in volatility in manufacturing than in the other two sectors. Basically the same story is told by Figure 3 showing the changes in volatility among men, again by industrial sector, educational level and age. Here too the evidence indicates a fairly widespread increase in volatility, although the magnitude differs substantially among our nine age-education groups. However, in none of the nine panels do we find any kind of indication that manufacturing volatility increases relative to that of the other two sectors. Instead, among men any increase in volatility evident in manufacturing is often less than that in private and public services.

Figures 4 and 5 show the evolution of volatility using the alternative measure *v* based on the frequently utilized decomposition of earnings differences into a permanent and a transitory part. These analyses, in which we thus control for age, sex, and educational differences in volatility as well as include unobserved individual fixed effects, again provide evidence of differences in the evolution of volatility in the various sex-age-education groups. However, with respect to our question these differences are inconsequential: the trends in earnings instability in the three industries are again roughly similar in all the 18 panels. As was the case above, although here more so among women than among men, there are even

some indications that manufacturing volatility actually seems to have increased less than volatility in the other two sectors. In our view, this seriously questions the idea that growing economic integration with other countries has been an important cause of the evolution of Swedish earnings volatility in recent decades.

As noted above, the changes in earnings volatility just presented represent the combined outcome of changes in wages, working hours, and employment. Since employers in different industries may handle globalization pressures differently, we could in principle have separate developments for each of these components in our three industries. It is therefore possible that a globalization effect only is apparent in one of the components pay, hours, and jobs, and examining earnings may conceal rather than reveal effects of globalization. Regrettably, the data contains no information on these separate components, making us unable to decompose the changes in earnings instability. Nonetheless, a look at fluctuations in two aggregate indicators of hours and jobs will at least give us some indication of any existence of separate trends in these earnings components. The evolution of volatility in weekly working hours and advance layoff notifications is shown in Figures 6 and 7, with both series indexed so that the starting year is set to 100. As is clear from these graphs, there are substantial oscillations in the volatility of hours as well as notifications over the period. In manufacturing, volatility in working hours in the early 1990's is thus twice as high as in the late 1980's, yet in the mid-1990's volatility in manufacturing is around half of what it was in the late 1980's. The amplitude of the swings in layoff notifications is even greater.

Most importantly, there is no indication that the development of volatility in either measure is any different in manufacturing than in the other two sectors. This in our view underscores the conclusions drawn in the analyses of earnings volatility, that there is no sign of a globalization effect on earnings. Although we are not able to look at the volatility of wages, the fact that fluctuations in hours and job loss are broadly correlated across sectors suggest that this also holds for wages. There is in other words no sign of manufacturing becoming more volatile than the other two industries, implying that increased economic integration has left the basic economic processes unchanged.

Conclusion

We have examined the evolution of earnings volatility in Sweden 1985 to 2003 using two different measures of volatility. Regardless of how volatility is defined, the evolution of earnings instability has been broadly similar in different industrial sectors during the period we consider. The general trend is for volatility to increase over the period as a whole, something that is true across most of a large number of subgroups defined by sex, age, and education. Most importantly, there is no evidence indicating that earnings volatility among employees in manufacturing has increased more than volatility among employees in private or public services. Instead, although this to some extent depends on which measure we choose to focus on, it often appears to have increased less. This indicates that the causal link between

openness and economic uncertainty is weak, or at any rate less straightforward than often assumed in the discussion of the consequences of globalization.

We see at least four possible interpretations of our empirical results. The first is that openness and earnings volatility are not causally linked at all. This seems rather unlikely, given the theoretically sound connections between international economic exchange and the level and structure of labor demand, but cannot be ruled out. A second possibility is that openness and earnings volatility are linked, but with counteracting gross forces (market expansion and specialization) that roughly net to zero. While perhaps more plausible than the first interpretation, there is no explicit reason to expect that the two gross forces should be equal in strength. But again, this cannot be ruled out.

Thirdly, openness and economic volatility may be causally linked, but only indirectly. We distinguish two variants of this possibility. One is that openness affects the rate of job turnover which in turn does not translate into earnings instability thanks to rapid individual reemployment and a compressed wage structure. The other variant is the Rodrik (1998) hypothesis of an interaction between openness and external risk (e.g., terms-of-trade volatility). Both scenarios appear reasonable to us. Sweden's rate of job mobility is fairly high by international standards (see, e.g., DiPrete et al. 1997), perhaps in part due to coordinated wage bargaining and active labor market policies. Further, Swedish terms-of-trade volatility has not increased since the 1970s and has actually declined in recent years (Statistics Sweden 2007) to an extent that may have been sufficient to offset the impact of increasing trade openness on economic instability.

A final possibility is obviously that our inter-sectoral comparative method to isolate the impact of international economic integration is flawed. But as long as trade openness is seen as the major ingredient of globalization it can hardly be doubted that manufacturing should be more affected by international integration than other sectors are (even if the latter are affected as well). However, other dimensions of globalization may of course impact services (private or public) to a larger extent than international trade does. An example may be New public management, spread through international networks and organizations (or simply by imitation), with conceivably significant economic consequences for public sector employees. But then the theory connecting globalization and earnings instability must be modified accordingly, with another specification of mechanisms. The standard theoretical version of the link between international economic integration and micro-level economic uncertainty is based on trade as the main causal driver. This account, we believe, clearly motivates the sectoral comparison that we use as analytical strategy.

Much further work is needed along the lines above in order to properly assess the consequences of international integration: the definition of globalization should be specific enough to distinguish theoretically pertinent mechanisms; micro data should be used so that consequences for individual workers are revealed; and micro-level outcomes should be

compared across subsectors of the economy (industries, e.g.) in order to isolate the specific impact of globalization. An obvious extension of our analyses in the present paper is to compare the impact of integration on earnings volatility across countries. International comparisons could, for instance, greatly facilitate explicit tests of the hypothesis of interaction effects between trade openness and external risk on economic outcomes. This type of analysis would contribute further to bridging the gap between macro- and micro-level studies in the current literature.

Acknowledgments

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Figures

Figure 1. Changes in earnings volatility (V) by industry, Sweden 1986-2003 (volatility 1986-1990 = 100).
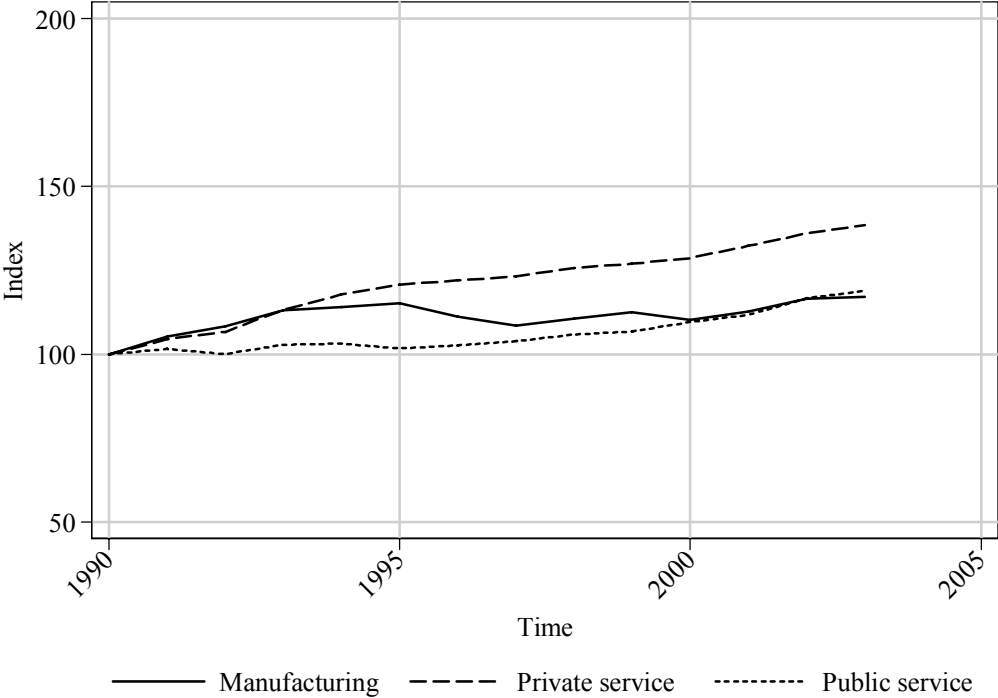
Note: The figure shows sector specific earnings volatility based on five year moving averages of yearly changes in earnings, were the first data points pertain to the window for the period 1986 to 1990 and the final ones to the window for 1999 to 2003.

Figure 2. Changes in earnings volatility (V) among women by age group, educational level, and industry, Sweden 1986-2003 (volatility 1986-1990 = 100).
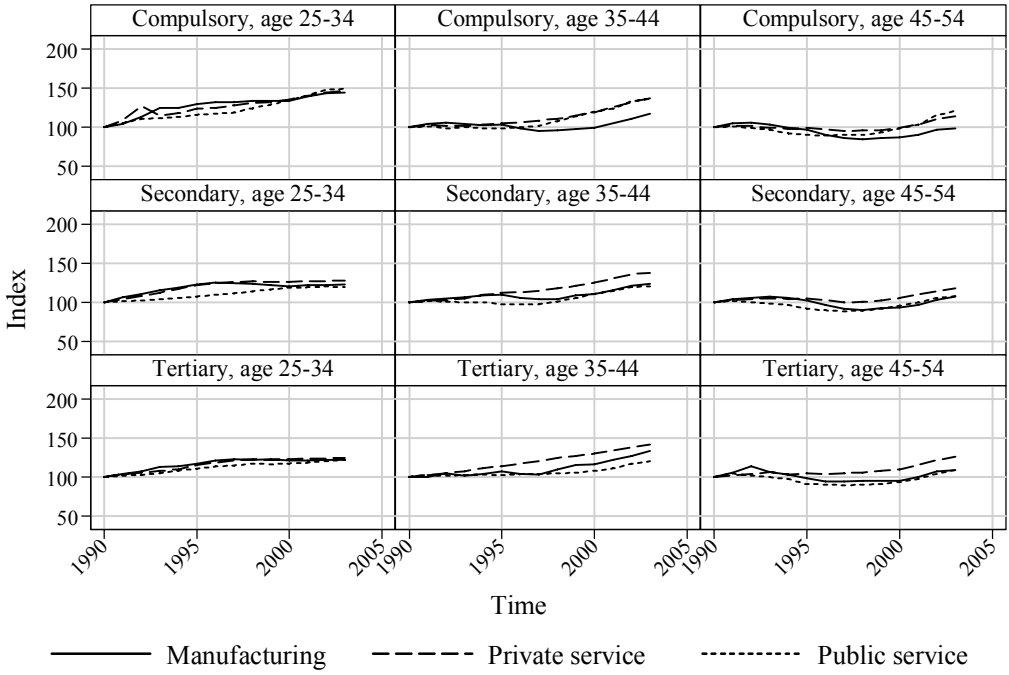
Note: The figure shows sector specific earnings volatility based on five year moving averages of yearly changes in earnings, where the first data points pertain to the window for the period 1986 to 1990 and the final ones to the window for 1999 to 2003.

Figure 3. Changes in earnings volatility (V) among men by age group, educational level, and industry, Sweden 1986-2003 (volatility 1986-1990 = 100).

Note: The figure shows sector specific earnings volatility based on five year moving averages of yearly changes in earnings, where the first data points pertain to the window for the period 1986 to 1990 and the final ones to the window for 1999 to 2003.

Figure 4. Changes in transitory earnings (v) among women by age group, educational level, and industry, Sweden 1986-2003 (transitory earnings 1985-1989 = 100).
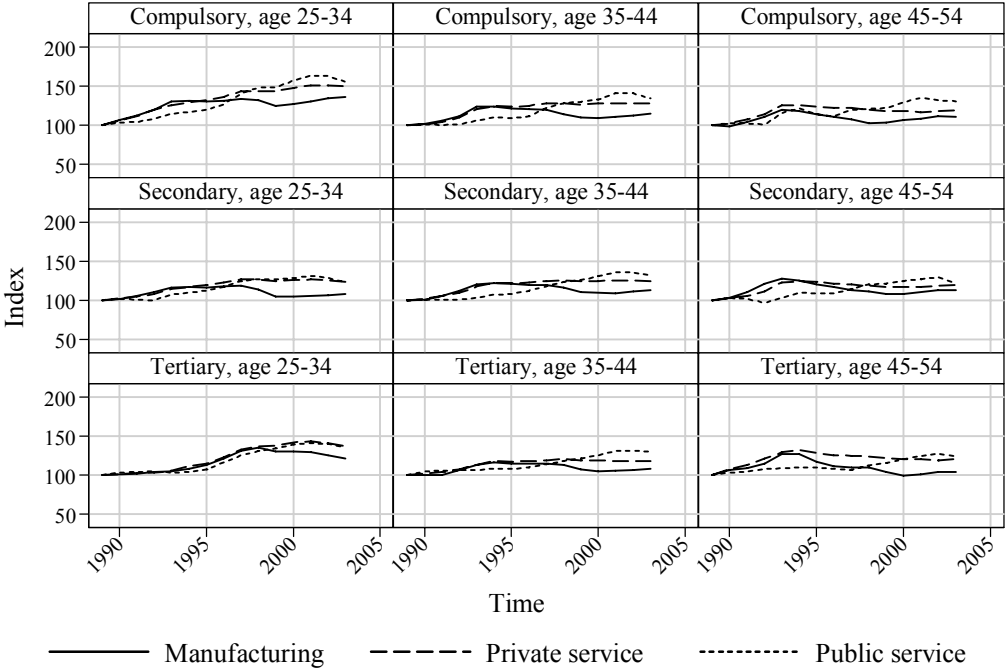
Note: The figure shows sector specific transitory earnings based on five year moving averages of standard deviations of transitory earnings, where the first data points pertain to the window for the period 1985 to 1989 and the final ones to the window for 1999 to 2003.

Figure 5. Changes in transitory earnings (v) among men by age group, educational level, and industry, Sweden 1986-2003 (transitory earnings 1985-1989 = 100).
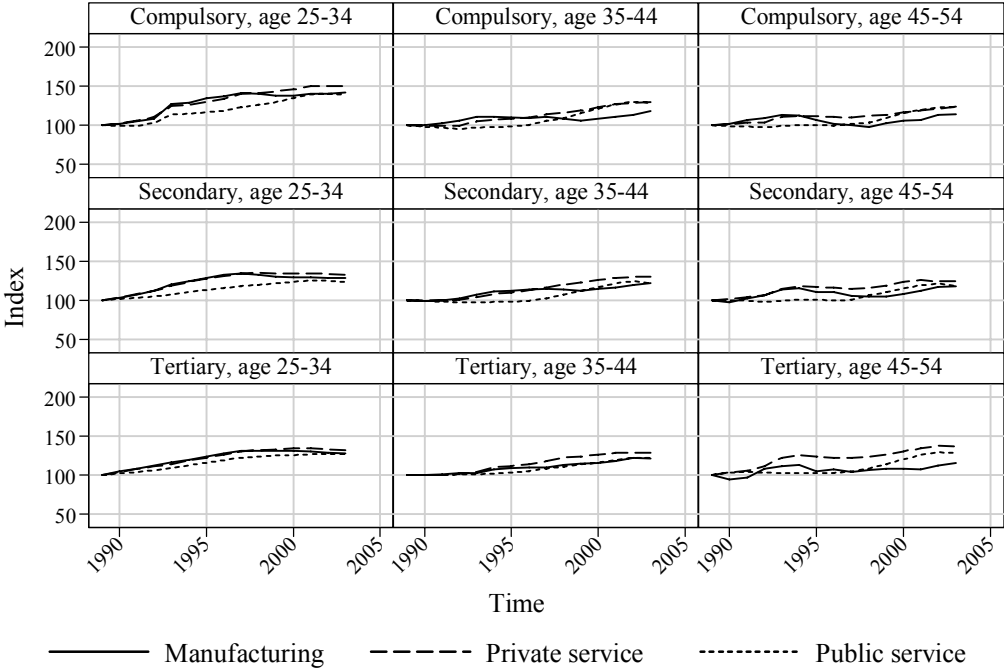
Note: The figure shows sector specific transitory earnings based on five year moving averages of standard deviations of transitory earnings, where the first data points pertain to the window for the period 1985 to 1989 and the final ones to the window for 1999 to 2003.

Figure 6. Changes in volatility (V) in weekly working hours by industry, Sweden 1988-2004 (volatility 1988-1992=100).
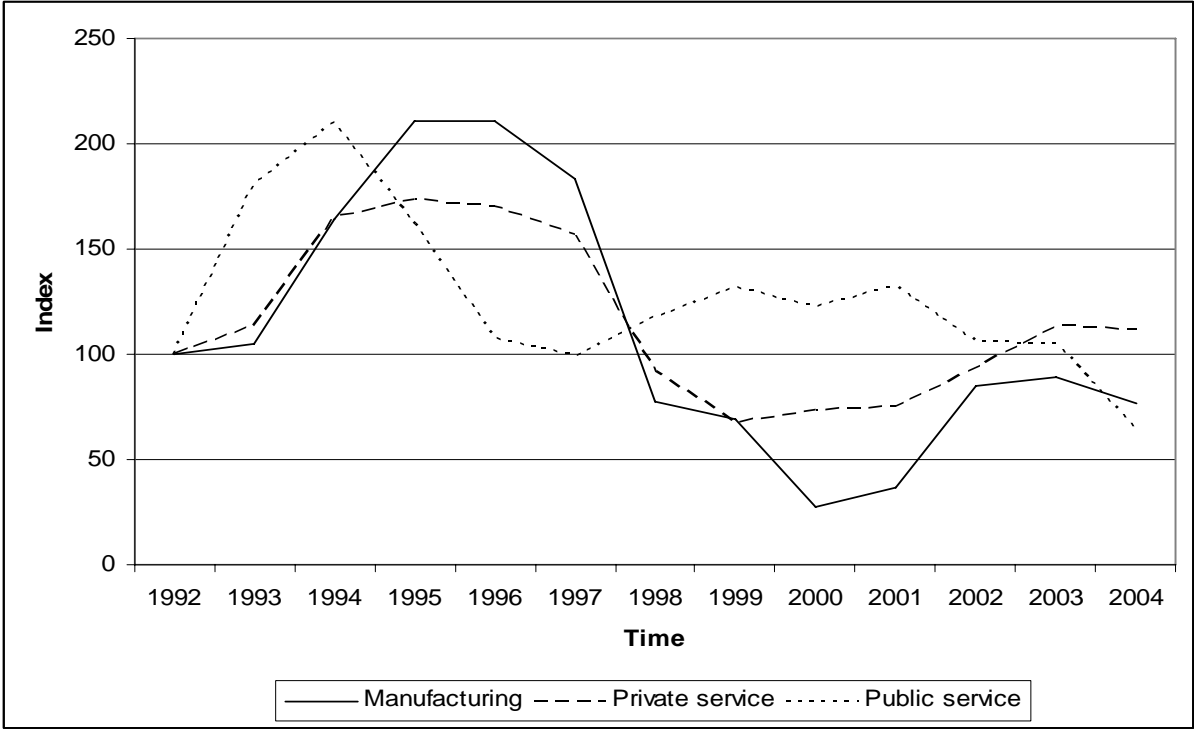
Note: The figure shows sector specific hours volatility based on five year moving averages of yearly changes in working hours, where the first data points pertain to the window for the period 1988 to 1992 and the final ones to the window for 2000 to 2004.

Figure 7. Changes in volatility (V) in advance layoff notifications by industry, Sweden 1982-2006 (volatility 1982-1986=100).
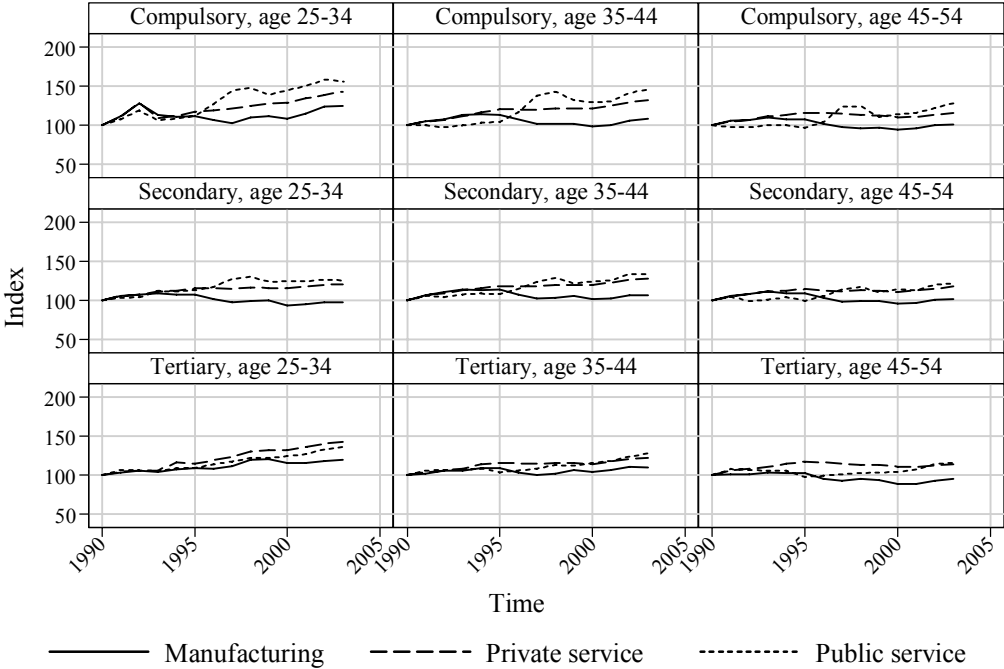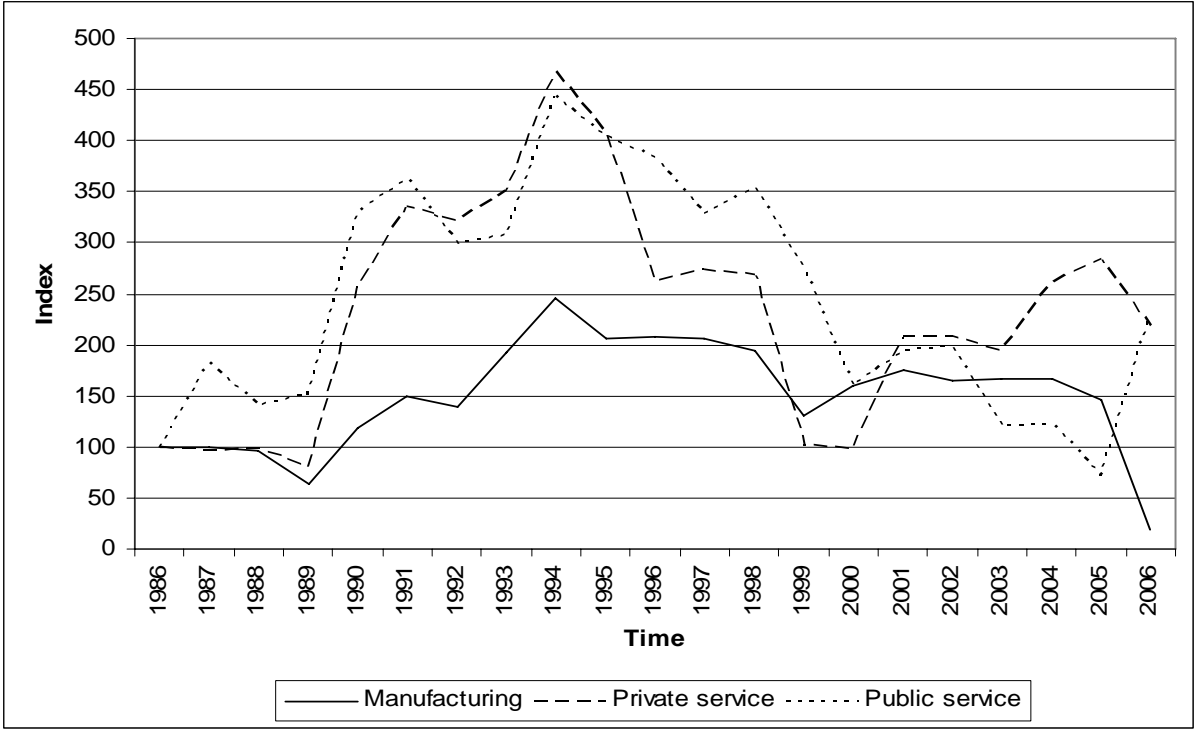

Note: The figure shows sector specific notification volatility based on five year moving averages of yearly changes in notifications, where the first data points pertain to the window for the period 1982 to 1986 and the final ones to the window for 2002 to 2006.

Appendix

Table A1. Changes in earnings volatility (V) among women by age group, educational level, and industry. Sweden 1986-2003 (volatility 1986-1990 = 100).

|	Compulsory, age 25-34			Compulsory, age 35-44			Compulsory, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1990	0.311	0.336	0.344	0.220	0.221	0.235	0.194	0.194	0.194
1991	0.325	0.366	0.364	0.229	0.227	0.238	0.203	0.198	0.196
1992	0.353	0.427	0.381	0.233	0.226	0.232	0.206	0.197	0.192
1993	0.388	0.388	0.385	0.229	0.225	0.236	0.200	0.193	0.187
1994	0.388	0.396	0.390	0.227	0.229	0.233	0.193	0.190	0.179
1995	0.405	0.417	0.400	0.228	0.232	0.232	0.187	0.192	0.175
1996	0.411	0.420	0.404	0.217	0.236	0.236	0.176	0.188	0.173
1997	0.412	0.431	0.409	0.209	0.240	0.240	0.167	0.184	0.176
1998	0.417	0.442	0.429	0.212	0.245	0.254	0.165	0.186	0.175
1999	0.416	0.446	0.445	0.215	0.254	0.268	0.166	0.187	0.181
2000	0.418	0.457	0.464	0.219	0.264	0.282	0.169	0.192	0.192
2001	0.433	0.472	0.486	0.231	0.278	0.292	0.176	0.201	0.200
2002	0.446	0.486	0.511	0.243	0.292	0.314	0.187	0.214	0.224
2003	0.450	0.492	0.514	0.259	0.302	0.322	0.191	0.221	0.235

	Secondary, age 25-34			Secondary, age 35-44			Secondary, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1990	0.372	0.377	0.393	0.214	0.212	0.225	0.179	0.179	0.181
1991	0.395	0.393	0.399	0.221	0.217	0.228	0.187	0.184	0.184
1992	0.411	0.407	0.401	0.225	0.217	0.227	0.189	0.186	0.181
1993	0.430	0.424	0.407	0.228	0.223	0.225	0.193	0.188	0.178
1994	0.443	0.442	0.415	0.232	0.232	0.225	0.189	0.187	0.174
1995	0.458	0.459	0.422	0.236	0.238	0.219	0.183	0.188	0.166
1996	0.466	0.469	0.430	0.226	0.239	0.219	0.173	0.184	0.162
1997	0.462	0.474	0.438	0.222	0.243	0.219	0.164	0.179	0.160
1998	0.458	0.477	0.448	0.223	0.250	0.227	0.161	0.180	0.162
1999	0.454	0.475	0.458	0.233	0.256	0.237	0.166	0.183	0.165
2000	0.449	0.475	0.467	0.237	0.266	0.249	0.168	0.189	0.173
2001	0.453	0.477	0.468	0.247	0.277	0.258	0.173	0.198	0.180
2002	0.453	0.479	0.472	0.259	0.289	0.269	0.185	0.204	0.190
2003	0.456	0.482	0.469	0.265	0.292	0.271	0.192	0.211	0.195

	Tertiary, age 25-34			Tertiary, age 35-44			Tertiary, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1990	0.440	0.445	0.438	0.253	0.250	0.223	0.177	0.182	0.163
1991	0.458	0.462	0.446	0.253	0.257	0.230	0.189	0.187	0.171
1992	0.474	0.472	0.449	0.266	0.263	0.226	0.203	0.190	0.166
1993	0.497	0.481	0.461	0.257	0.269	0.230	0.189	0.194	0.163
1994	0.502	0.491	0.475	0.263	0.279	0.231	0.183	0.189	0.159
1995	0.515	0.513	0.487	0.271	0.286	0.229	0.175	0.191	0.148
1996	0.533	0.529	0.498	0.263	0.293	0.232	0.167	0.190	0.148
1997	0.543	0.540	0.504	0.262	0.301	0.232	0.167	0.192	0.146
1998	0.539	0.546	0.513	0.277	0.311	0.235	0.169	0.194	0.147
1999	0.541	0.544	0.511	0.293	0.318	0.236	0.170	0.197	0.149
2000	0.534	0.548	0.515	0.295	0.325	0.242	0.169	0.201	0.153
2001	0.533	0.550	0.519	0.308	0.336	0.248	0.177	0.211	0.159
2002	0.539	0.553	0.529	0.321	0.345	0.261	0.191	0.223	0.170
2003	0.536	0.556	0.535	0.339	0.353	0.270	0.193	0.230	0.178

Table A2. Changes in earnings volatility (V) among men by age group, educational level, and industry. Sweden 1986-2003 (volatility 1986-1990 = 100).

Year	Compulsory, age 25-34			Compulsory, age 35-44			Compulsory, age 45-54		
	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services
1990	0.194	0.240	0.254	0.160	0.190	0.187	0.155	0.181	0.168
1991	0.217	0.266	0.274	0.167	0.199	0.187	0.163	0.190	0.165
1992	0.249	0.310	0.302	0.172	0.203	0.182	0.165	0.194	0.164
1993	0.220	0.262	0.271	0.180	0.212	0.187	0.170	0.202	0.169
1994	0.216	0.270	0.276	0.182	0.222	0.193	0.167	0.206	0.169
1995	0.217	0.281	0.285	0.181	0.229	0.196	0.166	0.210	0.163
1996	0.208	0.285	0.323	0.171	0.229	0.218	0.157	0.210	0.175
1997	0.200	0.291	0.366	0.162	0.228	0.258	0.151	0.209	0.209
1998	0.213	0.299	0.378	0.163	0.231	0.267	0.149	0.205	0.209
1999	0.217	0.306	0.354	0.163	0.231	0.246	0.150	0.204	0.187
2000	0.211	0.309	0.369	0.158	0.232	0.242	0.147	0.200	0.192
2001	0.224	0.322	0.382	0.161	0.239	0.245	0.148	0.201	0.195
2002	0.241	0.334	0.404	0.169	0.246	0.265	0.155	0.207	0.206
2003	0.243	0.343	0.398	0.173	0.251	0.272	0.156	0.210	0.216
	Secondary, age 25-34			Secondary, age 35-44			Secondary, age 45-54		
	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services
1990	0.214	0.231	0.255	0.165	0.181	0.167	0.155	0.174	0.145
1991	0.225	0.243	0.263	0.175	0.192	0.176	0.163	0.183	0.152
1992	0.230	0.246	0.264	0.182	0.196	0.174	0.167	0.187	0.144
1993	0.232	0.257	0.285	0.187	0.203	0.180	0.172	0.193	0.146
1994	0.229	0.260	0.283	0.186	0.209	0.181	0.169	0.195	0.151
1995	0.229	0.266	0.287	0.187	0.213	0.180	0.169	0.198	0.144
1996	0.217	0.265	0.299	0.176	0.212	0.191	0.160	0.195	0.153
1997	0.208	0.264	0.324	0.168	0.213	0.207	0.152	0.194	0.165
1998	0.212	0.268	0.331	0.171	0.216	0.215	0.153	0.196	0.170
1999	0.213	0.267	0.315	0.174	0.216	0.204	0.153	0.195	0.160
2000	0.200	0.267	0.316	0.167	0.215	0.207	0.148	0.192	0.165
2001	0.203	0.271	0.316	0.168	0.222	0.210	0.150	0.195	0.163
2002	0.209	0.276	0.322	0.175	0.228	0.223	0.155	0.199	0.174
2003	0.209	0.278	0.319	0.176	0.231	0.224	0.157	0.204	0.177
	Tertiary, age 25-34			Tertiary, age 35-44			Tertiary, age 45-54		
	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services	Manufacturing	Private services	Public services
1990	0.218	0.243	0.240	0.167	0.202	0.152	0.170	0.197	0.127
1991	0.225	0.253	0.256	0.170	0.210	0.161	0.171	0.209	0.137
1992	0.230	0.257	0.255	0.177	0.215	0.162	0.172	0.213	0.136
1993	0.228	0.258	0.253	0.177	0.220	0.162	0.175	0.218	0.134
1994	0.234	0.282	0.262	0.182	0.230	0.165	0.174	0.226	0.134
1995	0.238	0.279	0.262	0.181	0.234	0.158	0.174	0.231	0.124
1996	0.236	0.289	0.274	0.172	0.233	0.161	0.162	0.230	0.126
1997	0.243	0.300	0.282	0.167	0.232	0.165	0.158	0.226	0.128
1998	0.261	0.316	0.293	0.170	0.234	0.172	0.162	0.223	0.130
1999	0.263	0.320	0.293	0.178	0.234	0.170	0.159	0.223	0.131
2000	0.253	0.321	0.299	0.173	0.231	0.175	0.151	0.219	0.132
2001	0.252	0.331	0.305	0.178	0.238	0.180	0.151	0.218	0.137
2002	0.258	0.341	0.321	0.185	0.245	0.188	0.158	0.222	0.145
2003	0.261	0.347	0.327	0.184	0.248	0.194	0.161	0.225	0.147

Table A3. Changes in transitory earnings (v) among women by age group, educational level, and industry. Sweden 1985-2003 (transitory earnings 1985-1989 = 100).

| | Compulsory, age 25-34 | | | Compulsory, age 35-44 | | | Compulsory, age 45-54 | | |
| | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public services |
Year									
1989	0.265	0.271	0.288	0.213	0.213	0.218	0.200	0.190	0.186
1990	0.271	0.276	0.287	0.213	0.212	0.214	0.203	0.193	0.185
1991	0.278	0.287	0.287	0.219	0.213	0.212	0.213	0.197	0.183
1992	0.288	0.300	0.297	0.225	0.212	0.208	0.219	0.197	0.182
1993	0.337	0.337	0.329	0.236	0.224	0.212	0.227	0.211	0.185
1994	0.343	0.342	0.331	0.236	0.229	0.213	0.225	0.212	0.187
1995	0.357	0.352	0.337	0.235	0.231	0.215	0.213	0.212	0.187
1996	0.365	0.363	0.342	0.232	0.235	0.219	0.204	0.211	0.186
1997	0.375	0.380	0.355	0.236	0.243	0.231	0.200	0.210	0.190
1998	0.372	0.383	0.364	0.231	0.248	0.238	0.196	0.213	0.192
1999	0.365	0.388	0.374	0.226	0.254	0.252	0.206	0.216	0.204
2000	0.366	0.395	0.389	0.232	0.262	0.265	0.212	0.222	0.216
2001	0.371	0.406	0.403	0.236	0.271	0.276	0.214	0.226	0.223
2002	0.373	0.408	0.405	0.242	0.274	0.284	0.226	0.230	0.230
2003	0.377	0.406	0.401	0.252	0.276	0.281	0.228	0.235	0.229

| | Secondary, age 25-34 | | | Secondary, age 35-44 | | | Secondary, age 45-54 | | |
| | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public services |
Year									
1989	0.306	0.309	0.322	0.210	0.208	0.215	0.188	0.181	0.179
1990	0.315	0.320	0.327	0.207	0.207	0.213	0.184	0.184	0.178
1991	0.328	0.333	0.332	0.209	0.208	0.211	0.192	0.189	0.178
1992	0.344	0.346	0.338	0.215	0.209	0.209	0.200	0.194	0.174
1993	0.367	0.367	0.346	0.225	0.217	0.208	0.215	0.208	0.178
1994	0.381	0.382	0.357	0.234	0.225	0.210	0.217	0.213	0.180
1995	0.393	0.395	0.364	0.236	0.229	0.211	0.208	0.212	0.180
1996	0.405	0.405	0.373	0.238	0.235	0.213	0.207	0.211	0.178
1997	0.410	0.415	0.381	0.241	0.243	0.220	0.199	0.208	0.179
1998	0.405	0.417	0.386	0.239	0.251	0.231	0.197	0.211	0.190
1999	0.398	0.416	0.392	0.236	0.255	0.241	0.198	0.215	0.197
2000	0.396	0.416	0.398	0.241	0.263	0.251	0.204	0.225	0.205
2001	0.394	0.416	0.404	0.245	0.268	0.262	0.211	0.228	0.213
2002	0.393	0.413	0.403	0.251	0.271	0.267	0.221	0.225	0.216
2003	0.393	0.410	0.397	0.256	0.272	0.262	0.222	0.226	0.212

| | Tertiary, age 25-34 | | | Tertiary, age 35-44 | | | Tertiary, age 45-54 | | |
| | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public services | Manufac-turing | Private services | Public Services |
Year									
1989	0.349	0.351	0.336	0.230	0.231	0.205	0.193	0.175	0.163
1990	0.366	0.365	0.343	0.229	0.231	0.206	0.182	0.181	0.168
1991	0.379	0.379	0.350	0.231	0.231	0.205	0.187	0.185	0.170
1992	0.392	0.391	0.358	0.236	0.235	0.207	0.210	0.196	0.169
1993	0.408	0.400	0.367	0.235	0.240	0.207	0.215	0.215	0.167
1994	0.418	0.419	0.379	0.246	0.254	0.209	0.219	0.220	0.167
1995	0.432	0.430	0.390	0.250	0.258	0.212	0.203	0.217	0.167
1996	0.447	0.444	0.401	0.253	0.264	0.215	0.208	0.214	0.168
1997	0.457	0.458	0.412	0.252	0.273	0.222	0.200	0.214	0.171
1998	0.460	0.464	0.417	0.260	0.283	0.228	0.206	0.217	0.177
1999	0.459	0.466	0.421	0.265	0.286	0.234	0.209	0.221	0.186
2000	0.458	0.471	0.423	0.266	0.292	0.238	0.210	0.229	0.196
2001	0.455	0.472	0.426	0.272	0.297	0.246	0.208	0.235	0.205
2002	0.450	0.467	0.427	0.281	0.298	0.251	0.217	0.241	0.211
2003	0.448	0.463	0.427	0.279	0.298	0.250	0.223	0.239	0.209

Table A4. Changes in transitory earnings (v) among men by age group, educational level, and industry. Sweden 1985-2003 (transitory earnings 1985-1989 = 100).

	Compulsory, age 25-34			Compulsory, age 35-44			Compulsory, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1989	0.178	0.204	0.223	0.167	0.189	0.186	0.174	0.189	0.173
1990	0.190	0.217	0.231	0.170	0.190	0.188	0.172	0.193	0.178
1991	0.200	0.228	0.233	0.177	0.197	0.187	0.182	0.203	0.177
1992	0.213	0.245	0.242	0.187	0.207	0.188	0.193	0.215	0.175
1993	0.232	0.256	0.256	0.206	0.228	0.197	0.209	0.237	0.200
1994	0.233	0.264	0.261	0.207	0.235	0.205	0.207	0.237	0.211
1995	0.232	0.270	0.267	0.203	0.234	0.203	0.199	0.233	0.197
1996	0.233	0.279	0.283	0.201	0.236	0.207	0.193	0.231	0.193
1997	0.238	0.293	0.314	0.201	0.242	0.228	0.188	0.231	0.207
1998	0.234	0.293	0.331	0.191	0.242	0.239	0.179	0.226	0.209
1999	0.222	0.294	0.332	0.184	0.239	0.242	0.180	0.223	0.211
2000	0.226	0.302	0.351	0.183	0.241	0.247	0.187	0.224	0.225
2001	0.233	0.308	0.365	0.184	0.241	0.262	0.189	0.221	0.234
2002	0.239	0.307	0.365	0.187	0.242	0.262	0.194	0.223	0.228
2003	0.242	0.306	0.347	0.192	0.242	0.250	0.194	0.224	0.226
	Secondary, age 25-34			Secondary, age 35-44			Secondary, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1989	0.212	0.226	0.257	0.173	0.187	0.176	0.167	0.187	0.164
1990	0.216	0.231	0.261	0.174	0.190	0.177	0.172	0.192	0.169
1991	0.224	0.237	0.259	0.182	0.196	0.178	0.185	0.197	0.167
1992	0.234	0.244	0.257	0.194	0.204	0.177	0.202	0.208	0.159
1993	0.248	0.259	0.277	0.208	0.219	0.182	0.214	0.229	0.169
1994	0.248	0.265	0.281	0.211	0.227	0.188	0.210	0.232	0.180
1995	0.247	0.270	0.289	0.209	0.227	0.190	0.201	0.230	0.178
1996	0.250	0.277	0.301	0.207	0.229	0.197	0.195	0.227	0.178
1997	0.252	0.287	0.321	0.206	0.232	0.207	0.189	0.224	0.188
1998	0.241	0.287	0.326	0.201	0.233	0.217	0.187	0.221	0.197
1999	0.223	0.281	0.325	0.191	0.231	0.221	0.181	0.219	0.199
2000	0.223	0.285	0.330	0.189	0.233	0.230	0.180	0.219	0.204
2001	0.225	0.286	0.337	0.188	0.233	0.238	0.185	0.219	0.208
2002	0.226	0.283	0.330	0.192	0.234	0.238	0.189	0.221	0.212
2003	0.229	0.279	0.316	0.195	0.233	0.232	0.189	0.222	0.200
	Tertiary, age 25-34			Tertiary, age 35-44			Tertiary, age 45-54		
Year	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services	Manufac-turing	Private services	Public services
1989	0.228	0.246	0.226	0.181	0.207	0.154	0.182	0.199	0.144
1990	0.230	0.250	0.234	0.181	0.211	0.161	0.194	0.214	0.149
1991	0.232	0.252	0.236	0.181	0.215	0.163	0.198	0.225	0.151
1992	0.237	0.255	0.237	0.194	0.223	0.163	0.209	0.242	0.155
1993	0.239	0.260	0.234	0.204	0.235	0.164	0.231	0.257	0.157
1994	0.247	0.275	0.236	0.211	0.245	0.167	0.231	0.263	0.158
1995	0.258	0.282	0.243	0.207	0.244	0.166	0.214	0.256	0.159
1996	0.277	0.303	0.264	0.208	0.244	0.169	0.203	0.249	0.156
1997	0.300	0.327	0.284	0.208	0.247	0.176	0.199	0.249	0.154
1998	0.308	0.337	0.296	0.205	0.251	0.182	0.199	0.247	0.162
1999	0.298	0.340	0.304	0.195	0.247	0.187	0.189	0.243	0.167
2000	0.298	0.350	0.315	0.191	0.246	0.193	0.181	0.240	0.174
2001	0.295	0.354	0.320	0.191	0.245	0.201	0.183	0.240	0.180
2002	0.286	0.347	0.317	0.193	0.245	0.202	0.189	0.237	0.184
2003	0.278	0.337	0.308	0.196	0.245	0.200	0.189	0.240	0.179