Industry- and firm-level mechanisms of competitiveness

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* We want to express our gratitude to Karsten Albæk (Denmark), Erling Barth (Norway) and Fredrik Heyman (Sweden) for their invaluable help in performing computations with their firm data for Denmark, Norway and Sweden. In addition, Pekka Vanhala has provided excellent input in coding productivity decompositions. We also want thank Juuso Vanhala for his insightful comments. This study is partly based on the analysis made in the project *Technology choices, experimentation and systemic changes: An economic perspective* funded by the Tekes – the Finnish Funding Agency for Technology and Innovation (project 30/30/2011).

Introduction

This section examines the development of real unit labour costs in Nordic countries at the level of industries and firms. Comparisons of changes in real unit labour costs with the main competitor countries provide indicators of conditions of external balance, i.e. competitiveness in the short-run.

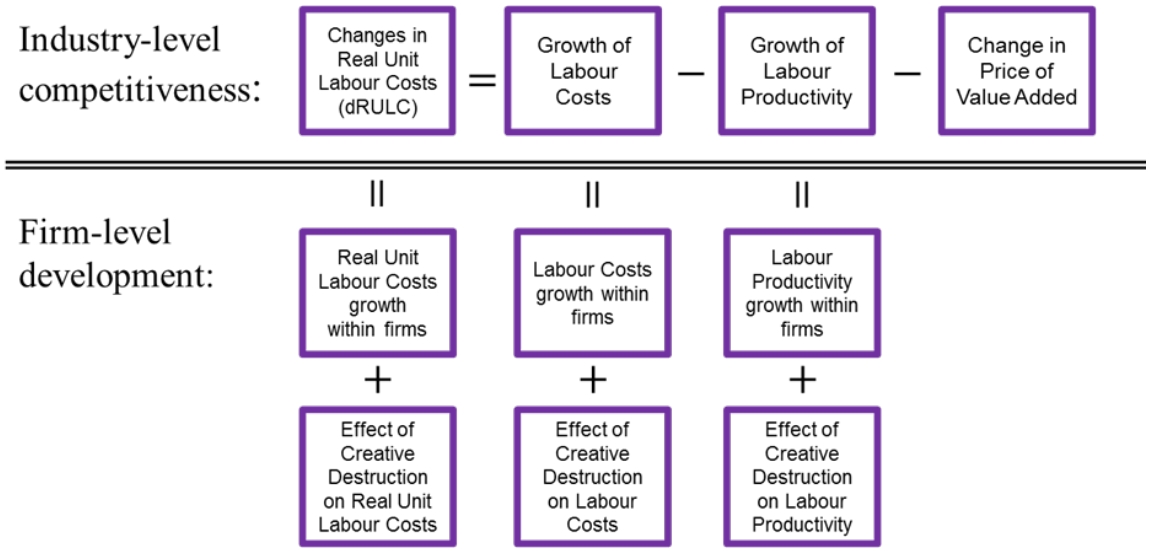
In our analysis competitiveness of industries in the short-run depends on three factors: growth of labour costs, growth of labour productivity and change in the price of value added. The most common measure of competitiveness, nominal unit labour costs, ignores the role of change in the price of value added and thus gives a misleading picture of changes in economic conditions for firms prospering in the international markets. Real unit labour costs on the other hand take this into account and measure the profitability of jobs in a given country. This is the measure that deserves a close attention in policy circles.

The framework of our analysis is illustrated in Figure 1. The factors of real unit labour costs are examined first by decomposing them into *industry-level* components that consist of 1) labour cost growth, 2) labour productivity growth and 3) changes in the price of value added. To grasp firm-level roots of competitiveness, industry-level changes in labour costs and labour productivity are further decomposed into two *firm-level* main sources: 1) the contribution of the average growth in the firms (the so-called "within firms" effect) and 2) the effect of firm-level restructuring ("creative destruction") on labour costs and labour productivity growth. Creative destruction mechanisms involve entries and exits of firms and reallocation of labour between continuing firms. Decompositions are also performed to examine how

competitiveness evolves at the level of firms and what is the role of a firm's competitiveness in the industry evolution.

Empirical comparisons of Nordic countries show the importance of considering labour reallocation in analysis of wage formation and industry competitiveness. An in-depth consideration of reallocation is particularly important because restructuring at the levels of industries and firms is an essential mechanism of sustained productivity growth, i.e. competitiveness in the long run. From the standpoint of policy consideration, the reallocation perspective is crucial due to its close link to product market competition, firm subsidies, wage formation, functioning of labour markets more generally as well as links to various aspects of welfare states, including the social security systems.

Figure 1. Framework of analysis



One of the policy lessons is that the evaluation of the wage agreements and the wage formation more generally should be based on indicators that properly take into account the conditions of external balance. It means that the indicators should capture all three factors (including the price of value added) that affect investment and job creation decisions of the firms. In addition, the effects of restructuring should be carefully considered in interpretation and policy recommendations. For example, official measures for growth of labour costs may include biases due to compositional changes over time and may thus give a distorted view of the development of competitiveness.

Competitiveness in the short- and long-run

Competitiveness is a controversial topic. Krugman (1994) denies the concept altogether. Anyhow, competitiveness has had a central role in macro policy analysis. There seems to be two broad different perspectives that are often confused in the discussion. A long-run view focuses on an economy's capability to strong sustained economic growth. A short-run view, on the other hand, is concerned with conditions of external balance, i.e. the current account. Long-run competitiveness is essentially a maximization problem (with considerations of environmental and social issues) whereas the short-run competitiveness is an optimization problem. From the latter perspective, competitiveness may be deficient or excessive if the difference between the value of exports and imports is too far in surplus or deficit.

By definition, the value of exports depends on the price and the volume of exported goods and services. An increase in the volume of exports may stem from improved cost competitiveness that allows firms to capture market shares by lower prices. Cost competitiveness improves when productivity grows or input prices decline relative to the competitors.

The change in cost competitiveness is traditionally analysed with relative nominal unit labour costs, which compares the differences in the growth rate of labour costs in nominal terms (possibly with an adjustment for changes in exchange rates) and labour productivity (measured in real terms). However, the decision regarding job creation (and destruction) is based on the relative *profitability* between alternative locations. It can be evaluated with the so-called real unit labour costs that take into account of the relative prices of value added, in addition to the price and productivity of labour input. The real unit labour costs measure the profitability of jobs so it can be defined as a measure of "profit competitiveness".

In this study we examine conditions of external balance in Nordic countries on the basis of relative real unit labour costs in manufacturing industries. In the baseline analysis the real unit labour costs of a country are compared to nine other OECD countries so that each competitor is weighted on the basis of their trade share (exports + imports).[1]

Macro-level components of real unit labour costs

Real unit labour costs (*RULC*) are nominal unit labour costs (*NULC*) (in common currency) divided by the price of value added. Formally this can be presented in log-form as follows:

$$\ln RULC = \ln\left(\frac{\frac{W}{E}}{\frac{(V/p)}{L}}\right) - \ln p \qquad (1)$$
$$\Leftrightarrow \ln RULC = \ln NULC - \ln Price$$

where *W* is labour costs, *p* is the price of value added, *E* is the labour input of employees, *L* is the total labour input (including the contribution of the self-employed), *V* is the value of value added. It should be noted that *RULC* is the labour income share (W/V) corrected for the contribution of the self-employed:

$$\ln RULC = \ln\left(\frac{W}{V}\right) + \ln\left(\frac{L}{E}\right) \qquad (2)$$

RULC consists of three main macro-level determinants: 1) the labour costs, 2) labour productivity and 3) the price of value added:

$$\ln RULC = \ln\left(\frac{W}{E}\right) - \ln\left(\frac{(V/p)}{L}\right) - \ln(p) \qquad (3)$$
$$\Leftrightarrow \ln RULC = \ln Labour\,Costs - \ln Productivity - \ln Price$$

[1] The trade shares are determined at the level of industries or at the level of the total manufacturing, depending on whether the unit labour costs are measured with the so-called normalized industry-structures (our baseline analysis) or with more traditional aggregate (sector) numbers.

Typically the analysis focuses on the changes in competitiveness and its components, i.e.

$$\Delta \ln \left(RULC \right) = \Delta \ln Labour\ Costs - \Delta \ln Productivity - \Delta \ln Price \qquad (4)$$

where Δ denotes the difference operator. For measuring competitiveness, these changes are compared to a competitor or a group of competitors, where each competitor can be weighted in alternative ways (by use of exports share, for instance). In other words, competitiveness is gauged by *relative* real unit labour costs.

The change in the nominal unit labour costs (NULC) can presented as

$$\Delta \ln \left(NULC \right) = \Delta \ln Labour\ Costs - \Delta \ln Productivity \qquad (5)$$

Firm-level components of real unit labour cost

As can be read from Equation (4), *industry labour cost growth* ($\Delta \ln Labor\ Costs$) has a positive and *industry labour productivity growth* ($\Delta \ln Productivity$) has a negative effect on real unit labour costs. The effects on the competitiveness of the firms are, of course, the opposite.

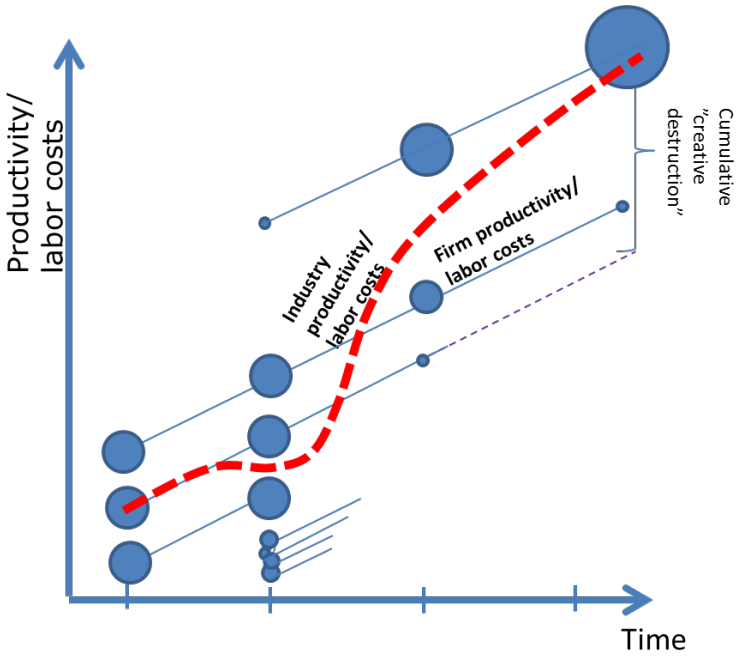
Both industry labour productivity growth and industry labour costs growth takes place through different firm-level mechanisms. Industry-level growth of productivity and labour costs has two main components: 1) growth within firms (i.e. average growth rate of the continuing firms) and 2) growth due to firm-level restructuring (involving entries, exits and reallocation of resources between continuing firms).

The firm-level mechanisms underlying the industry-level development are illustrated in Figure 2. The dashed thick line indicates industry-level productivity (labour costs). It is a weighted average of firm-level productivity (labour costs), which is indicated by thin solid lines. The weight of each firm is determined by employment, which is indicated by the size of the ball. In this illustration, the industry-level growth is faster than the firm-level growth (i.e. the slope of the dashed line is steeper than the average slope of thin lines) because of the exiting of low productivity (labour costs) firms, employment growth in high productivity (labour costs) firms and employment decline in low productivity (labour costs) firms (the size of the ball changes).

These mechanisms can be measured from firm-level data by use of the decomposition method advocated by Böckerman and Maliranta (2012). The basic idea of this version of decomposition is simple. The within component refers to the average productivity growth rate of the (continuing) firms. Each firm is weighted in accordance to an ideal index, i.e. average input share in the initial and end year (see Hyytinen & Maliranta, 2013)[2]. Industry productivity growth rate is calculated in a way that is equivalent to the aggregate statistics. The creative destruction effect is defined as the difference in industry productivity growth and the within component. The creative destruction effect consists of distinct restructuring component including the entry and exit effects and reallocation of labour between continuing firms. The formal expressions of these components are presented in Böckerman and Maliranta (2012).

[2] By definition, only the continuing firms have a growth rate of productivity. This is the logic for focusing on the continuing firms in the measurement of the within component. As a result, the sum of the weights over the continuing firms is one and the within component can be interpreted as a weighted average productivity (or labour costs) growth rate of the firms.

Figure 2. Illustration of firm-level sources of industry productivity and industry labour costs



Empirical analysis of real unit labour costs

Industry-level analysis

The aggregate numbers for the relative nominal unit labour costs (which are corrected for the changes in exchange rates) are presented in the top-left panel of Figure 3. These series suggest that competitiveness has developed very favourably in Sweden, reasonably well in Finland (until recent years), but less satisfactorily in Denmark and Norway.

The comparisons of the nominal unit labour costs presented in the top-right panel of Figure 3 are based on the so-called standardized industry-structures.[3] In this way we aim to imitate a situation where all countries produce the same (or similar) products and they compete with prices. In other words, the use of a standardized industry-structure is a way to correct potential biases (or sources of potential misinterpretations) in the unit labour costs when at least a part of price changes (and productivity growth) depends on the industry structures.

On the other hand, the use of standardized industry structures for measuring real unit labour costs, in conjunction with aggregate measures, allows us to examine to what extent profitability and competitiveness problems arise from the industry structures, often determined by natural resources or choices made in the distant past history, and to what extent disparity of labour costs and productivity within industries.

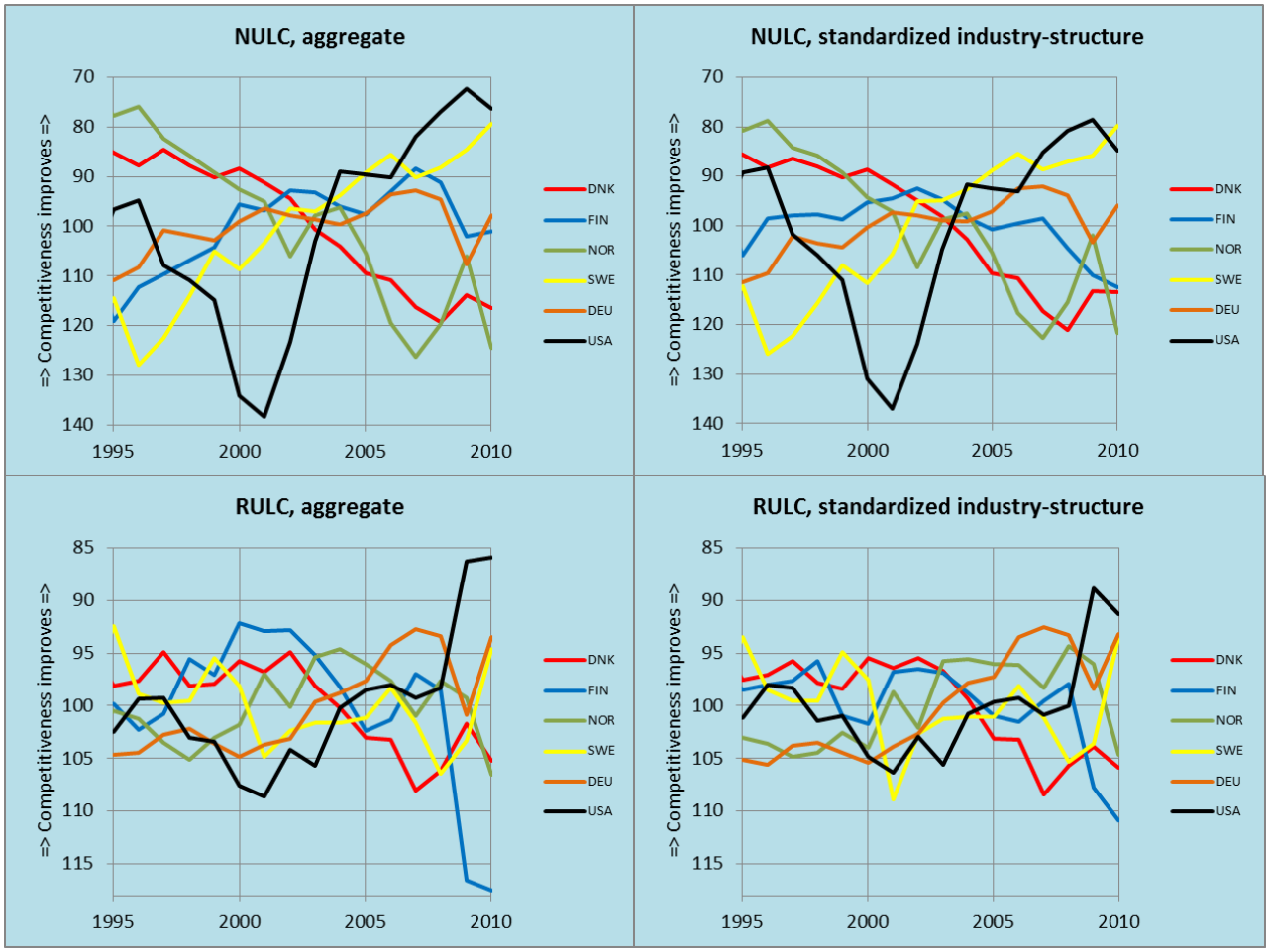
However, here the standardization is made with a reasonably broad industry-classification (the manufacturing sector is split into ten industries). Thus our aim may not have been achieved as well as one

[3] As for further details, see the note under Figure 3.

could wish. Yet, the use of the standardized industry-structures leads to some striking changes in the results. In particular, now the series shows considerable deterioration for Finland since the early 2000s.

Comparisons made with the relative real unit labour costs are presented in the bottom-left panel. Compared to the NUCL results, the scale of variation is substantially reduced. This indicator shows that the USA, Sweden and Germany have experienced a surge and Finland a collapse in competitiveness. The bottom-right panel presents the comparisons with the standardized industry-structures. The use of the standardized industry-structures does not seem to have a very large impact on the results obtained with the real unit labour costs. Norway has witnessed improving competitiveness since the late 1990s (but an abrupt collapse in 2010) whereas Denmark and Finland have experienced a declining trend in competitiveness.

Figure 3. Measures of competitiveness, relative to 9 other OECD countries, manufacturing, 1995-2010=100.

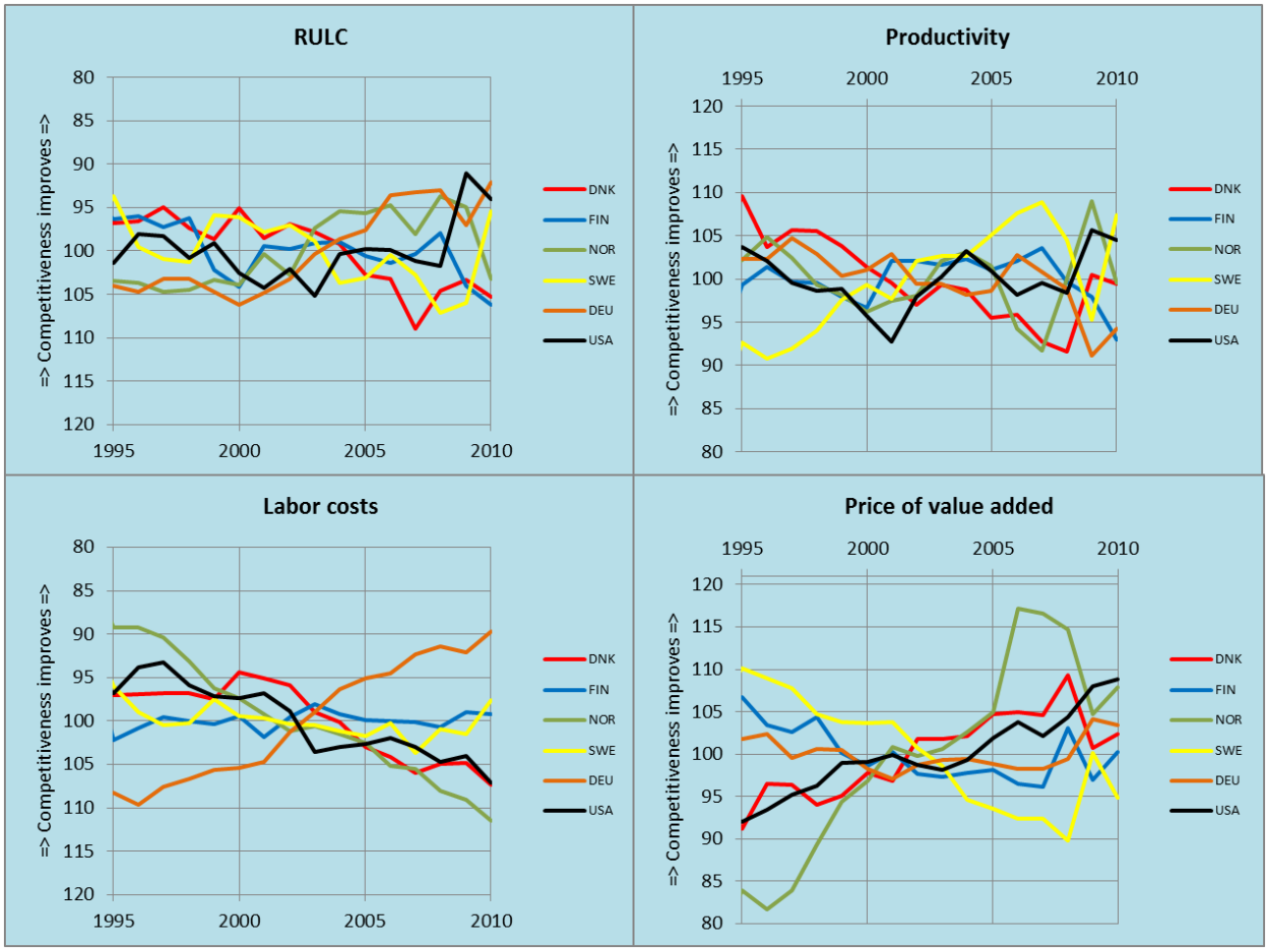


Notes: *Based on the computations made by use the OECD's STAN-database and OECD International Trade by Commodity Statistics (ITCS). The "aggregate" refers to total manufacturing. For measures with "standardized industry-structure" analysis is performed separately for ten manufacturing industries. These results are then aggregated by using the average value added shares of ten OECD countries in years 1995-2010. Nominal unit labour costs are corrected for changes in exchange rates. Unit costs are presented with a reversed scale so that upward-sloping line indicates improvement of competitiveness.*

Figure 4 presents development of relative real unit labour costs (the upper-left panel) and its three components: 1) labour productivity, 2) labour costs and 3) the price of value added. Electrical machinery industry ("26" in NACE 2) is now excluded from the following analyses. One of the reasons is the concern for the comparability of data between countries. The measurement of the quality aspect is particularly crucial in this industry and it is not quite clear whether all countries have been equally successful in making a distinction between quality change and price change.

Again, Denmark and Finland seem to have witnessed a declining trend in competitiveness over time. The same holds true for Sweden until 2008. Sweden's recent rise in competitiveness is based on its improving relative productivity level and decreasing relative wage level. In addition, the continuous decline in the price of value added has come to its end. In Norway the reasonably favourable development in competitiveness has been based mainly on the increasing price of value added (with strong short-term fluctuation in the 2000's, though). In recent years the development of relative labour productivity has been quite positive, too.

Figure 4. Relative real unit labour costs (RULC) and its components, relative to 9 other OECD countries, standardized industry-structures without electronics industry (i.e. exc. "26" in the NACE 2 classification), 1995-2010 = 100.



Notes: Based on the computations made by use the OECD's STAN-database and OECD International Trade by Commodity Statistics (ITCS). Analysis is performed separately for ten manufacturing industries. These results are then aggregated by using the average value added shares of eleven OECD countries in the years 1995-2010. The scales are presented so that an upward-sloping line indicates improvement from the point of view of competitiveness

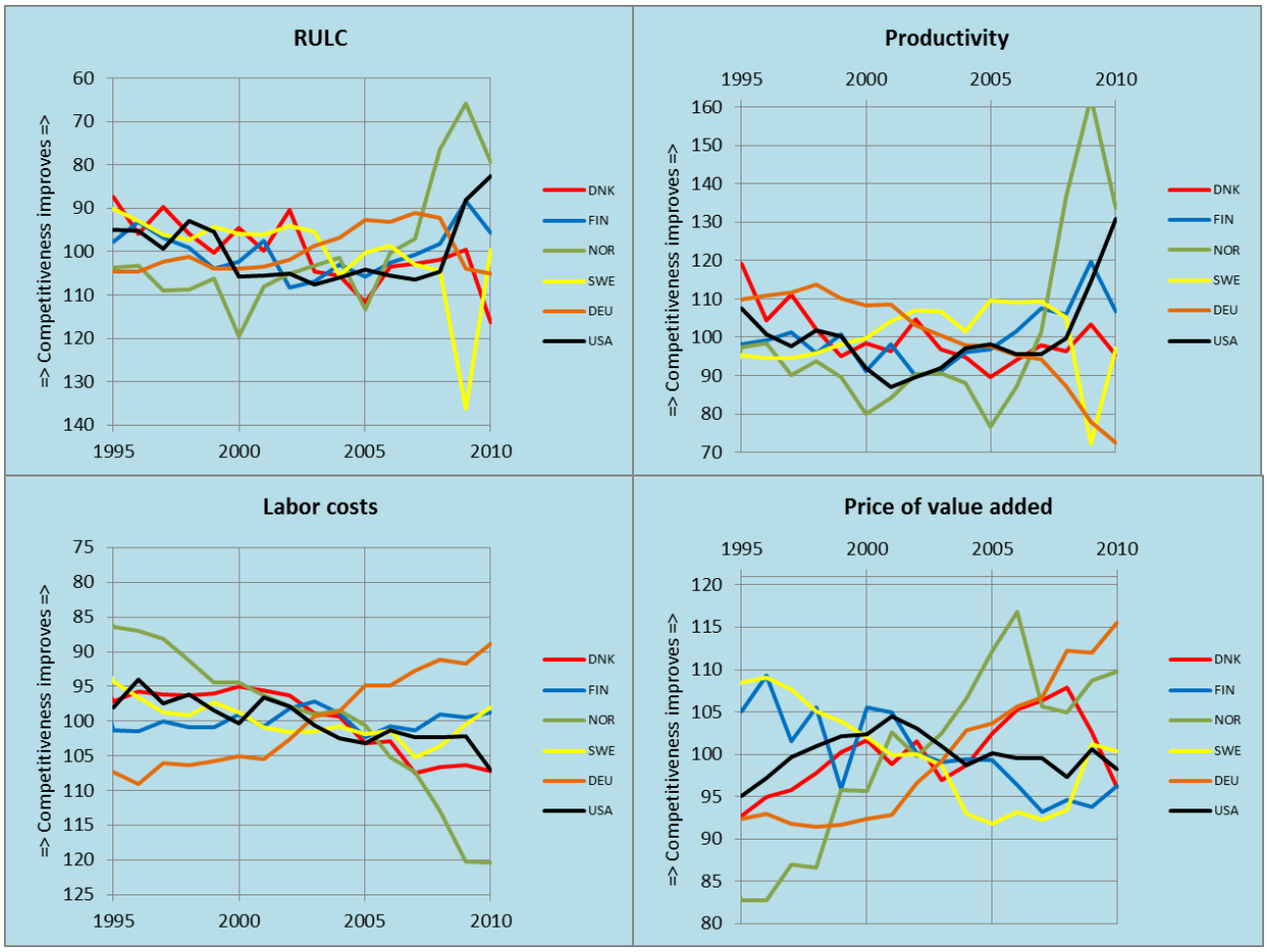
Figure 5 presents results for one relatively large and important manufacturing industry that is the machinery industry ("28" in the NACE 2 classification). The results for one single industry are less accurate than those for the total manufacturing, but they also may indicate interesting patterns in the development. For example, Norway has experienced a quite marked improvement in competitiveness in the latter part of the 2000s. It is based totally on the substantial increase in relative labour productivity and the price of value added. At the same time, labour costs per employee have increased and hence negatively contributed to competitiveness.

More generally, the development of relative productivity and the price of value added appear to exhibit mirror patterns in the figure. This may reflect problems in separating the changes in values and prices in a comparable manner among countries. For example, in some country the measured price of value added may increase faster than in other countries because the quality change has not been taken into account as fully as in other countries. As a consequence, the relative price level of the country appears to increase and the relative productivity level decrease. An example of such a phenomenon could be the machinery industry in Germany (or Denmark in years 1995-2008). Put differently, labour productivity growth in Germany may be underrated because the improvement of the quality of output is underrated. As for the development of competitiveness this, however, does not have any effect as long as it is gauged by the relative real unit labour costs.

A comparison of Figure 5 and Figure 4 indicates that the development of competitiveness and its factors may vary considerably between industries. In other words, the comparative advantages may change over time within a country. However, it is also worth noting that the comparison of these figures also indicates that the development of relative labour costs (per employee) has been quite similar in the machinery industry and other manufacturing industries in all countries.[4]

[4] Unreported computations for other industries provide further confirmation to this observation.

Figure 5. Relative real unit labour costs (RULC) and its components, relative to 9 other OECD countries, machinery industry ("28" in the NACE 2 classification), 1995-2010=100.



Notes: Based on the computations made by use the OECD's STAN-database and OECD International Trade by Commodity Statistics (ITCS). The scales are presented so that an upward-sloping line indicates improvement from the point of view of competitiveness.

Firm-level analysis

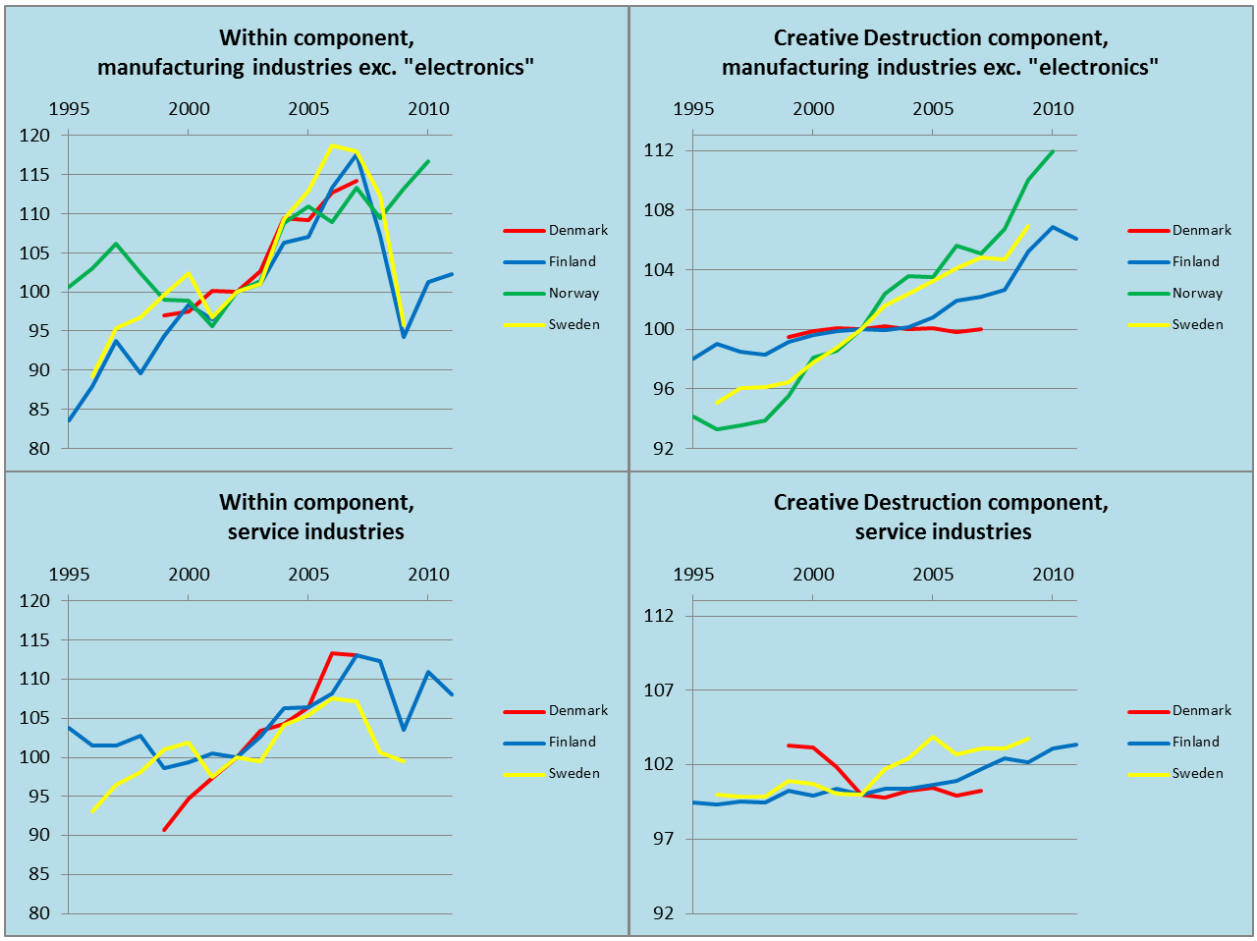
Next we examine the firm-level mechanisms underlying industry productivity and industry labour costs growth that were found to play a role in determining changes in relative real unit labour costs in manufacturing industries.

Productivity

The upper-left panel of Figure 6 shows that productivity growth within firms has been quite similar in different countries (except in Norway in the years 1995-2000 and in 2010). However, the creative destruction component has witnessed divergent patterns (the upper-right panel). In Norway and Sweden creative destruction has positively contributed to industry productivity growth in the manufacturing sector industries over the whole period. In Finland, the effect increased before the mid-2000s but in Denmark creative destruction was missing in the years 1999-2007.

The bottom panels of Figure 6 provide a comparison between manufacturing and service industries for other countries except Norway. In the service industries productivity growth has been somewhat slower than in the manufacturing industries (lower-left panel of Figure 6). However, especially the creative destruction component has been generally smaller in the service industries. Hyytinen and Maliranta (2013) has found similar findings earlier for Finland. On the other hand, as in the manufacturing sector, creative destruction displays divergent patterns across countries.

Figure 6. Firm-level sources of industry productivity growth in manufacturing (excluding electronics) and service sector industries on the basis of the standardized industry-structures, 2002 = 100



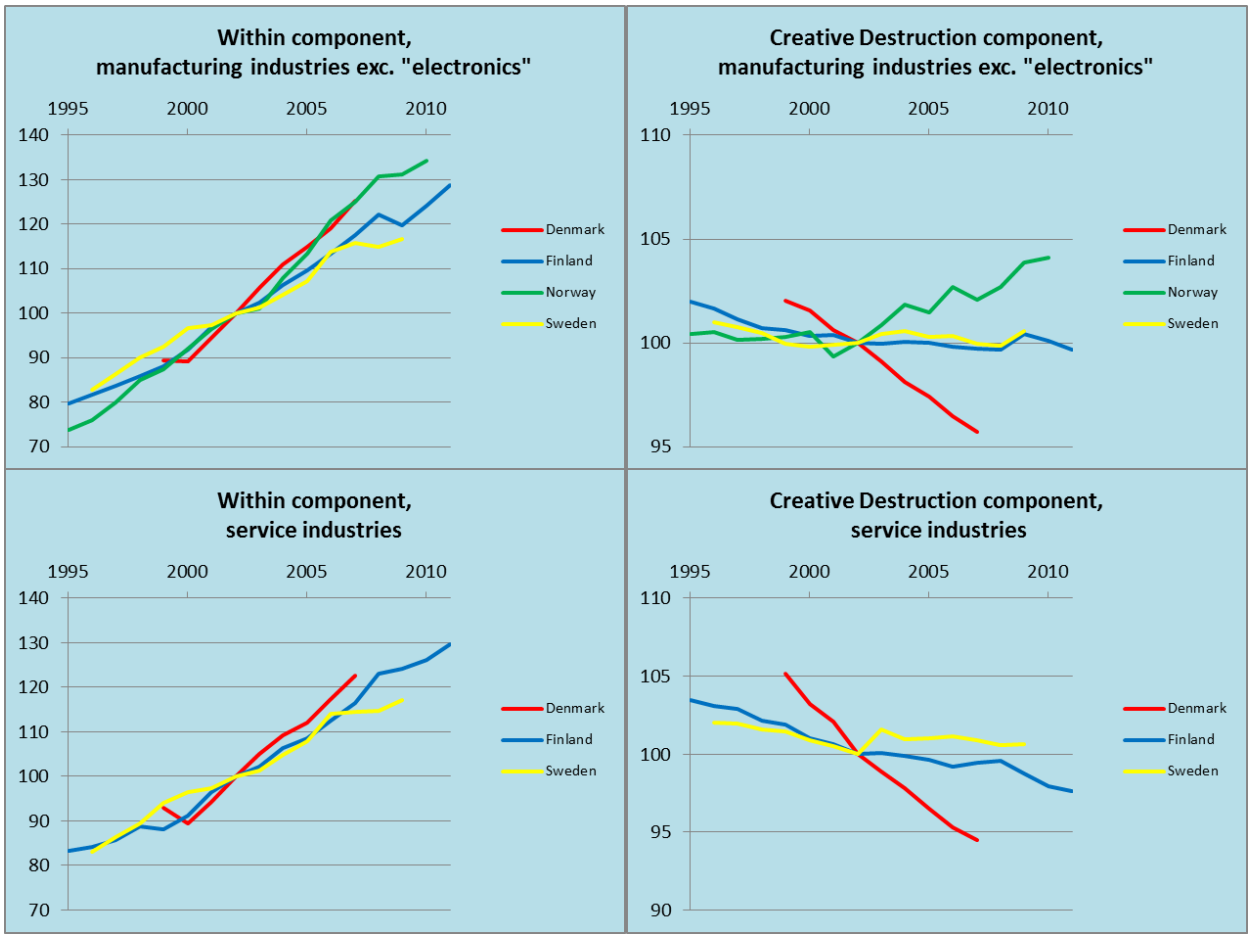
Notes: *Based on the computations made by use the firm-level data sets. Analysis is performed separately for ten manufacturing and eight service industries. These results are then aggregated to the sector level by using the average value added shares of eleven OECD countries in years 1995-2010.*

Labour costs

Figure 7 shows corresponding results for the labour costs per employee. Five interesting findings emerge from the figure. First, the growth of labour costs within firms has been fastest in Denmark and Norway. Second, there was a marked slow-down in labour costs growth within Swedish firms in the years 2006-2009. Third, in each country the growth of labour costs within firms has been very similar in manufacturing and service industries. Fourth, the creative destruction component exhibits, again, quite divergent patterns among countries. In Finnish and Swedish manufacturing industries the creative destruction component has been very stable but with slight counter-cyclical variation. In Norway the effect has been positive in the manufacturing industries since the early 2000s. In contrast to the other countries, in Denmark the effect

has been unceasingly negative in both the manufacturing and service industries. Fifth, a comparison of Figure 6 and Figure 7 reveals that the creative destruction components of labour productivity and labour cost growth seem to be mutually related but in all cases the component for productivity growth is much larger.

Figure 7. Firm-level sources of industry labour costs growth in manufacturing (exc. electronics) and service sector industries on the basis of the standardized industry-structures, 2002 = 100

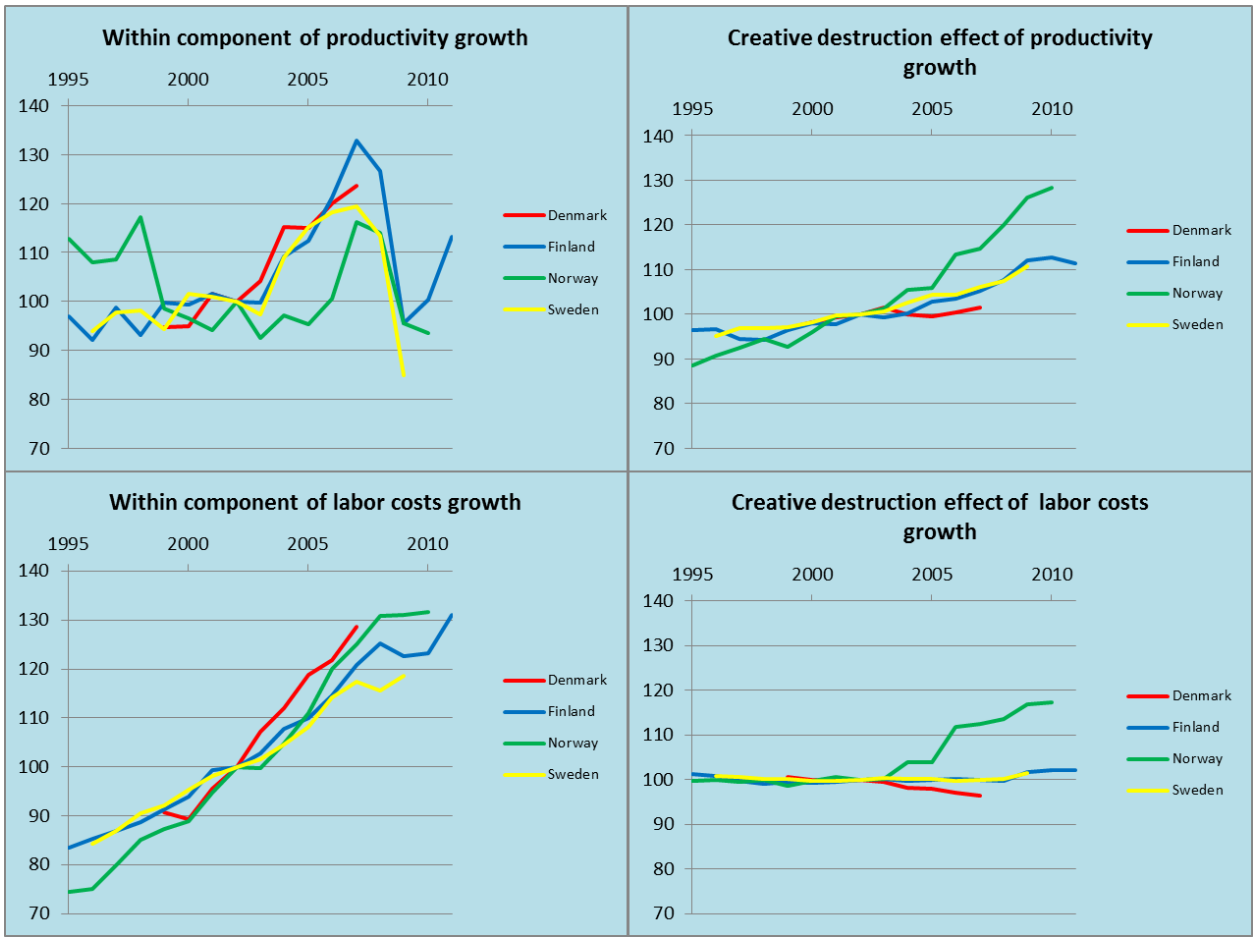


Notes: *Based on the computations made by use the firm-level data sets. Analysis is performed separately for ten manufacturing and eight service industries. These results are then aggregated to the sector level by using the average value added shares of eleven OECD countries in the years 1995-2010.*

Productivity and labour costs in machinery industry

Figure 8 presents the results for the components of productivity and labour costs growth in the machinery industry ("28" in the NACE 2 classification). The general patterns in the results largely correspond to those of the all manufacturing industries that were presented in Figures 6 and 7. The similarity of the results Finland and Sweden is even striking, given the inevitable inaccuracies of the measurement in narrowly defined industries. In addition, the results for Norway demonstrate how misleading the industry-level components of competitiveness may sometimes be. As noted in conjunction with Figure 5, there has been an outstanding increase in competitiveness (i.e. decrease in relative real unit labour costs) in the machinery industry in the recent years that has been largely based on the surge in the labour productivity. Figure 8 suggests in turn that to a large extent the surge derives from productivity-enhancing firm-level restructuring. It also seems to involve creation of high wage jobs and/or destruction of low wage jobs at the level of firms, which explains the surge in the labour costs at the level of the industry (see Figure 5).

Figure 8. Firm-level sources of labour productivity and nominal industry labour costs growth in machinery industry ("28" in NACE 2), 2002 = 100



Notes: *Based on the computations made by use the firm-level data sets and OECD's STAN-database. Analysis is performed separately for ten manufacturing industries. These results are then aggregated by using the average value added shares of eleven OECD countries in the years 1995-2010.*

Real unit labour costs

Analogously to productivity and labour costs growth, the growth of the industry-level real unit labour costs (i.e. labour costs per value added) can be decomposed into two firm-level components: 1) the change within firms and 2) the change owing to firm-level restructuring. This provides us a complementary perspective to the analysis of the changes in competitiveness at the level of industries.

Figure 9 provides an additional indication from the firm-level data that competitiveness has gradually declined in Finland and improved in Norway in the manufacturing industries when the electronics industry is excluded (see also Figure 5).[5] On the top of that, the figure shows that the industry-level changes depend on the balance between mechanisms that typically affect in opposite directions; the development within firms and firm-level restructuring (Böckerman & Maliranta, 2012; Kyyrä & Maliranta, 2008).

The middle panel of Figure 9 indicates the general tendency of declining competitiveness within firms (except the years after 2003 in Norway). It means that generally the growth of labour costs exceeds that of

[5] When "Electronics" is also included the basic patterns are similar except the decline in competitiveness of Finland is slightly deeper within firms as well as at the level of industries.

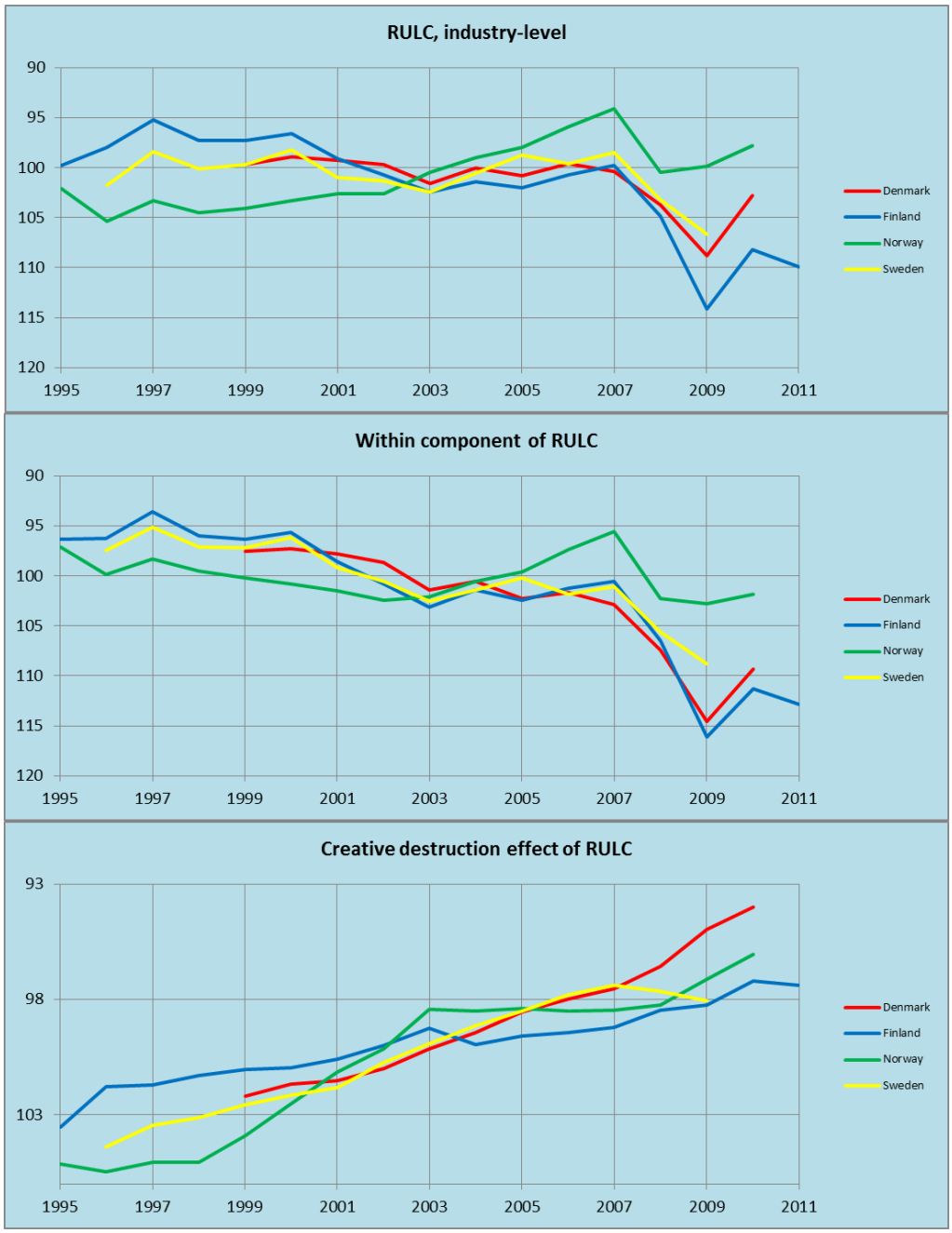
labour productivity in the firms when labour costs are measured in the price of value added. In other words, a “typical” or “representative” firm faces declining profitability over time. The decline is stronger during downturns. Obviously, cyclical variation in the changes of the real unit labour costs depends on the cyclical flexibility of wage formation.

The bottom panel of Figure 9 shows that, as a rule, firm-level restructuring has a positive impact on the industry-level competiveness. More competitive firms (i.e. firms with a low labour costs to value added ratio) gain markets shares (in terms of nominal value added) from less competitive firms.

Interestingly, the creative destruction effect of the real unit labour costs is reasonably similar in all these countries. The Danish development merits our closer scrutiny. As indicated in the upper-right panel of Figure 7, creative destruction has lowered the labour costs at the level of manufacturing industries, which contributes positively to the industry-level competitiveness. At the same time, the effect of creative destruction on labour productivity has been quite neutral in Danish manufacturing industries (see the upper-right panel of Figure 6). The net effect of these two creative destruction components on competitiveness is positive, which is in accordance of the findings made from Figure 9

In other words, it seems that in Denmark market shares (in terms of value added) are captured (lost) by firms that have low (high) relative labour costs and an average relative labour productivity level. Norway seems to be quite different. The upper-right panels of Figure 6 and Figure 7 suggest that in Norway market shares are captured (lost) by firms that have high (low) relative labour costs but even a higher (lower) relative labour productivity level. Finland and Sweden seem to be in the middle in this respect. High productivity firms have increased and low productivity firms have decreased their market shares but there is no significant relationship between the level of labour costs and changes in market shares.

Figure 9. Real Unit Labour Costs and its firm-level sources in manufacturing, normalized industry-structures without electronics (1999-2007=100).



Notes: *Based on the computations made by use the firm-level data sets. Analysis is performed separately for ten manufacturing industries. These results are then aggregated by using the average value added shares of eleven OECD countries in the years 1995-2010. The costs are presented with a reversed scale so that an upward-sloping line indicates improvement of competitiveness.*

Conclusions

Competitiveness is a concept having implications for policy at multiple levels. Worries over declining competitiveness affects tax policy, industrial policy and technology policy at the national level. Wage bargaining between labour market organizations is also affected by perceptions of changes in competitiveness.

Proper measures of competitiveness are needed for identifying current competitiveness and anticipating forthcoming development. In addition, comprehensive indicators help to identify the main components of the changes. All these elements of indicators are crucial for successful policymaking. To evaluate whether changes in policies are needed, one need to know how and why competitiveness has changed.

Decomposition of the changes in industry-level competitiveness into three components allows more elaborated policy considerations. Two of them are particularly relevant for immediate remedies. Growth of labour costs can be dealt with various labour market policy measures as well as changes in taxation of labour input. Growth of the price of value added in turn can be adjusted by exchange rate policy (if it is not fixed) or by subsidies, taxes and other costs (e.g. trade and transport costs). Improvements of the third component of competitiveness, i.e. labour productivity, by policy tools are more difficult to achieve and the effects can be expected only with a considerable lag. Furthermore, much of the substantial gains materialize through painful restructuring at the level of jobs and firms that also makes these measures politically less appealing.

By use of micro-level data the changes in labour costs and labour productivity can be further decomposed to changes taking place within continuing firms and the effect of creative destruction. The results in this chapter show that industry-level competitiveness is enhanced by creative destruction due to its effect on productivity growth, especially in manufacturing. Creative destruction typically has a smaller impact on labour costs, although there is some variation between countries. Related to this, the results show that for continuing firms, competitiveness declines over time on average. That is, their labour costs more quickly than productivity.

Our empirical analysis shows that the development of competitiveness of Sweden (when measured by the relative real unit labour costs) has outperformed that of Norway, Denmark and especially Finland in recent years. Rapid labour productivity growth has been an essential determinant. Firm-level analysis shows that productivity-enhancing restructuring, i.e. the so-called “creative destruction”, has been an important component of industry productivity growth in Norway and Sweden over the whole period from the mid-1990s to the recent years. In Finland creative destruction gained more strength just before the financial crisis in 2007 and stayed strong at least until 2011. In Denmark there was no indication of creative destruction before 2007, which is the last year for which we have productivity decomposition results.

Analyses of real unit labour costs (i.e. labour income share) with firm-level data indicate that profitability typically declines within incumbent firms (or a “representative” firm) over time. However, in all four Nordic countries examined here the development of profitability is much more favorable at the level of industry than at the level of firms. This is due to profitability-enhancing firm-level restructuring, which means that higher profitability firms have a tendency to increase their market shares at the expense of less profitable firms.

Profitability-enhancing restructuring originates from the fact that productivity-enhancing restructuring is greater than wage–enhancing (or labour costs) restructuring. Although profitability-enhancing restructuring (that improves competitiveness of the industries) has been, more or less, equally strong in all four countries, underlying mechanisms exhibit interesting differences. In Norway, Sweden and Finland firm-level restructuring has had a significant positive effect on industry productivity growth in manufacturing in recent years but much less so for labour costs growth. In Denmark, on the other hand, the effect of firm-level restructuring has been insignificant on labour productivity but strongly *negative* on labour costs growth, which explains a positive restructuring effect on profitability (and competitiveness).

Our results have clear implications for policy: to support competitiveness of industries the barriers to creative destruction should be abolished in order to increase productivity growth. On the labour cost side, the analysis implies that labour costs are growing faster than productivity in continuing firms. This is a fact that the labour market organizations should consider in the bargaining table.

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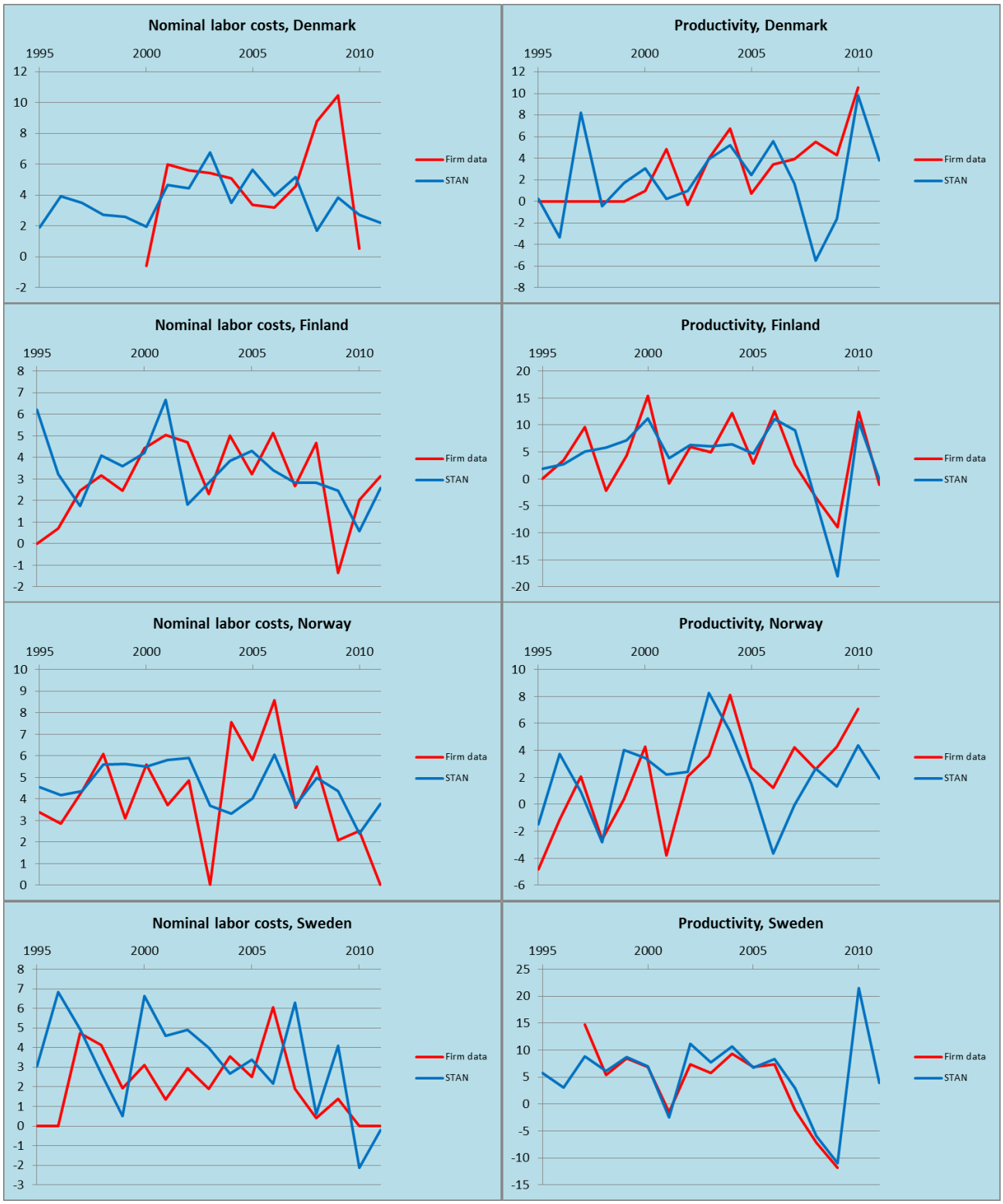

Appendix figure 1. Comparison of firm- and industry-level data sources, %)