Péter Bauer: Corporate profitability and labour market adjustment – findings of a micro data study*

During the crisis, firms saw their profitability deteriorate sharply in the weakening demand environment, which they reacted to by curbing labour costs. Cost-side adjustment thus acted as a buffer against inflationary pressure. In earlier analyses, we investigated this behaviour of firms using macro variables; this study complements our previous effort with an analysis carried out on a firm-level database. The profit margin determined on the basis of micro data paints a similar picture as the one calculated using macro statistics, suggesting that profitability had returned to pre-recession levels by 2011. At the same time, we believe that the return indicator (ROA) derived from corporate data provides a better indication of developments in profitability, to which firms must adjust. Growth in value added plays a pivotal role in their profitability gains. Companies adapted to lower demand during the recession through labour cost adjustment, but this trend only more or less followed changes in profitability. The return indicator suggests that a pronounced improvement in the demand environment is needed in order for private sector profitability to regain its pre-recession level of 2007 from the level of 2011. At the same time, profitability trends are characterised by strong heterogeneity, and thus as external demand started to increase moderately from 2010, the profitability of export-oriented firms improved significantly. Firms producing for the domestic market may see a marked improvement in their profitability once domestic demand picks up.

INTRODUCTION

During the global recession that started in 2008, demand for domestic products decreased significantly, which took a huge toll on firms' profitability. Instead of raising prices, firms reacted to deteriorating profitability by curbing expenses, specifically labour costs, which accounted for a large part of their expenditures. Past studies have only investigated profitability at the macro level (see e.g. MNB, 2013a); by contrast, this article attempts to supplement the literature with an analysis of a firm-level database.

We first demonstrate that the profit margin calculated based on microdata co-moves closely with the macro level profit margin. We then determine profitability metrics that cannot be construed based on macro data and compare the overall picture they give to corporate sector profitability. Private sector profitability deteriorated more sharply based on ROA (*return on assets*) than based on profit margin, and profitability would need to improve significantly following 2011 in order to return to pre-recession levels. It should be noted, however, that profitability may remain below this level for a prolonged period if capital and labour substitution occurred, resulting in expected capital gains that are lower than in the past. The recent cut in taxes on labour compared to capital taxes could foster such a substitution process.

Using micro-level data, firms can be segmented based on sector, size and other characteristics, allowing a study of profitability heterogeneity across firms. We also examined labour market adjustment in relation to this, concluding that manufacturing and export-oriented firms experienced a marked improvement in profitability up to 2011 compared to the trough seen during the recession, while others only saw much weaker improvement. Almost every segment reviewed showed signs of labour market adjustment, i.e. slower growth in real wages coupled with declining employment. However, this adjustment was only able to stop the further deterioration of profitability, which only improved materially when demand rose. In the latter cases, the real labour cost had returned to its pre-crisis level by 2011. For the firms that failed to experience the improvement in demand, the real labour cost persistently fell short of the pre-crisis level, albeit to a slight degree. Finally, after the investigation of the simple co-movement of the time series, we analysed firms' labour market adjustment in response to profitability shocks using econometric tools. Our findings shed light on the fact that the deterioration in profitability does in fact lead to a decline in labour costs, partly by pulling real wages downwards and partly by reducing employment. In addition, labour market adjustment is more pronounced among loss-making firms.

DATA

We used the National Tax and Customs Administration's (NAV) firm-level panel database, which essentially covers the entire corporate sector. Annual data is available for the 1995–2011 period. We used tax years in our analysis, meaning that for firms reporting based on business years that diverge from the calendar year, we consider the preceding year as the tax year if the balance sheet date falls before 1 June, and the year at issue for later dates.

This article only examines private sector firms (sectors A–N). We omitted the financial sector (sector K), which would call for different methods for examining profitability, and is also rife with structural breaks.

In the case of micro-level analyses, we use the ROA profitability indicator, the indicator most commonly used in corporate finance, determined as the ratio of operating profit and the balance sheet total.

In order to clean the sample, we omitted firms with balance sheet totals of under HUF 1 million or holding non-financial assets of less than HUF 100,000.

In order to eliminate outliers, we omitted the upper and lower one per cent of the sample ranked based on the ROA indicator.

The database features an unbalanced panel structure, meaning that data is not uniformly available for each firm for every year. This may yield a composition effect in the case of temporal analyses. In order to eliminate this potential bias, we also calculated results (with the exception of regression analyses) from 2006 onwards only in respect of the firms for which data was available for every year between 2006–2011. In other words, we also examined a balanced panel database for the 2006–2011 period, and our statements proved robust. In the following, we present only the findings based on the unbalanced panel.

The charts only cover the 2001–2011 period as the developments in the transition period leading up to 2001 are not typical and would provide little valuable insight on the period of the crisis.

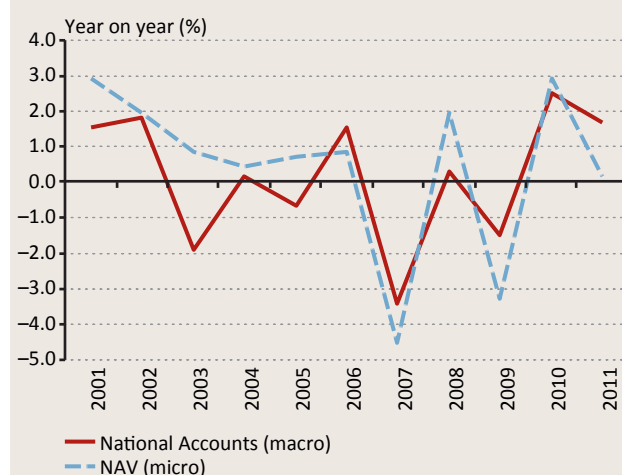## PROFIT MARGIN BASED ON MACRO AND MICRO DATA

The profit margin is a commonly used profitability indicator based on macro statistics and is the ratio of gross operating

surplus (GOS) to value added. GOS is the difference between value added and labour cost. There are several versions of the indicator: labour cost can be determined based on full-time workers, adjusted for part-time workers or based on national accounts data, where all domestic workers are taken into account, not including those working abroad. The Report on Inflation is based on the latter indicator when analysing corporate adjustment (MNB, 2013b). The profit margin that can be calculated from the firm level database is closely linked to the latter concept. At the same time, the indicator based on the firm-level database cannot be expected to match the macro statistics in terms of level, as in the latter case the calculation methodology for GDP calls for adjustments that were not applied to firm-level statistics (e.g. taking into account the impact of the shadow economy). Therefore, in addition to levels, we also compared annual changes: annual changes that are close to each other suggest co-movement of the indicators. The findings for the private sector (Chart 1 and 2) illustrate that the value derived from the corporate database is close to national accounts figures in terms of the annual change of profit margin (the correlation is approximately 0.8 from 2001).[1]

The profit margins calculated based on both macro and micro level data illustrate that after hitting a low in 2009, profitability had returned to its 2007 level by 2011 (Chart 2).

Chart 1

Private sector profit margin based on macro and micro level data
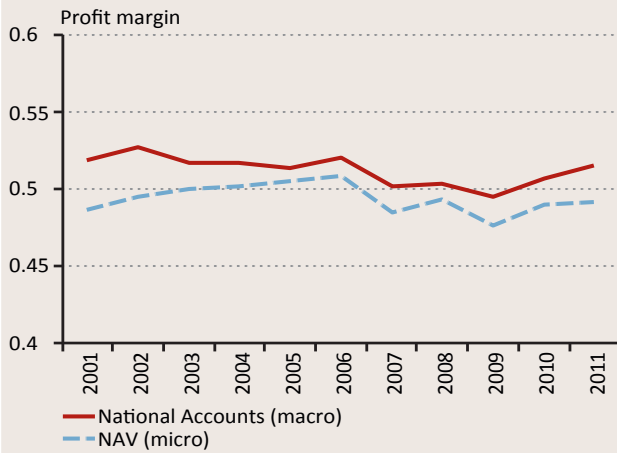
(annual change)

Source: MNB.

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[1] If the financial sector is included in the private sector, the correlation of macro- and micro-level data is essentially lost. This observation also corroborates the choice of omitting the financial sector.

Chart 2

Private sector profit margin based on macro and micro level data

(level)

Profit margin

Source: MNB.

PRIVATE SECTOR PROFITABILITY BASED ON ROA

In the previous section, we examined firms' profitability based on their profit margin. However, firms seek to maximise their profit, rather than their profit margin, and therefore changes in profit must be used to assess profitability. Falling value added, for instance, only appears in the profit margin in a diluted manner, as profitability is examined relative to value added. In addition, the GOS used for calculating the profit margin differs from actual profit, in that it contains depreciation of capital, for instance. However, profit alone cannot function as the sole basis of comparison, as firms with different amounts of assets will post different profit figures. Profitability is therefore expressed using various return indicators. The most common are: ROA *(return on assets),* ROE *(return on equity),* ROI *(return on investment),* and ROIC *(return on invested capital),* where a company's profits are divided by its assets, equity, profit-generating investments and invested capital, respectively. Company earnings can also be determined in different manners, such as operating surplus, operating profit, earnings before tax or earnings after tax. These indicators can be determined using corporate data, but not or only with great difficulty using macro data.

In the following, we analyse the ROA based on operating profit, that is operating profit divided by the balance sheet total. This type of indicator is frequently used in business valuations. Another advantage of the ROA indicator is that the balance sheet total can be deemed as a reliable figure based on the available data, as opposed to the amount of equity providing the basis for the ROE indicator, which appears to be a good alternative.

At the same time, ROA is often determined by dividing earnings after tax, rather than operating profit, by the balance sheet total. Earnings after tax includes earnings on financial operations and extraordinary profit, but does not include corporate tax. Although earnings after tax are a better indicator of a company's actual profit than operating profit, they also include several volatile elements that a company has little influence in the short run and is unlikely to react to in labour or wage-related decisions. If firms view these changes as lasting ones, they may of course make the necessary adjustments. Our analysis of Hungarian data revealed that the revaluation of financial investments and securities significantly dampened profitability in both 2008 and 2011. As the main focus of our investigation is the relationship between profitability and labour market adjustment, such impacts should be ignored. Accordingly, we determined ROA in this study using operating profit (unless specified otherwise). Another aspect worth mentioning is that the difference between the aforementioned GOS and amortisation is a good approximation of operating profit (furthermore, we did not include the balance of other revenues and expenditures for GOS, but did include it for operating profit).

The ROA indicator is most commonly used in economics in industrial organisations analyses (e.g. Slade, 2004; Claessens and Laeven, 2004). A recent European Commission analysis is an example of the application of the indicator in macroeconomic analyses (European Commission, 2013a).
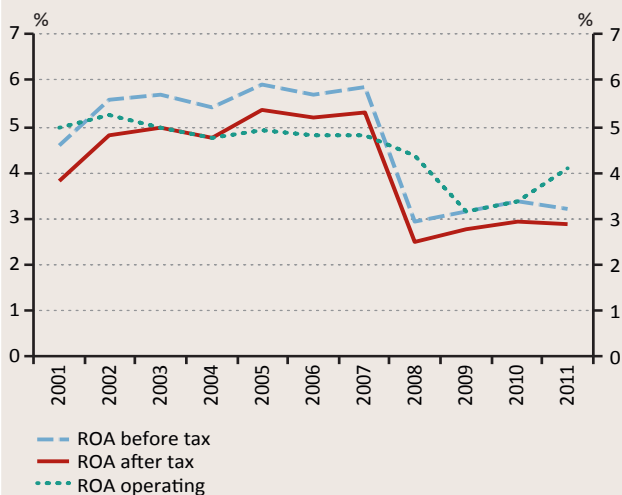
Using the average of a corporate-level profitability indicator is most suited for characterising the profitability of a corporate segment (e.g. sector). A simple average is not suitable, as there are many small businesses with weak profitability which bias the average. In the following, we use the balance sheet total weighted average. Other options are averages calculated using value added or employment. Compared with these, the balance sheet total weighted average has the benefit of being additive, meaning that if several firms are examined in aggregate form, the ROA for the new entity thus formed is exactly the balance sheet total weighted average of the individual ROA indicators. The drawback of value added weighting is that firms with negative value added must be omitted, and the employment weighted average biases the figure towards smaller firms (as larger firms generally have higher labour productivity).

Analysing these results, Chart 3 illustrates the difference between ROA calculated based on operating profit and earnings before or earnings after tax in the private sector. The chart shows that the evolution over time of ROA calculated based on earnings before and earnings after tax is highly similar, with the latter obviously being lower. ROA calculated based on operating profit displays a different dynamic: after hitting a low in 2009 during the crisis, it then improved

Chart 3

ROA indicators calculated based on operating profit, earnings before tax and earnings after tax

(balance sheet total weighted averages)

- – – ROA before tax
- —— ROA after tax
- ••••• ROA operating

Source: MNB.

Chart 4

Private sector profitability using various weightings

(based on ROA calculated with operating profit)

- —— ROA operating, value added weighted
- – – ROA operating, balance sheet total weighted, value added>0
- – • – ROA operating, employment weighted
- ••••• ROA operating, balance sheet total weighted

Source: MNB.

markedly. The more pronounced divergence from the earnings before tax ROA indicator in 2008 and 2011 stems from the revaluation of financial investments addressed above. Chart 4 presents the impact of the different weightings: despite the differences in level, the value added weighted and the balance sheet total weighted ROA (for all firms, or only for positive value added firms) share very similar dynamics. Only employment weighted ROA shows a pronounced divergence.

The remainder of this analysis is based on the balance sheet total weighted ROA metric calculated using operating profit. It reveals that private sector profitability already started deteriorating from 2008, plummeted in 2009, and then started an increase up to 2011. Profitability still would need to improve substantially in the period following 2011 in order to regain its 2007 level. By contrast, profit margins returned to their 2007 levels in 2011. The main reason behind this difference is that the profit margin is obtained by dividing by value added, and thus the decline in value added is partially eliminated from the indicator, while balance sheet total adjusted to a lesser extent in case of ROA.
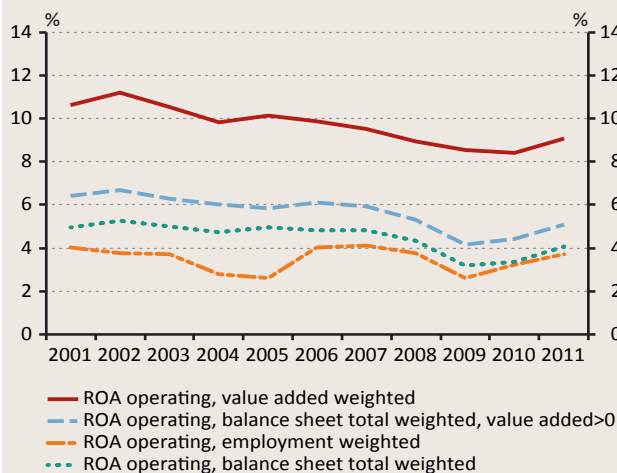
HETEROGENEITY OF PROFITABILITY

Firm-level data allow the examination of the differences in the profitability of firms with different attributes. Table 1 and Table 2 in the Appendices show the distribution of firms by employment, sector and exporting status.
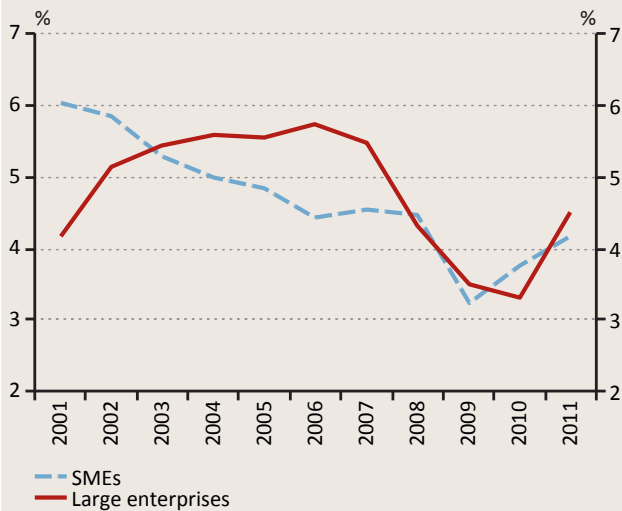
We first examined the diverging developments in profitability according to company size. As the conduct of large corporations may differ sharply from the rest of firms, we examined the profitability of companies with at least 250 employees and companies with less than 250 employees (Chart 5). Firms in the latter group are called SMEs (small and medium-sized enterprises).[2] Both large enterprises and SMEs saw their profitability dip sharply during the crisis. Large enterprise profitability already took a downward turn in 2008 and bottomed out in 2010, while SMEs only saw a marked deterioration in profitability in 2009, which has since been slowly improving. Profitability in 2011 failed to reach the pre-crisis level of 2007 in both segments. Large enterprise profitability was somewhat higher than those in the SME segment in 2011, and was substantially better compared to the latter in the years leading up to the crisis. This discrepancy was almost entirely eliminated following the crisis. Thus, in contrast to the pre-crisis period, company size alone does not entirely explain the level of profitability in a low demand environment.

We then examined profitability in a breakdown by sector, looking at two major groups: manufacturing and market service firms (Chart 6). After hitting a low in 2009, the manufacturing sector's profitability took a positive turn until 2011 and essentially returned to its 2007 level. It should be noted, however, that profitability had already deteriorated by 2007, and the 2011 figure falls short of the 2006 peak. By contrast, market service sector profitability only improved slightly compared to the low point during the crisis.
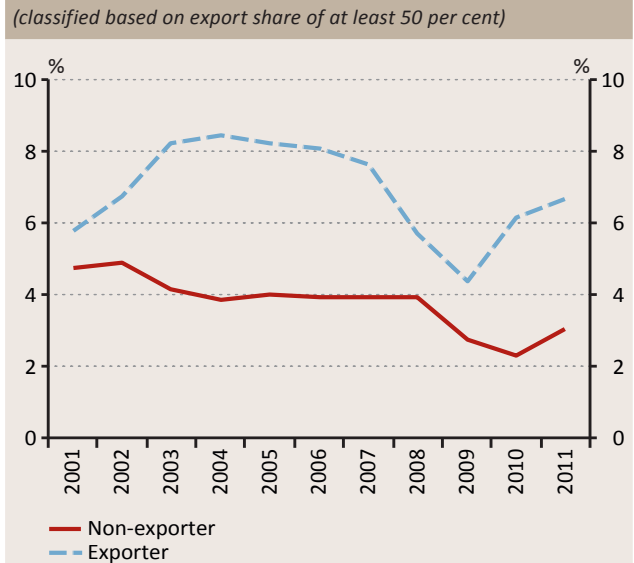
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[2] The official definition of the SME sector also sets limits on sales revenue and balance sheet total, which we ignored for the sake of simplicity. The European Commission follows a similar methodology in its analyses on SMEs (e.g. European Commission, 2013b).

Chart 5

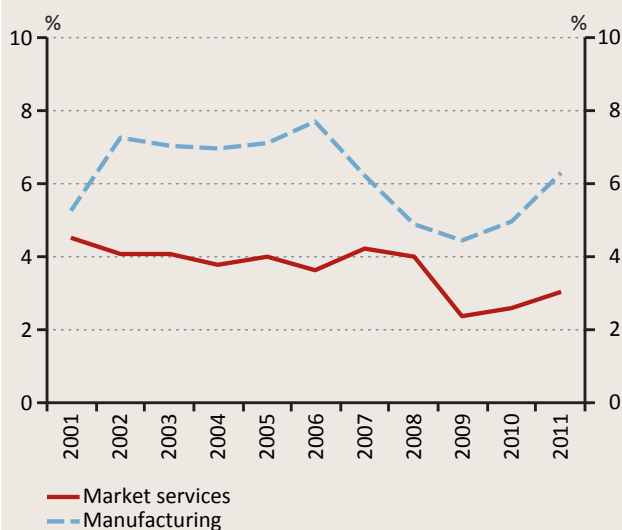**Profitability of firms with less than 250 employees (SMEs) and firms with more than 250 employees**

- - - SMEs
—— Large enterprises

Source: MNB.

Chart 7

Profitability of exporting and non-exporting firms

(classified based on export share of at least 50 per cent)

—— Non-exporter
- - - Exporter

Source: MNB.

Chart 6

Profitability in the manufacturing and market services sector

—— Market services
- - - Manufacturing

Source: MNB.

It is also worthwhile to analyse profitability for export-oriented and non export-oriented firms, as external demand trends were far more positive after the initial shock of the crisis than domestic demand (Chart 7). Unsurprisingly, this breakdown yields similar results as a breakdown along the lines of manufacturing versus market services, as export-oriented firms are usually manufacturing firms.[3]

Analysing the heterogeneity of profitability among firms, we can conclude that profitability improved significantly for mainly export-oriented manufacturing firms following the low point of the crisis, while service sector and non-exporting firms failed to regain profitability. The breakdown by size category yields a far smaller difference: large enterprise profitability only just outperformed smaller firms' at the end of the period.

DEVELOPMENTS IN FACTORS SHAPING PROFITABILITY AND AN ANALYSIS OF LABOUR MARKET ADJUSTMENT

In this section, we not only look at profitability, but also the other factors shaping it for the various categories of firms. For one, we look at cost factors, including labour market variables: real wages (or more specifically, the real labour cost per capita), employment and the total real labour cost obtained as the product of these two items. On the revenue side, we look at (real) value added, which may partially reflect trends in demand and partially changes in productivity, if examined in conjunction with changes in employment.[4] As ROA expresses profit in proportion to the balance sheet total, we also examine

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[3] We defined exporting firms as companies with at least half of their sales revenue derived from export operations. Results are insensitive to this threshold, which stems from the fact that export share follows a U-shaped distribution, i.e. the lion's share of sales revenue of firms exporting in any quantity is derived from exports.

[4] If we look at sales revenue instead of value added, changes in intermediate consumption would also have to be taken into account. We ignored this factor for the sake of simplicity.

changes in the balance sheet total as a determining factor of profitability.[5] It should be noted that any potential price adjustment is reflected in real wages and real labour costs. Our analysis characterises each corporate segment using employment, real labour cost, value added and balance sheet total variables defined as a simple average of each company, and the real wage variable using an employment weighted average.[6] As the variables under review feature different units of measure and orders of magnitude, the charts show the percentage change compared to 2006.
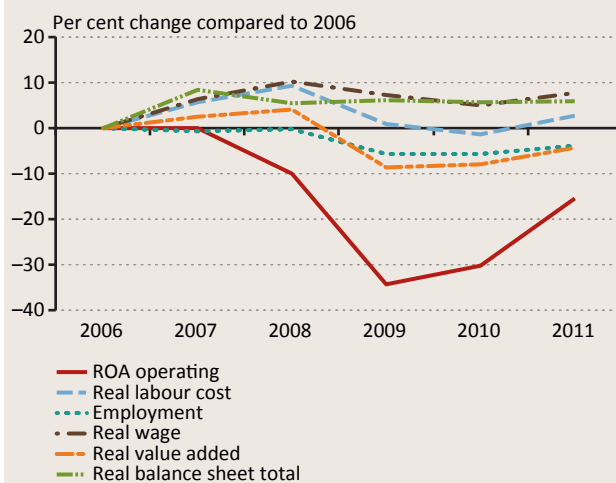
We first examined the entire private sector, which showed improvement in profitability following a sharp deterioration in 2008 and 2009, but has since failed to return to the pre-recession levels of 2007 (Chart 8). Real labour costs were curbed following the shock in 2008, mainly in the form of job cuts, while real wages started rising again from 2011. Nonetheless, the upward trend in real wages in the years leading up to the crisis was clearly broken. Labour market adjustment, however, was only enough to halt the further deterioration in profitability, as the slight improvement was primarily driven by minor growth in value added and lower depreciation (not included on the chart).

Companies with at least five employees should be examined separately within the private sector, as data on firms smaller than these are quite noisy (Chart 9). In this segment, the initial sharp deterioration was followed by a significant improvement in profitability, which already exceeded the 2008 level by 2011. Value added had returned to its 2008 levels by 2011; in parallel, real labour costs had resumed a rising trajectory by 2011 after shrinking in 2009–2010, only just slightly lagging from the 2008 level. The improvement in profitability in this segment was therefore driven by rising value added, instead of the reduction in labour costs.

In examining the heterogeneity of profitability trends, we found that manufacturing and export-oriented firms saw a pronounced rise in their profitability, while by 2011 large enterprises also saw slight improvements in their profitability, which surpasses that of SMEs. We will therefore now investigate developments in the determinants of profitability for firms sharing these three attributes — large, export-oriented manufacturing firms (Chart 10). The evidence shows that profitability has essentially returned to its pre-2007 level in this corporate segment, in parallel with a sharp rise in value added, which had already

Chart 8
Private sector profitability and its main determining factors
(percentage change compared to 2006)

Source: MNB.

surpassed 2007–2008 levels by 2011. Meanwhile, real labour costs and its determinants (employment, wage) had returned to the 2008 level by 2011. This illustrates that the decline in labour costs was only temporary and the gains in profitability are linked to rising value added, as profitability improved even as real wages and employment increased.

Non-exporting market service SMEs showed the smallest improvement in profitability. It is worth taking a look at firms' labour market adjustment in this corporate segment (Chart 11): real labour costs have remained below the 2008 level, in particular due to falling real wages. Improving profitability in this segment in 2010–2011 therefore partly stems from the slight increase in value added and partly from falling labour costs, alongside steeply declining depreciation (not represented on the chart).
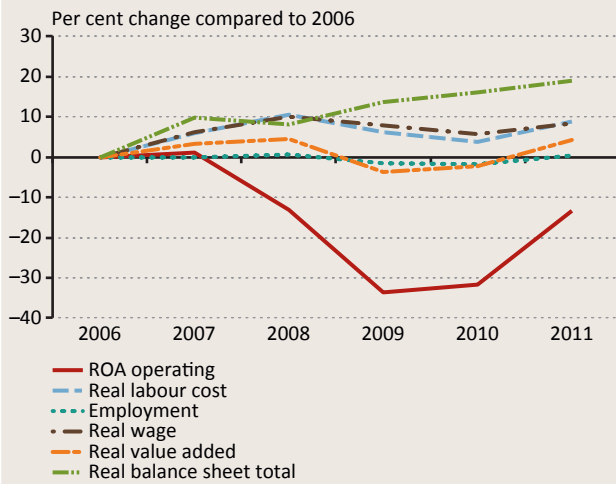
The above findings suggest that it was not possible to achieve a marked improvement in profitability following the crisis merely by scaling back labour costs; it also required increasing value added. As the latter was generally achieved in the export sector which is sensitive to improvements in the external demand environment, we can assume that demand was a driver of increases in value added. Improving profitability generally went hand-in-hand with rising labour cost.

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[5] We deflated the labour cost by producer prices and balance sheet total by value added deflator.
[6] The reasoning behind the average calculation method is similar to the reasoning behind the ROA metric: the variables are extensive in nature, with the exception of real wages, meaning that they can be added up among firms. In contrast, real wage is an intensive variable, that is the weighted average calculation satisfies the criterion of additivity.

Chart 9

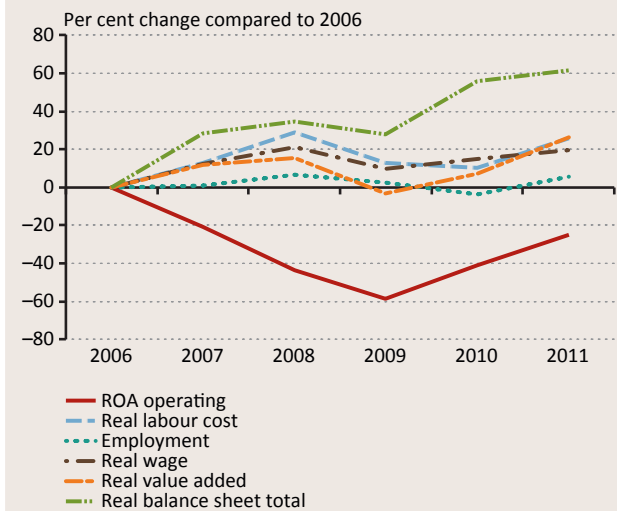**Profitability of firms with at least five employees and its determinants**

(percentage change compared to 2006)

Per cent change compared to 2006

ROA operating
Real labour cost
Employment
Real wage
Real value added
Real balance sheet total

Source: MNB.

Chart 10

Profitability of export-oriented manufacturing firms with at least 250 employees and its determinants

(percentage change compared to 2006)

Per cent change compared to 2006

ROA operating
Real labour cost
Employment
Real wage
Real value added
Real balance sheet total

Source: MNB.

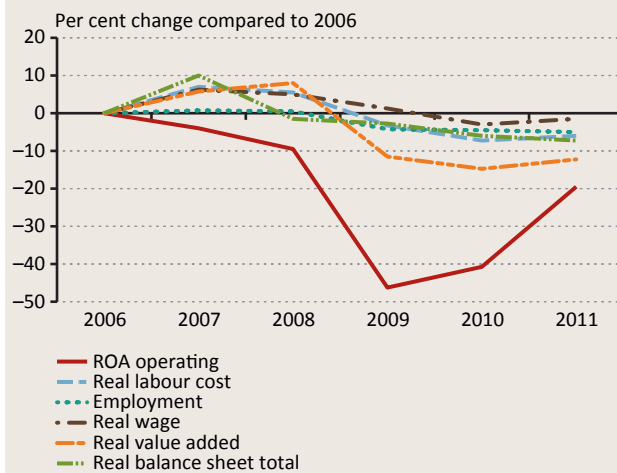## ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN PROFITABILITY AND LABOUR MARKET ADJUSTMENT

The previous section examined the relationship between profitability and labour market adjustment by firms using illustrative examples and based on the co-movement of time series, but a causal relationship was only assumed. In this section, using econometric tools we analyse whether changes in firms' profitability cause any changes in wages or employment. The crisis saw a rise in the number of loss-making firms, and we can assume that these firms had to adapt more strongly than profitable ones.[7] We therefore examine separately whether loss-making firms adjusted differently (to a greater degree). It should be noted that there was an exceptionally high proportion of loss-making firms among non-exporting firms even before the crisis hit, and this situation was subsequently exacerbated by the recession.

We would like to preface that our findings reflect estimated average effects drawing on data for the period 1995-2011 and therefore do not capture the degree of adjustment during times of crisis for the same profitability shocks.

For examining labour market adjustment, we used an equation very similar to the one used in the study of Blanchflower et al. (1996).[8] The equation we estimated:

Chart 11

Profitability of non-exporting service firms with less than 250 employees (SMEs) and its determinants

(percentage change compared to 2006)

Per cent change compared to 2006

ROA operating
Real labour cost
Employment
Real wage
Real value added
Real balance sheet total

Source: MNB.

$$y_{it} = a_i + \delta_t + \gamma y_{it-1} + \beta_1 roa_{it-1} + \beta_2 loss_{it-1} + u_{it},$$

where i is the firm, t the year, a_i the firm fixed effect, δ_t the time fixed effect (time dummies), roa_{it-1} the ROA of company i in year $t-1$, and $loss_{it-1}$ is 1 if company i was in the red in the

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[7] Some studies simply qualify trends in profit position in the crisis with loss (e.g. Crawford et al., 2013).

[8] The cited study focuses on how revenues in excess of cost are shared between the company and the employee, thus examining whether higher profits-per-employee would actually lead to higher wages.

year *t-1,* or 0 otherwise. We performed an estimate of three different versions of the equation: (1) y_{it} is the logarithm of real labour costs, (2) y_{it} is the logarithm of real wage, (3) y_{it} is the logarithm of employment for firm *i* in the year *t.*

The inclusion of the firm fixed effect controls for factors specific to the company that are constant in time, and thus their effect is not mistaken for the effect of profitability in the estimation. For instance, certain sectors may be more profitable and boast higher wages because they employ mo-re qualified labour. Without controlling for such factors, we would find that higher profit generates higher wages solely based on this correlation. Sector-based classification, however, is a fixed effect and we therefore control for it. We control for aggregate effects specific to individual years by including time fixed effects.

We resolve the issue of simultaneity — i.e. that it is not only profitability that affects labour market variables, but also vice versa — by lagging ROA and the dummy variable expressing loss. The drawback of this approach is that we cannot give an estimate of the simultaneous effect of profitability. During normal periods, reactions to shocks are expected to materialise with a smaller lag, while during the recession, adjustment to larger shocks materialise only with longer lag. The estimates, however, reflect an average reaction, and therefore it is probable that our findings will be a lower bound of adjustment during the crisis.

The lagged dependent variable (y_{it-1}) must be included in the equation, because labour market variables are highly persistent, as they are incapable of reacting to shocks immediately due to various frictions.

Interpretation of the coefficient $β_1$ based on the equation: real wages/real labour costs/employment are $β_1$ per cent higher in the following year if ROA is 1 percentage point (0.01) higher for one firm compared to another. Here, we compare the two firms in the same year; their time-invariant attributes are the same, and real wages/real labour costs/employment in the year at issue are also the same, and both firms are either profitable or loss-making. Interpreting $β_2$ is more complicated, as given the same ROA figure, one company cannot be in the red and the other one profitable. The interpretation therefore is that the difference in real wages/real labour costs/employment in the following year is 100 $β_2$ per cent higher between the loss-making and the profitable company compared to what the difference in profitability alone would warrant. This coefficient therefore captures the non-linear

effect of profitability, i.e. deterioration in profitability triggers a stronger degree of adjustment if it puts a firm in the red.

We estimated the coefficients of the equation using the so-called fixed-effect method, meaning we eliminated the effect for companies that is constant over time (a_i) by using only the deviation of variables from the time average. It is well known that including a lagged dependent variable causes bias, but its size decreases as the time dimension increases. We assume that the available sample (1995–2011) is long enough not to cause any significant bias. Estimation results are presented in Table 3 included in the Appendix.[9]

To assess the robustness of our results, we also estimated the equation using a version of the Anderson and Hsiao (1982) method, where we used the first difference of the equation's variables and instrumented the lagged dependent variable with two lagged level variables (y_{it-2}, y_{it-3}) (Table 4). Our findings corresponded with the fixed-effect estimate qualitatively (sign, magnitude and significance of coefficients). In the following, we interpret coefficients obtained using the fixed-effect estimate (see Table 3).

Based on our findings, an increase in profitability triggers higher real labour costs, stemming in part from higher real wages and in part from higher employment. Going into the red would warrant a stronger reaction in both employment and real wages, and thus in real labour costs than a fall in profitability alone would warrant. While mere changes in profitability affects employment and real wage adjustment similarly, going into the red triggers a more pronounced labour-side adjustment, i.e. a sharper cut in the number of employees or per capita hours worked.

However, the adjustment suggested by estimates is in fact lower than what emerges at the aggregate level. Private sector profitability fell by roughly 2 per cent and the proportion of loss-making firms rose by 6 per cent in 2008–2009. Based on the regressions used, this entails an approximately 1-1.5 per cent fall in real labour costs. In reality, labour cost in the private sector fell to a much greater extent in the 2009–2010 period. This is presumably explained by the fact that for one, the estimate only shows the lagged effect of profitability, and also the above specified simple equation does not capture the heterogeneity of reactions of different firms to the crisis. Furthermore, the degree and lag in labour market adjustment to substantial shocks may have also changed during the crisis, and therefore the above regression analysis only yields an average result — over time and among

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[9] We also estimated the equation using ROA obtained using earnings after taxes and obtained highly similar results.

firms — regarding the link between profitability and labour market adjustment.

CONCLUSION

This paper sheds new light on the relationship between developments in profitability and labour market adjustment. The former can be analysed drawing on macro or micro data and characterised using various indicators. Our findings show that the choice of indicator is important. The usual profit margin indicator calculated using macro statistics paints a similar picture of firms' profitability as the same indicator determined using micro data, which suggests that profitability had returned to pre-crisis levels by 2011. At the same time, we believe that the ROA metric derived from firm-level micro data provides a better indication of actual developments in profitability, which calls for adjustment from firms. This indicates that further improvement is needed in the private sector in the period following 2011 to regain 2007 levels. Trends in profitability show a large degree of heterogeneity; for instance, the profitability of large export-oriented manufacturing firms has improved significantly compared to the low point in the crisis, driven by rising value added and only temporarily coupled with falling labour costs. Profitability improved to a slighter degree among non-exporting market service SMEs, which have retained lower labour costs compared to the pre-crisis period, while their value added only grew slightly. This means that the rise in value added plays a pivotal role in profitability improvements. Companies adapted to lower demand with labour cost adjustment, but this trend only more or less followed changes in profitability. Formal econometric analyses confirmed that firms react to changes in profitability by adjusting employment and wages, which are the determinants of labour costs, and loss-making firms do so in a more pronounced manner.

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APPENDICES: CHARTS AND TABLES

Table 1
Distribution of firms by employment and sector
(percentage ratio within employment categories)

Sector	Employment					Total
	<10	<50	<250	≥250	Missing	
Manufacturing	12.1	25.4	39.1	52.8	7.7	14.6
Market services	72.7	53.7	36.8	31.2	77.9	69.3
Other	15.2	21.0	24.1	16.0	14.4	16.2
Total	100	100	100	100	100	100
Source: MNB.						

Table 2

Distribution of firms by employment and export status

(percentage ratio within employment categories)

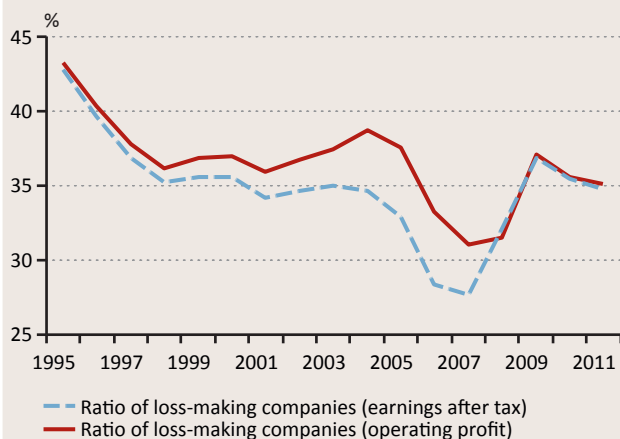| Export status	Employment					Total
	<10	**<50**	**<250**	**≥250**	**Missing**	
Non-exporter	97.0	93.6	81.9	69.4	98.5	96.1
Exporter	3.0	6.4	18.1	30.6	1.5	3.9
Total	100	100	100	100	100	100

Source: MNB.

Table 3

Impact of profitability on labour market adjustment

	y_t = log(real labour cost)		y_t = log(employment)		y_t = log(real wage)	
y_{t-1}	0.498	0.496	0.577	0.575	0.336	0.336
	(0.0007)	(0.0007)	(0.0006)	(0.0006)	(0.0007)	(0.0007)
ROA_{t-1}	0.288	0.213	0.150	0.095	0.138	0.111
	(0.0027)	(0.0034)	(0.0016)	(0.0020)	(0.0022)	(0.0028)
loss-making$_{t-1}$	–	−0.066	–	−0.048	–	−0.024
		(0.0018)		(0.0011)		(0.0015)
Number of observations	1,689,255	1,689,255	1,686,384	1,686,384	1,656,651	1,656,651
within R^2	0.31	0.31	0.38	0.38	0.17	0.17

Note: Fixed-effect estimation of the dynamic panel model, sample period 1995–2011, standard errors in parentheses, all coefficients being significant at a level of 1 per cent, year dummies included in all cases in the regression.

Chart 12

Proportion of loss-making firms in the private sector

(based on operating profit and earnings after taxes)

Ratio of loss-making companies (earnings after tax)
Ratio of loss-making companies (operating profit)

Source: MNB.

Table 4
Robustness analysis

	y_t = log(real labour cost)		y_t = log(employment)		y_t = log(real wage)	
y_{t-1}	0.513	0.512	0.814	0.813	0.382	0.382
	(0.0072)	(0.0072)	(0.0082)	(0.0082)	(0.0034)	(0.0034)
ROA_{t-1}	0.208	0.175	0.103	0.088	0.103	0.089
	(0.0029)	(0.0035)	(0.0021)	(0.0025)	(0.0025)	(0.0030)
loss-making$_{t-1}$	–	−0.029	–	−0.014	–	−0.013
		(0.0017)		(0.0013)		(0.0015)
Number of observations	1,103,004	1,103,004	1,107,164	1,107,164	1,087,754	1,087,754

Note: Dynamic panel model estimation taking first differences, instrumenting the lagged dependent variable using two lagged level variables, sample period 1995–2011, standard errors in parentheses, all coefficients being significant at a level of 1 per cent, year dummies included in all cases in the regression.