

SHORT-TERM MODELLING FOR WAGE DEVELOPMENT

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Slovakia's position within international comparisons of the wage level and its determinants

Experience from modelling wages in a standardizing economy such as that of Slovakia confirms the fact that economic theories reach conflicting conclusions about the causal relations in wage developments. When seeking explanatory variables of wage developments within the conditions of the Slovak economy, it should be noted that Slovakia occupies a marginal position in international comparisons of wage-determining macroeconomic indicators as well as in actual wage and income comparisons.

For example, the wage table published by the Federation of European Employers (FedEE) in 2005 places Slovakia 35th out of 48 countries and regions, with its average gross wage at only 11% of that in Denmark (the study is based on statistical data for average hourly earnings in 31 occupation groups among enterprises in three size categories).

Regarding employee compensation as a share of gross domestic product, Slovakia has one of the lowest levels in the EU. This means that an employee in Slovakia gets a lower share of overall national income than do employees in other EU countries. Whereas in euro area countries it is the norm for the division of income to favour employees, in Slovakia this relationship is reversed to the benefit of employers.

Not only that, but the relatively low average gross wage and low compensation include relatively high social contributions¹ – deductions for health insurance, hospital insurance, pension insurance, disability insurance, unemployment insurance, employer's insurance against insolvency (guarantee insurance), injury insurance, and insurance payments to the Solidarity Reserve Fund. Payroll deductions in Slovakia are among the highest in the OECD (World Bank, April 2005). In Slovakia, the share of total gross wages and compensation that goes to the public administration sector is higher than the average for OECD countries, and a relatively smaller share ends up in the household sector (employees) for further use.

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¹ The extent to which social contributions are included in employees' gross wages and compensation varies. The gross wage includes social contributions paid by the employee; employee compensation includes, besides the gross wage and payments, those social contributions paid by the employer on behalf of the employee.

The result of the relatively low wages and employees' low stake in the division of national income, together with the relatively high deductions, is a lower level of consumer demand in the form of household final consumption as a share of the total volume of goods and services produced within the economy. In Slovakia, private consumption as a share of GDP is among the lowest in the EU.

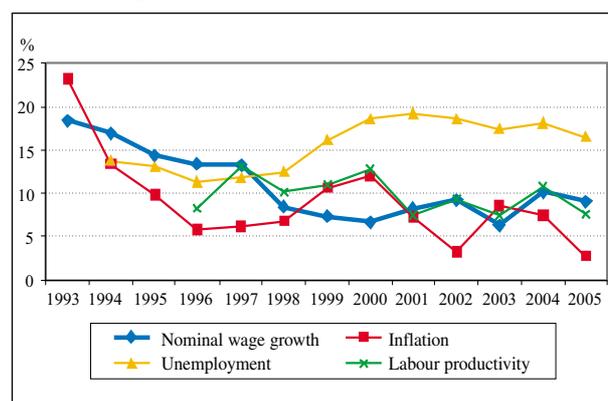
A brief comparison of the wage level, its components and its reflection in consumer demand needs to be linked with a survey of the production side, where the wage level is set. Based on a comparison of data for EU countries, Slovakia has one of lowest levels of value added per employee. The low level of value added corresponds with a low wage level that is also maintainable due to the unemployment rate being among the highest in the EU.

Not only is it necessary to monitor and evaluate the outlined causes and consequences of wage development from the long-term view of wage catch-up in the Slovak economy, it is also right to consider them in terms of their economic interpretation for the short-term model relationship between the average wage and its determinants. The main determinants of the wage level are generally considered to be: inflation, labour productivity and unemployment. The historical development of the wage level and its general determinants is shown in Chart 1, where:

- inflation is defined as the year-on-year growth in consumer prices in terms of the total consumer basket.
- unemployment is defined as the rate of unemployment according to selected surveys of the workforce,
- labour productivity represents the year-on-year growth in labour productivity in terms of GDP in current prices per employee.

By quantifying the interrelationships in the annual data,

Chart 1 Wage developments and its determinants





it is clear that the nominal wage development over the whole period correlates positively with inflation development with a time lag of one year (correlation coefficient: +0.7) and it correlates negatively with unemployment development without a time lag (correlation coefficient -0.7). During the period 2001 – 2005, wage development may be explained by the development of labour productivity that is more reliable than in previous cases (the correlation coefficient increased to +0.8). In the real economy, however, individual factors operate simultaneously. The composite model presented in the following section describes the simultaneous operation of selected variables in the short-term setting of the nominal wage.

Composite model of wage developments

The model's construction is based on observations of usual practice in collective negotiations in Slovakia and on the evaluations of deviations recorded between short-term forecasts and actual development – supplemented by the mathematical apparatus of the European Central Bank (ECB) and supported by economic theory. The composite model of wage development was constructed using the quarterly data in current prices published by the Statistical Office of the Slovak Republic (ŠÚ SR) for the period from the first quarter of 1993 to the third quarter of 2005. Since the time series for nominal wage data shows significant seasonality, the data was seasonally adjusted. With this model, it is possible to forecast nominal wage development for the next four quarters.

The composite model of wage development consists of two independent components. The first is based on the general validity of downward wage rigidity as an attribute of the nominal wage. This is factored into the model by separating the rigid part of the wage from overall wage growth using the mathematical apparatus employed by the ECB (in, for example, output analysis). The part of the wage growth thus separated is called the "carry-over effect from the previous year". The residual part of the total wage growth is therefore "updated wage dynamics in the current year", which is explained in the second component of the composite model.

$$\text{Total wage growth} = \text{carry-over effect} + \text{updated wage dynamics}$$

The construction of the model's second component focused on seeking those explanatory variables that would with sufficient reliability be able to describe the collision of interests of the employee and employer in regard to wage negotiations. That is why the variable explaining the development of the updated dynamics comes from two data sources: price statistics providing data tracked by employees, and financial statistics whose results are monitored by employers.

Carry-over effect from the preceding year

Assuming that the agreed nominal wage has a tendency not to fall but to rise, the first step was to separate the rigid element from the updated dynamics of wage growth by using a simple mathematical apparatus. The rigid element in this respect is that part of the average annual wage growth which results from the wage level for the previous quarter being carried over to the following four quarters.

The seasonally-adjusted time series for nominal wage data shows a rising trend from quarter to quarter. Let us consider year t and its highest absolute wage level running in a seasonally adjusted time series from the previous quarter. If throughout the following year ($t+1$), the wage level does not change and remains at the highest level of year t , then the average wage level in year $t+1$ will be higher than the average wage in year t with the difference representing the carry-over effect. The carry-over effect is therefore an effect that passes on the wage level from the end of the previous year to the next year, and as far as wage development is concerned it is positive. This means that the average wage reports growth even where no wage adjustments took place during the course of the year ($t+1$). Only after deducting the carry-over effect from the real growth in the average wage is it possible to obtain information on the current wage dynamic in year $t+1$.

Chart 2 The wage level

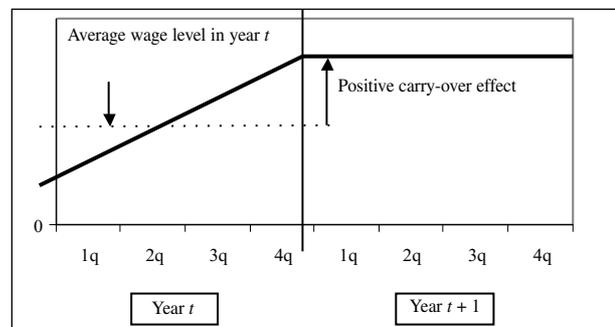
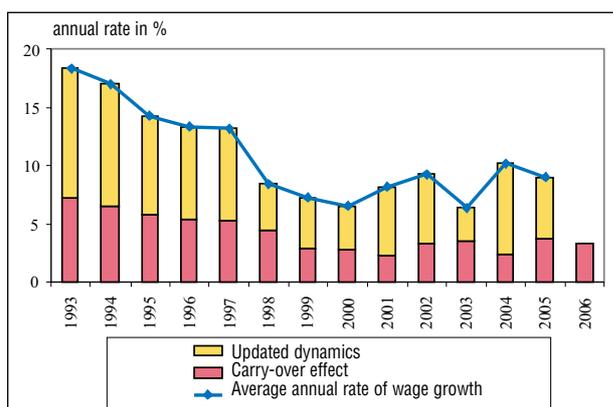


Chart 3 shows the historical dynamics of the average monthly employee wage² in Slovakia broken down into the carry-over effect and updated dynamics. The wage development in the fourth quarter of 2005 is projected on

² Primary source of data: ŠÚ SR – the data are obtained from comprehensive surveys conducted in organizations performing financial mediation and in all non-corporate organizations regardless of their number of employees, and from quarterly selected surveys conducted in corporate organizations having 20 or more employees, or having up to 19 employees and annual output which is worth at least SKK 100 million and has been organized according to a selected method since 2004. Data for other small enterprises with up to 19 employees are obtained from selected quarterly surveys. Wage data for employees of sole traders are obtained by qualified estimate.

Chart 3 The wage developments


Source: ŠÚ SR, own calculations.

the basis of monthly data on nominal wage development in selected industries (the ŠÚ SR data on the average employee wage in the fourth quarter was not available when this article was written). With the projection for the fourth quarter of 2005, it is possible to calculate the carry-over effect for 2006.

For the period 1993-2001, there was an almost linear decline in the value of the carry-over effect. An ever lower pace of wage growth was passed on from one year to the next. Insofar as the average wage for the last quarter of the previous year was lower in relation to the first three quarters of the current year, so the carry-over effect of the wage level at the end of the preceding year was down. Since 2002, the linear decline has been replaced by a 3.2% fluctuation in the carry-over effect. Based on data from the preceding year, it can be calculated that the wage development in 2005 predicted a carry-over effect in 2006 of around 3.3% (the carry-over effect in 2005 was 3.7%). This means that if the average wage does not alter during 2006, then the average annual wage for 2006 will be approximately 3.3% higher than that for the previous year. The quantified values of the carry-over effect constitute the first of the two components in the composite model of wage development.

Updated wage dynamics in the current year

The second (residual) component of the final annual wage growth is updated wage dynamics in the current year, definable as the results of wage adjustments made during the course of the current year. The development in this regard has so far been characterized by the fact that, firstly, updated wage dynamics have accrued only positive values, thus confirming the downward rigidity of the nominal wage, and, secondly, that they have deve-

loped independently of the carry-over effect values. By way of comparison, the highest updated dynamics were recorded in 1993 (accounting for 11.2 percentage points of the total wage growth of 18.4%), probably representing an indexing correction under the then conditions of high inflation (above 20%). The lowest updated dynamics were recorded in 2003 (2.9 percentage points of the total wage growth of 6.3%), which at first sight corresponds to the low inflation of the previous year (3.3% in 2002). The annual updated dynamics for the period 1994 – 2005 averaged 6.6% excluding extreme values. In 2005, including the projected wage development for the fourth quarter, they represented 5.3%. The calculation of updated wage dynamics may be applied to both annual and quarterly data (see Table 1).

After separating the updated dynamics from the carry-over effect within the overall wage growth, one can begin to seek the variables that would provide a sufficiently accurate explanation for the development of updated wage dynamics in the current year. The group of potential explanatory variables was restricted to price and financial statistics in order to record the collision of two sets of interests during nominal wage negotiations – the interests of the employee and the employer. The aim of the employee and his trade union is to ensure that wages are increased by at least the level of inflation, in other words, their minimum interest is to have the nominal wage index-linked. The employer's objective is to have an effective wage policy that should not threaten the results of his performance. Given the limited availability of statistics or the uneven definitional restrictions and coverage of the required indicators within financial statistics, we abstracted both the search for wage (i.e. work) expenses as a designated sustainable share of total expenses, and the relationship of wage (work) expenses to labour productivity. The latter indicators could have been replaced by data from the ESA 95 national accounts system, but one of the aims of the described modelling process was to provide an easy-to-interpret employer's view of the nominal wage negotiation mechanism using financial statistical data. In fact, financial statistics provide an overview of the financial performance results, reflecting also

Table 1 Breakdown of annualized annual wage growth in 2005

	Carry-over effect from the previous year	Annualized updated wage dynamics	Overall annualized wage growth in the current quarter
1 st quarter 2005	3.7 %	6.2 p. b.	9.9 %
2 nd quarter 2005	3.7 %	5.8 p. b.	9.5 %
3 rd quarter 2005	3.7 %	6.1 p. b.	9.8 %
4 th quarter 2005	3.7 %	5.3 p. b.	9.0 %

Source: ŠÚ SR, own estimates and calculations.



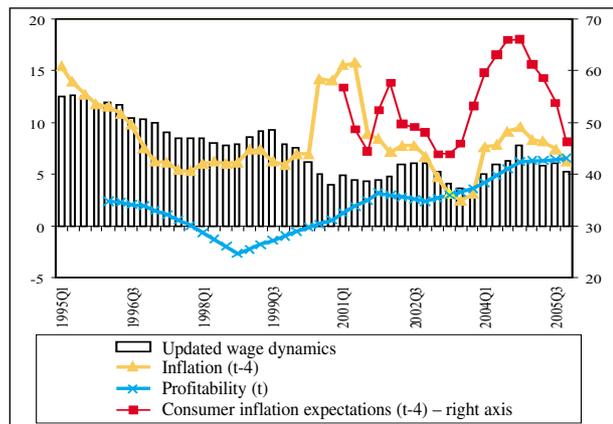
changes in the number of employees and the results of introducing processes that increase labour productivity in both production and non-production processes.

The incorporation of the employee indexing interest into the model assumes knowledge of how employees define the rate of inflation and of which time period they take into account (the previous year, current year, next year). Fundamental economic theories work with expected inflation but are distinguished by the frame of reference for employee expectations, which may extend from extremely optimistic to extremely pessimistic expectations in comparison with the real rate of inflation. In answer to the question about the period set for indexing, there may be two basic variants: the rate of inflation for the previous year or the projected inflation for the current year. In addition, there may be used any of several modified variants for wage indexing. Observations have so far tended to confirm the contention that the indexing of wages to the previous year's inflation is the prevalent mechanism in collective wage negotiations. Testing of the quarterly data confirmed the strong correlation between wage growth and the previous year's inflation, especially since the first quarter of 2002. From the group of price statistics, the testing was carried on the real rate of inflation in terms of consumer prices in the whole consumer basket.

The quality of correspondence increased after supplementing the above-mentioned correlation with the new variable – the expected rate of inflation in terms of consumer opinions on the development of prices for goods and services over the next 12 months in Slovakia. The nominal wage reacted to consumer inflation expectations with a time lag of four quarters (4Qs), as it did with development of inflation. While consumer inflation expectations for the period $t-4$ Qs represent a subjective estimate of inflation for the period t , made without regard to how accurate they prove to be, it is clear from testing that they serve as a useful auxiliary indicator for explaining wage development. It should also be noted that the strength of consumer expectations has gradually weakened and the strength of real inflation has grown, which may be attributed to stabilization and greater transparency in the inflation environment.

As regards the search for an explanatory variable pertaining to employers, it is again reasonable to ask about the defining period as well as the method of measuring the effectiveness of wage policy. From the field of financial statistical data, testing was carried out on absolute and relative indicators (absolute amount of profit or loss, return on costs, return on sales of own work, return on household sales, coverage of costs with loans, incurred costs to generate income). After statistical and economic verification, only return on costs remained available for consideration as an explanation for wage development, and only since the first quarter of 2001; the quality of cor-

Chart 4 Updated wage dynamics and explanatory variables



respondence has improved since the first quarter of 2003.

The basis data selected for testing are included in Chart 4, which gives an overview of the quarterly development.

From several verified combinations of the different variables and different time lags, we can see which of them best fulfils the simple rules of statistical and economic verification. It is based on the narrower period of 1Q2003 – 3Q2005 and it is expressed as follows:

$$\text{Updated wage dynamics} = f \text{CE}(t-4); \text{CPI}(t-4); R(t),$$

Where:

$\text{CE}(t-4)$ represents consumer inflation expectations with a time lag of four quarters, represented by an annualized index of responses given in monthly surveys to the question "How do you see the prices of goods and services in Slovakia developing over the next 12 months?". Each response is a qualitative evaluation of prices (rising, not changing, or falling) and the index is calculated as a weighted comparison of the positive and negative responses (the index values are positive). The data processed in this way have been available since the first quarter of 2001.

$\text{CPI}(t-4)$ represents inflation in terms of the consumer price index with a time lag of four quarters.

$R(t)$ is the return on costs in the form of the profit or loss as an annualized share of costs in non-financial corporations with 20 or more employees. The data processed in this way has been available since the first quarter of 1996.

With annualization of the financial results, the nominal wage for the current quarter takes into account the real profitability for the other four quarters.

Forecast for nominal wage growth in 2006

The forecast for average annual wage growth in 2006 will represent the sum of the carry-over effect from the previous year (3.3%, as stated above) and the updated wage dynamics in the current year. If we consider the cal-



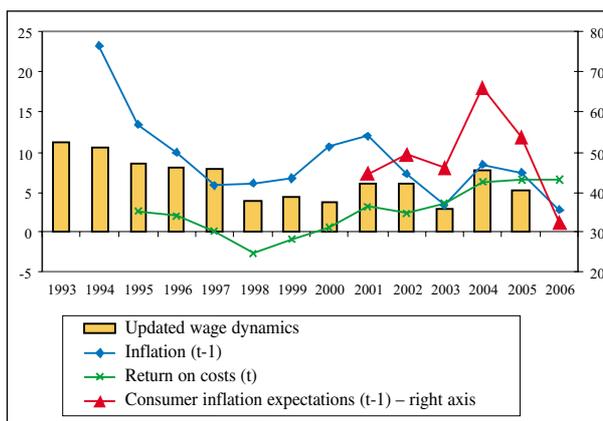
culated model of updated wage dynamics as interpretable in economic terms, then its use for forecasting purposes needs to begin with consideration of how it may be used for making forecasts about the next four quarters. The problem with forecasting is to have sufficiently reliable values of the explanatory variables for the forecast period. In the case of this model, the following are applied to the next four quarters: inflation expectations based on the Consumer Barometer published by the ŠÚ SR and the development of real inflation as measured by the ŠÚ SR.

The missing variable is projected profitability for the next four quarters. With any exclusion of profitability from the described model, and therefore from the process of explaining short-term wage development, we would get results difficult both to interpret economically and to substantiate. Amid the current low-inflation environment (to which consumer inflation expectation have already reacted strongly), the signs are that nominal wage growth in 2006 would be the lowest in the history of the Slovak economy but for the fact this is an election year with a change in the political cycle. In addition, the economy finds itself in a growth phase of the business cycle with rising economic growth, domestic demand, exports and employment, together with improving financial performance. Therefore the typical indicators that have so far sufficed for predicting the nominal wage will not, at least in the short-term, be considered sufficiently accurate to explain the development of updated wage dynamics and the overall nominal wage. As the chart shows, the combination of low inflation in 2005 and the substantial reduction in consumer inflation expectations provide almost no, or at least very little, scope for the growth of updated wage dynamics in 2006.

Some well-founded scope for future growth in updated wage dynamics may lie in the improving financial performance of corporate entities, even while the graph shows return on costs for 2006 to be unchanged from the previous year. The charting of expected profitability in 2006 represents a conservative estimate compared with the statistically more credible approach of surveying profitability projections. These projections are obtainable using either a trend development model or the precisely-defined interim results from cyclical surveys conducted in the construction industry; in an extreme case, profitability may be replaced with GDP growth with GDP being among the most frequently predicted indicators.

Each of these three approaches to projecting profitability indicates a higher level compared with the selected conservative approach (indeed the highest level according to the available time series), and this should be taken into consideration when giving an economic interpretation of the ultimate wage growth mentioned below. If we incorporate into the model of updated wage dynamics the con-

Chart 5 Development of updated wage dynamics and their explanatory variables



servative projection of profitability, real inflation, and the recorded consumer inflation expectations with the respective time lag, the result will be quarterly projections that represent an annual average of 4.9 percentage points (5.3 percentage points in the previous year). Based on the composite model for the nominal wage, and after factoring in the carry-over effect from the previous year, the nominal wage in 2006 may be expected to grow by 8.2%.

Table 2 Forecast for average annual pace of wage growth in 2006

Functional form of the model for updated wage dynamics	Carry-over effect in %	Updated wage dynamics in percentage points	Pace of wage growth in %
$f(CE(t-4); CPI(t-4); R(t))$	3.3	4.9	8.2

The mentioned additive approach to the projection for nominal wage growth may also be applied to the remuneration of employees within the income approach to the calculation of GDP. It is a suitable instrument not only for forecasting but also for analysing wage development.

In terms of the national economy, predictions for wage development represent an important basis for decisions on the setting of monetary policy and they are also among the main fiscal assumptions upon which the income components of public budgets are set. From the microeconomic view, the level and pace of wage growth is a basic factor in the living standard of the population. The viewpoints stated here set out the role of correct predictions in the economy's wage development.

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