Income Distribution: An Important Factor for Economic Forecasts

by Ferdinand Fichtner, Simon Junker, and Carsten Schwäbe

The development of private consumption is a crucial factor in compiling macroeconomic projections as part of national accounts. Household savings also play an important role as an explanatory variable for consumer development, since private households must decide whether to spend their incomes on consumption or saving. The estimated savings rate in DIW Berlin's economic projections can be improved by including micro-data from the German Socio-Economic Panel Study (SOEP). It is evident that the significant increase in the savings rate in the years before the crisis in 2008/2009 is also related to the redistribution of income. While relatively low earners receive their income overwhelmingly from wages or social welfare benefits, wealthy households not only receive higher wages, but also earn the bulk of their money from entrepreneurial activities and income from investments. Particularly in the years before the financial crisis, the latter increased dramatically while wages remained virtually static. Strong income growth has therefore primarily benefited those segments of the population that save a lot. If wage and profit incomes had developed similarly, consumer demand in Germany would have grown faster. In the next two years, however, a further increase in the savings rate is unlikely because of rapidly rising wages.

This report presents a method developed at DIW Berlin which takes into account information from the German Socio-Economic Panel Study (SOEP) on the distribution of income in estimating the aggregate savings rate and also in DIW Berlin's economic projections.[1] This makes it possible to significantly improve the accuracy and, in particular, the consistency of the estimated savings rate with other variables in the projections.

DIW Berlin's quarterly economic projection[2] contains a detailed quantitative and qualitative forecast of economic developments in Germany based on a comprehensive analysis of the current economic situation. The quantitative projection is compiled based on National Income Accounting (NIA), which focusses on circular flows, and among other things, distribution across income categories, the use of gross domestic product, and for its formation to be determined and systematized.[3] Gross domestic product can be represented using various expenditure components (consumer spending, gross investments, and net exports) or various income types (compensation of employees, company revenue, investment income, and others) for the NIA. However, the NIA contains no information about the individual distribution of income; this would require data at the household level.

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1 The SOEP is a wide-ranging representative longitudinal study of private households which has been conducted annually in western Germany since 1984 and in the former German Democratic Republic (GDR) since 1990. See G. G. Wagner, J. Göbel, P. Krause, R. Pischner, and I. Sieber, „Das Sozio-oekonomische Panel (SOEP): Multidisziplinäres Haushaltspanel und Kohortenstudie für Deutschland—Eine Einführung (für neue Datennutzer) mit einem Ausblick (für erfahrene Anwender)," AStA Wirtschafts- und Sozialstatistisches Archiv, no. 2 (2008).

2 DIW economic projections („baselines") generally appear in the first week of each quarter in the Wochenbericht des DIW Berlin, see F. Fichtner et al., „Deutsche Wirtschaft vor kräftigem Aufschwung," Wochenbericht des DIW Berlin, nos. 14+15(2012).

3 For more details about the NIA, see, for example, the Federal Statistical Office, Volkswirtschaftliche Gesamtrechnungen: Wichtige Zusammenhänge im Überblick, 2011, www.destatis.de/DE/Methoden/Methodenpapiere/Methodenpapiere.html?nn=69170.

In addition to the quantitative accuracy—as compared to the growth rate of gross domestic product published retrospectively—internal consistency is the projection's core and quality criterion. There are well-founded theoretical and empirical relations between the different variables recorded in the NIA: a typical example is the strong correlation between investment and import expenditure (as a large proportion of imports are made up of intermediate goods, which are consecutively used for investments) or an inverse relationship between labor productivity and unit labor costs (since rising productivity reduces labor costs for a given output quantity).

Private consumer spending, a difficult variable to predict, plays an important role in determining demand-side gross domestic product due to its size (almost 60 percent of nominal gross domestic product).[4] Trust and confidence indicators can be consulted as explanatory variables for private consumption, but the correlation is not usually very strong. It is more informative to determine consumer spending based on income growth. While increased income typically leads to increased consumer spending, it should be noted that many factors may influence household savings and, consequently, private consumption.

Therefore, although the average disposable incomes of private households increased in the NIA at an average rate of 2.1 percent between 2001 and 2008, private consumption in the same period only grew by an annual average of 1.8 percent. Accordingly, aggregate savings—and thus the savings rate—have increased significantly in Germany over the last decade.

At the same time, it should also be noted that the increase in disposable income was largely based on strong growth in income from self-employment and investments, while aggregate wage income, in particular from 2002, was so weak that at times it was lower than inflation. In real terms, wage income sometimes decreased while profit income recorded strong growth (see Figure 1).

It is often assumed there is a close link between the increase in the savings rate, on the one hand, and the relative development of various income types, on the other. However, this correlation is seldom quantified.[5] While it can be observed that self-employment and investment income (profit income) mainly flow towards higher-in-

Figure 1

Income in the System of National Accounts[1]
Index 1999 = 100
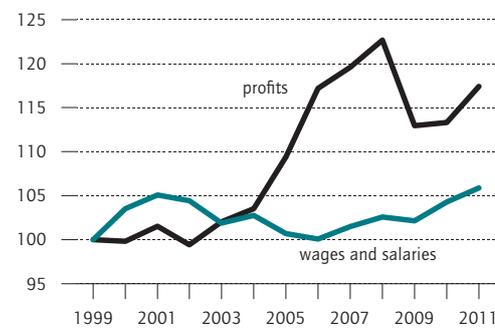
1 Adjusted for the consumer spending deflator.
Source: Federal Statistical Office, calculations by DIW Berlin.

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Since the turn of the century, profit income has risen sharply.

come population strata, wage income is more evenly distributed across all income groups. This is indicated in micro-data from the German Socio-Economic Panel Study (SOEP). On average between 1995 and 2010, private households with the lowest 95 percent of household income received almost 86 percent of wage income, but only received 55 percent of profit income (see Figure 2). Conversely, 14 percent of wage income went into the pockets of the top five percent of households, but 45 percent of profit income.

At the same time, SOEP's data indicate that the greater the income of the population group being considered, the higher the savings rate becomes. Consequently, according to the micro-data, the average savings rate of the top five percent of households is more than 17 percent, whereas for the entire population it is just under 11 percent on average.

Therefore, a sharp increase in profit income typically goes to those sections of the population that save disproportionately more. The modeling and projection developed at DIW Berlin and presented here transfers the correlations observed in SOEP's micro-data into the macroeconomic data of the system of national accounts, thus allowing household-related distribution information from SOEP to be used in DIW Berlin's economic projection.

Specifically, a correlation between household incomes and their specific savings rates can be derived from the micro-data. The development of the aggregate savings rate can be determined on the basis of macro projec-

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4 See consumption projections, such as C. Dreger and K. Kholodilin, „Verbraucherumfragen für Konsumprognosen besser nutzen," Wochenbericht des DIW Berlin, no. 28(2011).

5 See K. Brenke, „Einkommensumverteilung schwächt privaten Verbrauch," Wochenbericht des DIW Berlin, no. 8(2011); or E. Klär and J. Slacalek, „Entwicklung der Sparquote in Deutschland–Hindernis für die Erholung der Konsumnachfrage," Wochenbericht des DIW Berlin, no. 40(2006).

Figure 2

Distribution of Wage and Profit Incomes and Savings Rates by Income Groups
Average value[1] in percent
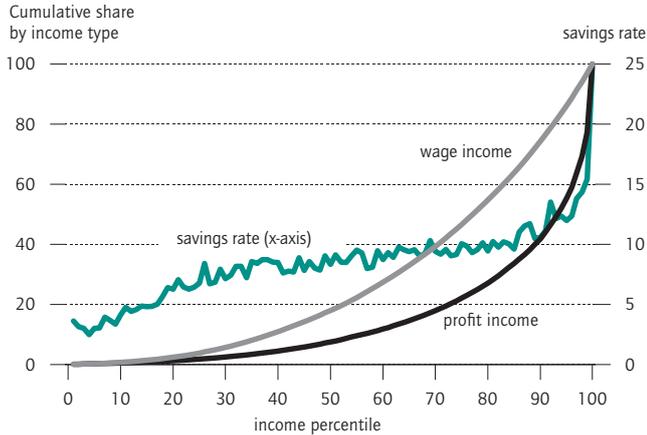
1 Income from 1995 to 2010; savings ratio 2002-2009.
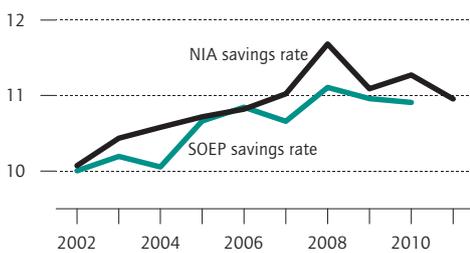Source: SOEP v27, calculations by DIW Berlin.

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Profit incomes benefit higher-earning and stronger-saving income groups more significantly than wage incomes.

Figure 3

Savings Rates According to SOEP and NIA
In percent

Sources: Federal Statistical Office; SOEP v27, calculations by DIW Berlin.

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The savings rates evolve in parallel, but in some years there are very significant differences.

tions for the various income types (such as net wages and salaries or self-employment and investment income) in the NIA. Thus, the use of micro-data helps to predict the savings rate in DIW Berlin's macroeconomic projections consistent with the development of the various macroeconomic income types and can make an important contribution to outlining the development of consumer demand.

Modeling the Savings Rate with Micro-Data

In linking the SOEP's micro-data with the NIA's macro-data, it is important to note that there are generally no equivalent figures in the SOEP's household surveys for the variables defined in the NIA. Rather, a variety of SOEP variables are typically aggregated so they approximately match their coutnerparts in the NIA.

Sometimes, however, a complete match is not always possible. As a result, the savings rate derived from the SOEP's micro-data does not always coincide with the savings rate resulting from the NIA (see Figure 3).[6] The reason for this is primarily that the SOEP survey explicitly asks for the amount that the respective household has "left over" for savings at the end of the month.[7] In addition to measurement inaccuracies in the responses, the question makes it impossible for the savings amounts in the SOEP to be negative. Dissaving, that is to say, spending from previously accumulated wealth which results in a lower average savings rate, is not accounted for in the SOEP, unlike in the NIA. Conversely, in the NIA, the repayment of loans is included as savings whereas the values specified by the SOEP do not take account of such transactions.

Given the sometimes significant differences between micro and macro level, a projection method based solely on micro-data is not sufficient: as there is no direct correlation between the micro- and macro-data, the gap must be bridged with a suitable procedure.

The method presented here is based on correlations observed at the micro-data level in the SOEP remaining relatively stable over time. Thus, for example, the distribution of the various income types over time remains essentially unchanged; the share of profit income, for instance, assembled by the top five percent of households has, in recent years, remained at between 45 and 50 percent. The shares and rates observed in the micro-data can thus simply be transferred to the macro-data and hence to the projection.

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6 See also U. Stein, „Zur Entwicklung der Sparquoten der privaten Haushalte—Eine Auswertung der Haushaltsdaten des SOEP," SOEPpapers, no. 249 (2009).

7 The question was: „Do you usually have an amount of money left over at the end of the month that you can save for larger purchases, emergency expenses or to build up savings? If yes, how much?"

Box

Income Distribution and Savings Rate: a Model Based on Micro-Data

The model developed here establishes a correlation between the savings rate and the proportion of income of an income group. It illustrates that if an income group's share of the economy's total income increases, this leads to an increase in the savings rate for that income group. As a result, changes in income distribution can be used to estimate consistent changes in the savings rate.

The method is based on a model which relates a group's savings rate to its income share, where the latter is expressed in logarithmic terms. To reflect the extreme saving behavior observed in the data for the lowest and highest income groups, the first, second, and third power of the log-income share is used; thus the model captures the fact that in the lowest income percentiles, the savings rate is disproportionately low, while it is exceptionally high in the upper income percentiles (see Figure for an example of data from 2005).

The applied model (pooled regression) is outlined as follows:

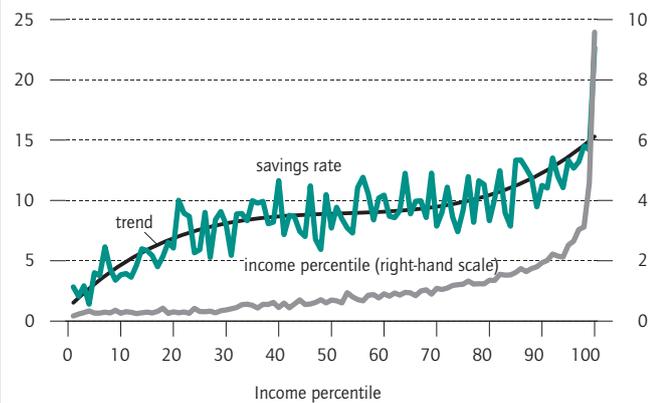$$s_t^i = c + \alpha_1 \log(y_t^i) + \alpha_2 \left(\log(y_t^i)\right)^2 + \alpha_3 \left(\log(y_t^i)\right)^3 + \epsilon_t^i,$$

where t is the period (year), i is the income group, s is the savings rate, and y is the respective income group's share of overall economic income.

The fit of the model is adequate with an R^2 of 0.76. The residuals show only a small bias for the groups, and in particular for time.

Figure

Savings Rate and Income Distribution in 2005
In percent

Source: SOEP v27, calculations by DIW Berlin.

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This intertemporal stability also solves the problem that the SOEP data are subject to a time delay due to their survey mode and are only available as annual data. As a result, the data differ from the quarterly NIA data in terms of frequency, and, in principle, arrive too late for typical forecasting purposes. But since the method presented here is only based on relatively stable correlations in the micro-data over time, distribution information contained in the SOEP can be extrapolated simply by averaging over the projection period and be applied at quarterly frequency.

To analyze decisions made about savings based on data from the SOEP,[8] the households surveyed are initially divided into 100 groups (percentiles) according to their total net income.[9] Time series for the average savings rate and the ratio of the respective group to total disposable income are calculated for each income group based on information given in the SOEP about household savings. Using these data, a model can be estimated which shows the (SOEP) savings rate as a function of relative income (see box). In addition, there is SOEP data available to determine a time series for the proportion of individually sampled income types (wage income, self-employment and investment income, transfer income) to total household income in each group. This information is needed for a correlation with the macro-data contained in the system of national accounts.

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8 Data was used from version 27 of the SOEP (doi:10.5684/soep.v27).

9 Net household income from the previous year's SOEP survey is used here.

Figure 4

Comparison of Different Estimates for the Savings Rate
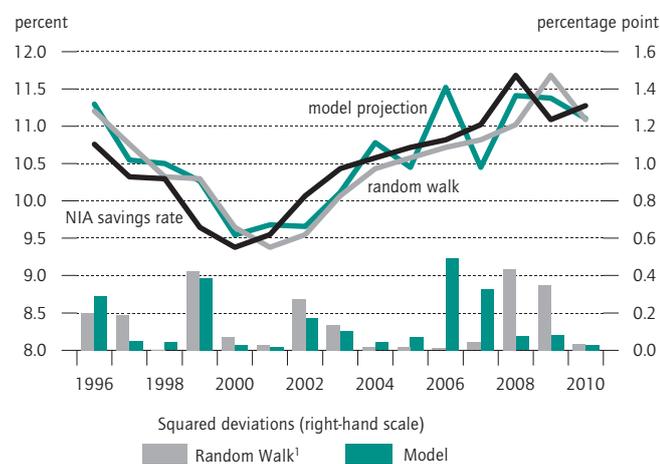
1 The savings rate is consistent compared to the previous year.

Source: Federal Statistical Office; SOEP v27, calculations by DIW Berlin.

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The model reflects the progress of the savings rate much better than simply transferring the value from the previous year (random walk).

Based on rates derived from the SOEP, aggregate income figures from the NIA can be broken down into different income groups.[10] This method ensures that the various NIA income types observed at the macro level and specified as part of DIW Berlin's projection—such as net wages and salaries (wage income) or operating surpluses, income from self-employment and investments (profit income)—benefit different income groups to varying degrees. As a result, profit income, as described above, contributes disproportionately more to higher incomes, while incomes in the lower- or middle-income bracket contain little profit income, but primarily consist of wage and transfer income.

By adding the various income components together, we obtain the total disposable income for each income group. This ensures a correlation is made between the development of projected (NIA) income types and the development of the income of the various income percentiles. The result is a distribution projection consistent with historical micro-data and the macroeconomic projection.

Accumulated savings consistent with the distribution projection, in the context of the NIA, can then be determined with the aid of the estimated model for the income-based savings rate. Figure 4 compares the savings rate predicted by the model with actual values from the system of national accounts. The model projection dominates an uninformed random walk, that is, performs substantially better than assuming that the saving rate remains constant. In particular, the sharp increases in the savings rate between 2000 and 2006 are correctly modeled from the development of various income types. Accordingly, the squared deviations between the model estimates and the actual NIA values are, especially in this phase, significantly lower than for the random walk forecasts, which assumes that the saving rate remains at its previous level. The most obvious exceptions are the estimates for 2006 and 2007 which significantly deviate from the actual figures. The model draws on an exceptionally strong increase in investment income in 2006 and relatively weak development in 2007. The impact of this redistribution on the savings rate is obviously overestimated by the model. Nevertheless, the model is certainly suitable for correctly predicting changes in trends in the savings rate and can therefore make an important contribution to the accuracy and consistency of the projection.

Recent Developments in the Savings Rate: Has There Been a Trend Reversal?

In both this year and next, the disposable income of households is expected to increase significantly by 3.2 and 3.4 percent, respectively. This rise is more than one percentage point above the average in the pre-crisis years from 2001 to 2008.[11] Net wages are expected to increase at roughly the same rate as the overall average—unlike between 2001 and 2008, when they remained on average about 0.8 percentage points per year behind the increase in disposable income. In contrast, profit income increased rapidly during the same period. Between 2001 and 2008, it increased by one-third, whereas net wages and salaries rose by a total of only 7.5 percent; and this meager wage increase took place almost exclusively in the last two pre-crisis years 2007 and 2008, previously wages had largely stagnated (see Figure 5). In 2012 and 2013, profit income will increase more than wages, but the difference in growth between the two is not likely to be as significant as it was previously.

The recipients of wage income are now benefiting more than in the pre-crisis years from economic growth in

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10 The rates are sufficiently stable over time. An average value over the last five years is then used to continue the sequence until the end of the projection period.

11 See current projection by DIW Berlin: Fichtner, Junker, et al. (2012).

Germany. There is a greater proportion of income growth for a wider segment of the population: according to the SOEP, the lower 90 percent of households account for almost three-quarters of total wage income, while they do not have even close to half the profit income. Since the development of wages is no longer so far behind that of profit income, the income shift that has been continued for years in favor of the top ten percent (and particularly the top five percent) of households is expected to slow, if not come to a gradual standstill (see Figure 6).

The procedure outlined here confirms that, considering the projected development of the various income types, the savings rate is not expected to increase further. Certainly, the downward pressure on the savings rate resulting from the similar courses of wage and profit income is superimposed by other effects not part of the model presented here. Consequently, households' uncertainty caused by the crisis in the euro zone continues to lead to a somewhat increased accumulation of savings (precautionary saving). Accordingly, the latest projection by DIW Berlin assumes there will be no significant decline in the savings rate.

Counterfactual Development of the Savings Rate

As outlined above, the observable income shift in favor of high earners in recent years—and an aggregate increase in the savings rate—has been largely driven by strong profit growth. The following section examines what the savings rate would have been if all income types had risen at the same rate as disposable income, that is, if there had not been an observed redistribution in favor of profit income in the last decade. Specifically, this means assuming less significant increases in profit income and higher growth rates in salary income.

The disproportionately high income among high-income earners is curbed significantly by the uniform development of income assumed in this scenario. Although a redistribution continues to take place, high earners achieve above-average increases in income even though these increases are evenly distributed across the income types. Hence, they record the highest growths in salary income and therefore still have a relative improvement in their income situation despite the more even developments across income types. Compared to reality, profit income in fact increases less significantly and wage income also increases more for the lower income peers, so that relative income growth at the top is less pronounced. Consequently, the savings propensity of high-income earners increases significantly less

Figure 5

Wage and Profit Incomes
Index 2001=100
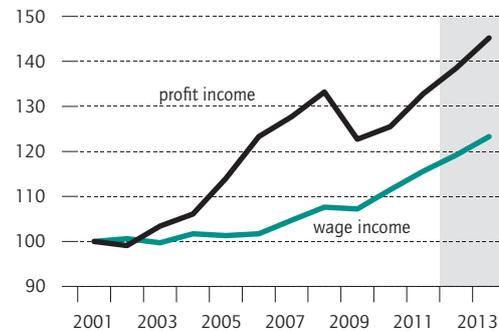
Source: Federal Statistical Office, calculations by DIW Berlin.

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In 2012 and 2013, wages increased almost as much as profit income. This was not the case before the crisis.

Figure 6

Share of Total Income for the Lowest 95 Percent of Income Earners

In percent

Source: Federal Statistical Office; SOEP v27, calculations by DIW Berlin.
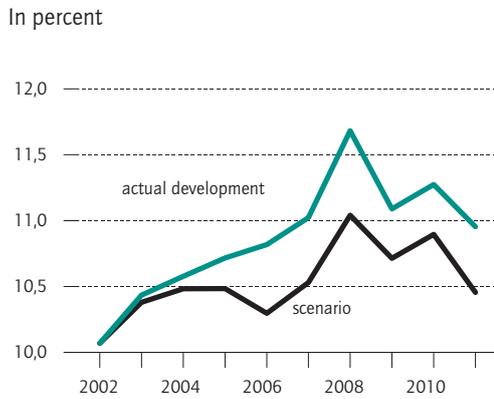
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The shift in income at the expense of lower-income earners decreases significantly.

than has been observed in recent years. Moreover, the assumed development here benefits the lower and middle-income groups who tend to have a lower savings rate.

Both effects cause the savings rate in this scenario to increase significantly less. However, it is still increasing because high-income groups—due to the high proportion of profit income they receive—still participate dispro-

Figure 7

The Savings Rate with an Actual and Uniform Development of Income Types

In percent

Sources: Federal Statistical Office; SOEP v27, calculations by DIW Berlin.

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With a steady increase in wage and profit incomes, the rise in the actual savings rate is much lower than the rate observed.

portionately more and, in addition, there are more incentives to save because of changes in the law intended to promote private pensions. But with all income types developing uniformly, lower-income earners are no longer falling so far behind. The counterfactual aggregate savings rate shown in the following moves at a significantly lower level than the actual rate (see Figure 7). At its peak, the two rates differ by as much as 0.64 percentage points. This would have meant additional spending of up to ten billion euros each year, or about fifty billion euros in additional spending between 2002 and 2011.

Conclusion

This analysis has shown how macroeconomic forecasts can benefit from including microeconomic data. The use of personal or household-related distribution information, such as the micro-data contained in the German Socio-Economic Panel Study, may, for example, be useful in explaining the savings rate—and, indirectly, in explaining consumer demand as a core component of gross domestic product.

The micro-data used allow us to quantify the effects strong growth in profit income tends to have on the average savings rate due to the associated growth in income, particularly in the high-income group. This report presents a methodology developed by DIW Berlin

that enables this information to be transferred to the macro-data of the system of national accounts and, as a result, can ensure projections of increased consistency and accuracy.

Application of the method shows that the disparity of income distribution increased in the pre-crisis years and was actually coupled to a more pronounced propensity to save and thus weaker consumer demand, in contrast to a counterfactual situation where income had been distributed more evenly. Since wage income hardly increased before the crisis in 2008/2009, and profit income skyrocketed, it has been mainly recipients of the latter form of income that have benefited from economic growth. It is mainly the wealthiest households that save a large proportion of their income. A more even development of wage and profit incomes would have freed up additional spending of up to ten billion euros a year and formed a broader foundation for growth in Germany.

Over the next two years, strong wage growth is expected to benefit middle-income earners more markedly than in the pre-crisis years. As a result, this slows the current upward trend in savings behavior: the savings rate will probably remain at the same level as last year which, along with substantial growth in wages, will stimulate private spending.

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