

Péter Benczúr, Gábor Kátay, Áron Kiss, Balázs Reizer and Mihály Szoboszlai: Analysis of changes in the tax and transfer system with a behavioural microsimulation model*

In this study, using a new microsimulation model, we estimate the long-term fiscal and labour market effects of the changes to the tax and transfer system which were passed into law in 2010 and which are currently planned. According to our results, if all of the currently planned measures are fully implemented, the level of GDP will be increased by over 5% over the long run, while employment will increase by about 1.5% (approx. 60,000 individuals). The estimated increase in employment is due exclusively to planned cuts in transfers. While changes to personal income tax may improve the incentives of high-income earners and thus have a stimulating effect on the economy, their effect on employment is negative due to the phasing out of the wage tax credit. These projections may change significantly if market perception of Hungary's economic risk deteriorates. In such a case, an increase in the required return on capital may completely offset the stimulating effect of tax and transfer changes. The measures analysed also produce a substantial distributional effect. Changes to welfare benefits, as well as tax modifications, impose a burden primarily on low income households, while households with higher income generally benefit from the changes. Overall, income concentration rises from a level similar to that of Denmark or Austria to the level of Germany or Estonia, approximating the EU average.

INTRODUCTION

In this study we estimate, with the help of a new microsimulation model, the long-term fiscal and labour market effects of changes to the tax and transfer system which were passed into law in 2010 and which are currently planned.

Microsimulation models assess the individual effects of tax and transfer changes, and then calculate the estimated macroeconomic effects by adding up these individual effects. The advantage of microsimulation over macroeconomic methods is its capability to take differences between individual households into account: different groups are affected differently by tax and transfer changes, while the reaction of households to changes may also vary across groups.

Prior to this study, microsimulation methods have been applied in Hungary at the Ministry of Finance (Benedek and

Lelkes, 2005; Benedek, Elek and Szabó, 2009), the research institute Ecostat (Cserháti et al., 2007, 2009; Belyó, 2009) and the Office of the Fiscal Council (Benedek and Kiss, 2011). Earlier studies predominantly followed a static approach, i.e. they did not take into account changes in the behaviour of economic agents¹ or general-equilibrium effects that may result from them. Building on new empirical estimations (Kiss and Mosberger, 2011; Benczúr, Kátay, Kiss and Rácz, 2011), the microsimulation model described here takes these effects into account.

According to our results, the implemented and planned changes to the personal income tax (PIT) system improve the incentives of high-income earners to increase their work intensity or hours worked, and thus have a stimulating effect on the economy; however, they negatively affect employment if the wage tax credit is phased out completely. Looking at the planned PIT-related measures separately, the complete phase-out of the "super gross" calculation of taxable income (equivalent to a decrease in the effective

* The views expressed in this article are those of the author(s) and do not necessarily reflect the official view of the Magyar Nemzeti Bank.

¹ The tax simulation model described by Benedek and Kiss (2010) applied adjustment along the intensive margin, but not along the extensive margin.

tax rate from around 21% to 16%) is estimated to cause an increase in long-term employment by 0.8%, while the planned increase in the health insurance contribution is estimated to decrease employment by another 0.3% approximately. Planned cuts in unemployment and disability benefits may increase employment by one percent each.

Overall, the results confirm that dynamic effects reduce the fiscal cost of stimulative measures over the long-term. However, we note that prudent fiscal planning must always be based on a conservative estimate of dynamic effects.² In our model simulations, we found that a cut in capital taxes significantly increases domestic capital stock, output and the disposable income of taxpayers, but fails to substantially affect employment. The significant adjustment in capital stock is a natural consequence of our focus on long-term effects in a small, open economy. The flexible adjustment of capital, however, also means that a possible increase of policy uncertainty perceived by economic agents may diminish the performance of the economy, due to an increase in the required returns on capital investments in Hungary.

With respect to distributional effects, the implemented and planned changes to the tax system (planned changes include the complete abolishment of super-grossing and the wage tax credit, as well as an increase in contributions) increase the disposable income of households overall, with most of the gains accruing in the highest quintile of households. At the same time, the planned abolishment of the wage tax credit results in major losses for lower- and middle-income households. Many lower income households will incur substantial losses from the cuts in disability and unemployment benefits.

Our analysis does not take into account the effects of possible compensation measures. If policy makers choose to provide compensation *within* the tax system to those who will be negatively affected by the tax changes, the resulting tax system will differ from the tax system analysed in this study. Alternatively, if policy makers choose to provide

compensation by means of an increased minimum wage or by quasi-mandated wage increases in the private sector, these measures may have an adverse effect on employment in a way that our analysis could not take into account.

The rest of this study first describes the principles of the model, then the results. The description of the results begins with the redistribution effects, and then turns to the labour market and fiscal effects that constitute the primary focus of the study. A brief summary concludes the paper.

THE MODEL

Analysis was conducted using the microsimulation model of Benczúr, Kátay and Kiss (2011), which is based on the 2008 Household Budget Survey (HBS) of the CSO (Central Statistical Office).³ The HBS contains detailed information on the composition of households (number of wage-earners, pensioners, dependent children, etc.) and the income of individuals, enabling us to examine the effect of a wide variety of changes in the tax and transfer system on the incomes of individuals and households.

The HBS is based on a representative sample of Hungarian households, but due to its objectives and methodology, it does not provide a completely accurate picture of income distribution (particularly of households from the lowest and highest income groups). For this reason, our calculations begin with an income adjustment to the upper segment of the distribution, in order to ensure that the income distribution in our database is as close as possible to the administrative data of the tax authority.⁴

The model focuses on changes in labour supply (i.e. on the question of how individuals adjust labour supply decisions following a change in economic policy). This individual behavioural response has two possibilities: response along the *intensive margin* and response along the *extensive margin*. A response along the intensive margin occurs when an individual works more or with greater intensity in reaction to a tax cut, and therefore generates more income

² In one respect our calculations almost surely overestimate the indirect fiscal effect. Since our model concentrates on the labour market decisions of individuals, and does not model their consumption-savings decision, it equates disposable income and consumption. This is reasonable in the “very long run”, and it is a good approximation of the behaviour of lower income households even in the short run, but it certainly overestimates the consumption effect of the increase of net incomes at the top of the income distribution. Therefore, for a prudent short and medium-term fiscal estimation it is advisable not to calculate with the full VAT effect in the tables presented below.

³ This was the most recent available data set at the time of the analysis. The advantage of the 2008 data over the subsequently accessible 2009 data set is that they show the Hungarian economy in an almost equilibrium position, as opposed to a severe crisis. This is in accordance with the methodology of the analysis, as the estimated effects reflect an “equilibrium-to-equilibrium” effect of the measures.

⁴ Income adjustment observed in household data has a result similar to the multiple matching of tax return data to survey data (this procedure is applied, for example, by Benedek and Kiss, 2011). Income adjustment is an adequate method to improve the accuracy of simulation results, but it is an incorrect procedure if the researcher uses household data to estimate economic correlations. Thus, in the same publication, Hosszú (2011) does not apply income adjustment to HBS data.

(or vice versa, generates less income in reaction to a tax increase).⁵ A response along the *extensive margin* occurs when an individual decides to enter the labour market or, on the contrary, leaves the labour market following a change in incentives. The latter type of adjustment is more relevant for low-income groups, while adjustment along the intensive margin is more relevant for the higher-income segment. We simulate these behavioural responses based on available estimates of individual Hungarian data: the intensive margin is based on the estimations of Bakos, Benczúr and Benedek (2008) and Kiss and Mosberger (2011), while the estimation of Benczúr, Kátay, Kiss and Rácz (2011) is used for the extensive margin.

Importantly, the model also takes into account the general-equilibrium macroeconomic effects of tax and transfer changes. This is achieved by embedding the microsimulation model within a parsimonious macroeconomic model. By summarising the behavioural effects of individuals calculated in microsimulation, we first calculate the aggregate change in effective labour supply, then use this labour supply shock as an input to the macro model in order to evaluate how wages, capital stock and output are adjusted. Based on the results of the macroeconomic model, we recalculate the labour market adjustment of individuals and its aggregate macroeconomic effect. This procedure is repeated until all indirect effects are integrated in the results (that is, until the system results in equilibrium).

The macroeconomic model is a parsimonious model of a small, open economy: capital adjusts elastically on the international capital market, where the equilibrium interest rate reflects the international rate of return on capital and equilibrium wages (per productivity unit) reflect the marginal product of labour. This means that the dynamic results of the model measure long-term effects, where “long-term” means sufficient time for adjustment of capital stock to have taken place. This time frame may range between five to ten years, depending on the size of the shock and the general economic environment.

How does the macro-economy adjust to an increase in labour supply (as the result of adjustment on the intensive or the extensive margin)? With unchanged labour demand, the wage level initially decreases. This increases the marginal product of capital, resulting in capital inflow. In a small, open economy, capital supply reacts quite elastically to changes in yields in the long term. The rise in capital stock increases the marginal product of labour and helps wages return near to their original level, while the return

on capital falls back to near its original level (i.e. to the yield determined and required on the international market, adjusted for country-specific economic risk).

Embedding the microsimulation model into a macro model makes it possible to analyse the effects of economic policy changes that do not directly affect the tax burden of labour. A corporate tax cut, for example, increases the return on capital employed in Hungary, resulting in a capital inflow through the elastic international capital supply. In turn, this increases labour productivity and thereby wages. The increase in wages, however, leads to a rise in labour supply. Capital and labour supply continue to adjust until wages and return on capital reach a new equilibrium near the original levels.

When interpreting results, one must keep in mind the inherent simplifications of the macro model. In particular, it is assumed that an increased labour supply can be completely absorbed by labour demand in the long term – irrespective of the skill composition and level of productivity. In other words, an increased rate of activity translates into increased employment. This may be an overly optimistic premise for two reasons. First, as a result of labour market frictions and skill mismatches, demand might not exist for job-seekers with certain skills and qualifications. Secondly, certain government measures (e.g. an increase in minimum wage, mandatory wage increases) might hinder the decline in wages needed to drive labour demand to absorb a growing labour supply.

STATIC DISTRIBUTIONAL EFFECTS

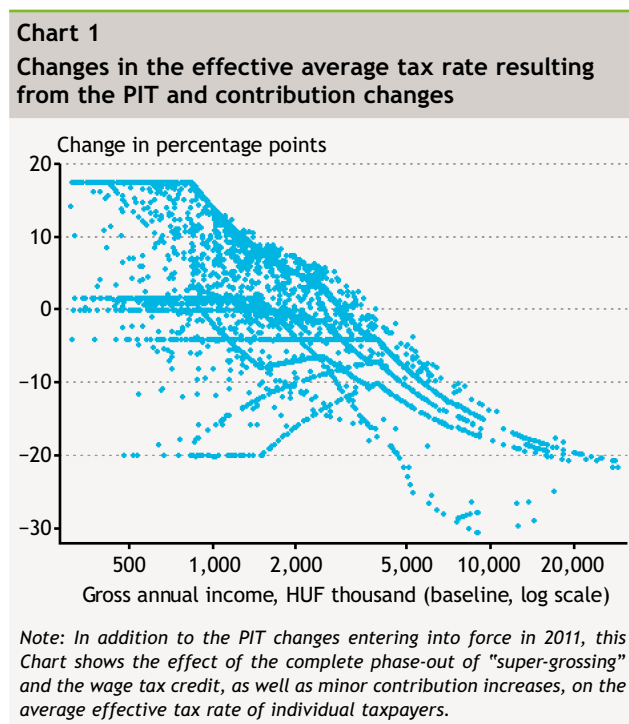
Before we turn to the analysis of long-term fiscal and labour supply effects, we briefly describe the distributional effect of the analysed policy packages. The distributional effects shown in this section are static in the sense that they do not take into account the behavioural responses of economic agents, only the direct effect of tax and transfer changes on net income. Our aim is to objectively show distributional effects and not to make value judgements. In a democracy, the legislative branch has the power and responsibility to choose the values that guide tax and transfer policy (specifically, to strike a balance between the competing values of economic policy: efficiency and equity). Besides informing the policy-making process, the analysis of distributional effects offers a good point of departure for the discussion of labour market effects, as it shows which specific changes are causing responses in individuals’ labour supply decisions.

⁵ Adjustment along the intensive margin may partially contain the legalization of some activities formerly conducted in the shadow economy (or, as it is referred to in Hungarian, the “whitening” of the economy). This legalization process also improves the position of the budget, but it does not constitute a real growth of the economy.

Chart 1 shows how taxpayers' average effective tax rate (AETR is defined as the sum of total deductions divided by gross wage income) changes as a result of the changes to the PIT and social security contributions (SSC) (a complete phase-out of the super gross calculation of the tax base and the wage tax credit, and a one percentage point increase in employee contributions, above and beyond the one-half percentage point increase which entered into effect in 2011). Here, as in most exercises below, the benchmark is 2010. Each point in the Chart corresponds to a taxpayer in the database. The logarithm of individual gross yearly income, prior to the tax changes, is shown on the horizontal axis (thus, the table is biased in a way that the distance between an individual earning HUF 500 thousand annually from an individual earning HUF 5 million is equal to the distance between the latter and an individual earning HUF 50 million.). The change of AETR (which also takes into account SSC) is shown in percentage points on the vertical axis.

Groups of "typical" taxpayers (those with wage income only or entrepreneurial income only, etc.), create almost connected lines; parallel lines of taxpayers differ in the number of children. "Non-typical" taxpayers (those who earn multiple types of income) create point clouds between the lines of "typical" taxpayers.

The right side of the chart shows that abolishing the upper tax rate in 2011 results in a dramatic decrease of 10-20



percentage points in the AETR of individuals earning over HUF 4 million annually. There is significant heterogeneity among taxpayers below that income level. Taxpayers who were tax-exempt due to the wage tax credit until 2010 (with earned income of about HUF 1 million or less) see their average tax rate increase by 17.5% (the new statutory tax rate of 16% and a 1.5% increase in SSC). Between HUF 1 million and HUF 4 million, taxpayers with only wage income who benefitted from the wage tax credit form a continuous curve. Since the effect of tax credits diminished with income, their loss also declines with income, and turns into a gain where the upper tax rate was applicable in 2010 at a gross income of about HUF 4 million (or HUF 5 million in super-grossing).

The effective tax burden of many lower income taxpayers grows only by the rate of the contribution increase. They were exempted from the PIT by the wage tax credit until 2010 and they are exempted by the increased child tax credit after 2012. The taxpayers whose tax burden does not change are ones that received only pension income or income from child care aid (gyes) in 2010. Between those who lose the maximal amount of the wage tax credit and those who see no changes in their tax rate are taxpayers who were, before the change, eligible for a partial wage tax credit; these taxpayers have both wage-type income and independent income.

At the same time, the average tax rate of a considerable number of taxpayers earning between HUF 1 million and HUF 4 million decreases by approximately four percentage points. These taxpayers were not entitled to tax credits in the past, as their income originates from entrepreneurial (independent) income and not wages. They benefit from the cut in the statutory tax rate, losing only part of the gain in increased contributions. Finally, even with income of about HUF 1 million, the average tax rate substantially decreases for those who are entitled to the expanded family tax benefit, but were not entitled to the wage tax credit in the past.

Table 1 analyses changes in the tax system in a different way (the effects on household income are shown, rather than the individual income shown in Chart 1). The set of measures analysed is the same: in addition to the PIT rules coming into force in 2011, it contains the complete phase-out of super-grossing and the wage tax credit as well as the one and one-half percentage point increase in contributions. The table shows distribution effects in a breakdown of five income groups, or quintiles. Households are divided into five groups of equal number, based on

		Worse off	Neutral	Better off
Quintile 1	Individuals affected (thousand)	1,464	561	542
	Change in annual hhold income (HUF thousand)	-65	-	99
	Change in annual hhold income (%)	-3.9%	-	4.8%
Quintile 2	Individuals affected (thousand)	1,020	492	578
	Change in annual hhold income (HUF thousand)	-132	-	166
	Change in annual hhold income (%)	-5.6%	-	5.2%
Quintile 3	Individuals affected (thousand)	795	526	484
	Change in annual hhold income (HUF thousand)	-173	-	223
	Change in annual hhold income (%)	-6.1%	-	6.0%
Quintile 4	Individuals affected (thousand)	762	414	607
	Change in annual hhold income (HUF thousand)	-161	-	352
	Change in annual hhold income (%)	-5.0%	-	7.5%
Quintile 5	Individuals affected (thousand)	424	202	1,021
	Change in annual hhold income (HUF thousand)	-132	-	976
	Change in annual hhold income (%)	-3.5%	-	12.4%
Total	Individuals affected (thousand)	4,464	2,195	3,232
	Change in annual hhold income (HUF thousand)	-122	-	454
	Change in annual hhold income (%)	-4.8%	-	8.0%

equivalent income⁶ (as households are divided into equal groups, the distribution of *individuals* is not entirely uniform). The table reveals the number, by quintile, of individuals living in households that benefit or suffer from the tax changes, or do not experience an effect (the majority of these are pensioner households). The average benefit or loss of households is expressed in 2010 forints and as a percentage of household income, by quintile. The effects in Table 1 are static effects.

It is clear that over three million people live in households that benefit from the tax changes. These households will pay an average of HUF 450,000 less in taxes than in 2010 (this is equivalent to 8% of their household income). At the same time, almost four and a half million people live in households which will suffer because of the tax changes. Their tax burden increases by approximately HUF 120,000 per household, corresponding to roughly 5% of their household income. Although the PIT and contribution changes overall lead to a tax cut in the aggregate, more people are worse off than better off as a result of the measures.

The table also shows that the higher the income quintile, the more (as a percentage of household income) that people benefit. This is attributable to the fact that taxpayers with high incomes can fully take advantage of the reduced PIT rates and the expanded family tax benefit. Of the households that are negatively affected, the lowest

quintile and the highest quintile suffer the smallest losses as a percentage of their household income. The former are probably households with several children, whose losses are reduced by the expansion of the family benefit, while the latter are presumably families with several employed members, who were only partly eligible for the wage tax credit.

Finally, it is noteworthy that the top quintile benefits the most; this segment gains the most from the abolishment of the upper PIT rate and the tax cut instituted by the phase-out of super-grossing. Approximately one million people live in households that belong to the top income quintile and benefit from the tax changes. Their annual household income increases by approximately HUF 1 million annually. This means that although the entire PIT and contribution package costs roughly HUF 200 billion, the winners in the upper income quintile gain approximately HUF 400 billion.

In the next section, we analyse two measures affecting transfers: cuts in unemployment and disability benefits. In this section, we touch only briefly on how these measures affect the distributional effects shown in Table 1. The two measures add approximately 220,000 people to the group who are made worse off. Two thirds come from the group of people affected neutrally by the tax measures, while over two-thirds of them belong to the two lowest income quintiles. As an additional consequence of benefit cuts, the net income of those made worse off by the package

⁶ Equivalent income is the income of a household per consumption unit. We apply the equivalence scale of the Ministry of National Resources for the calculation of the consumption units, where the weight of the first adult is 1, 0.9 for the second adult, 0.8 for the first two supported children and 0.7 for any other supported children.

decreases by an average of 7.5% (in contrast to an average loss of 5%, if only tax changes are considered). Some households, however, may lose as much as half of their annual income (not accounting for behavioural effects).

During our calculations, we simulated the GINI index that is frequently used to summarise income inequality. The GINI index equals 0 in case of total income equality and 1 if a single individual disposes of the total national income. According to our calculations, the GINI index of Hungary increases from 0.264 to 0.304 as a result of the entire package of tax and transfer measures (this calculation takes dynamic effects into account). The first Chart is approximately equal to the 2008 statistic published on the Eurostat website (Eurostat 2011), showing that Hungary had approximately the 6th most equal income distribution among the 27 EU member states (the Czech Republic, Denmark, Austria and Finland had similar GINI indices). The 0.304 value is close to the EU average, corresponding to roughly the 14th most equal distribution among the EU 27 states (Ireland, Germany, Estonia and Italy had similar GINI indices).

LABOUR MARKET AND FISCAL EFFECTS

The microsimulation model helps expose how government measures implemented and planned since 2010 contribute to the long-term development of the labour force and the budget. The results below contain static and dynamic estimates. Static effects quantify the immediate fiscal effects of the measures, before adjustment in the behaviour of economic agents (e.g. changes in the labour supply). By contrast, dynamic effects can be interpreted as a long-term effect, after labour supply, wages and the stock of capital have fully adjusted to the changes.

In the following, we compare each set of measures to the 2010 policy prior to the change. In Tables 2–5, changes in macroeconomic variables represent changes in levels. For example, the PIT changes coming into effect in 2011 increase the level of long-term GDP by 2.4% compared to the baseline scenario (i.e. 2010 policy prior to the change [see the second column in Table 3]). The fiscal effects shown in the tables are in HUF billion at 2010 prices, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. As the model focuses on the labour market behaviour of individuals, it does not explicitly model consumption-saving decisions. Thus, with respect to VAT revenue, we applied a simplifying assumption that households spend all of their surplus income. This assumption is reasonable over the very long term, but it clearly overestimates consumption and hence VAT revenues in the short and medium term.

Table 2 shows the static and dynamic effects of four planned measures. The first two columns show the effects of the complete phase-out of super-grossing. The second two columns show the effects of the complete phase-out of the wage tax credit. The next two columns analyse changes in contributions announced in September 2011 (employee contribution increases by one percentage point, while employer health insurance contributions are paid at least one and a half times the minimum wage). Finally, the last two columns show the effects of the two percentage point increase in VAT. Effects in this table are relative to regulations in force in 2011.

The phase-out of super-grossing increases effective labour supply by approximately 1.5% (weighted for productivity), predominantly through encouraged entry into employment, as it reduces burdens on labour across all income brackets. We estimate the direct annual cost of the measure at about HUF 250 billion (which is probably a lower-limit estimate in the short run, due to unrealised VAT revenues). The behavioural effects reduce the long-term annual cost to about HUF 150 billion.

The complete phase-out of the wage tax credit affects labour supply through the behaviour of two groups. The average tax burden on wage income increases for lower income groups. Since employees with lower productivity are less motivated to enter into employment, employment may decline by about 2% in the long term. Since unemployment benefits and Phase 1 of the child care benefit (gyed), among others, are taxed as wage income, the tax burden on these also increases through the phase-out of tax credits; this increases the incentive to work for individuals who receive these benefits. If we neutralise this latter effect, the phase-out of the wage tax credit reduces long-term employment by an even higher rate (by approximately 2.7%). Thus, our calculations suggest that the wage tax credit increases employment by decreasing the tax burden on wages around and slightly above the minimum wage.

The phase-out of the wage tax credit, on the other hand, has a stimulative effect on higher-income individuals (i.e. taxpayers who receive a reduced wage tax credit). Their marginal effective tax rate (METR) is increased by the phase-out of the wage tax credit (if their super-grossed income increases by HUF 100, they are entitled to about HUF 12 less in wage tax credit, thus their METR is higher by $12 \cdot 1,27 = 15.24$ than for others). With the abolishment of the wage tax credit, these taxpayers will lose some tax credit, yet their marginal tax rate will decrease; both changes encourage them to increase their labour intensity. According to our estimates, this second effect may increase

Table 2
Effect of personal income tax in the past and its hypothetical changes

	Phase-out of super-grossing		Complete phase-out of the wage tax credit		Increase in contributions		VAT increase	
	static	dynamic	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		1.3%		-0.3%		-0.3%		-0.1%
Employment		0.8%		-1.9%		-0.3%		0.1%
Capital stock		1.0%		-0.3%		-0.5%		-0.1%
GDP		1.2%		-0.3%		-0.4%		-0.1%
Average gross wage		-0.1%		0.0%		-0.2%		0.0%
Disposable income		3.9%		-4.3%		-1.3%		-2.2%
Personal income tax	-310	-301	440	436	0	-9	0	-2
Employee contributions	0	20	0	-4	101	94	0	-1
Employer contributions	0	28	0	-7	20	8	0	-2
VAT	61	79	-87	-86	-20	-27	168	170
Taxes on capital	0	8	0	-2	0	-3	0	-1
Local business tax	0	5	0	-1	0	-2	0	0
Transfers	0	11	0	-19	0	-4	0	1
Total	-248	-150	353	317	101	58	168	164

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

the aggregate effective labour supply by over one percentage point. Thus, the measure hardly affects the long-term wage sum overall.

With regard to fiscal effects, the complete phase-out of the wage tax credit produces annual savings of HUF 350 billion as a static effect and a saving of HUF 320 billion with regard to long-term dynamic effects.

The rise in contributions moderately increases the effective tax burden on labour. Therefore, it has a moderately negative effect on employment. As a static effect, it is estimated to produce about HUF 100 billion in savings for the budget; the dynamic effect is smaller, of course. The VAT increase has relatively little effect on labour supply; although the value of consumption possible through work declines, the value of income that can be realised from work (benefits, pensions, etc.) also declines. Therefore, this source of revenue has only a limited negative effect on the aggregate economy.⁷

Table 3 arranges the analysed measures into larger units: the first two columns analyse the measures coming into effect in 2011 (introduction of the flat tax, reduction of the wage tax credit, expansion of child tax benefit, increase of employee contributions by one-half of a percentage point).

The next two columns add to this package the four measures analysed in the previous table, the phase-out of the wage tax credit and super-grossing, increased VAT and contributions. Finally, the last two columns add the effect of the corporate tax cuts of 2010 on the other measures.

According to our calculations, the measures coming into effect in 2011 increase long-term labour supply by 2.6%, primarily by improving the incentives of higher-income individuals to increase their work intensity or hours (labour market adjustment along the intensive margin). Change in employment, however, is negligible (extensive margin). The total behavioural response (intensive and extensive) may still be substantial: according to our estimates, the long-term annual fiscal effect of the tax changes may lower the direct annual cost by two-thirds (from roughly HUF 300 billion annually to roughly HUF 100 billion annually, with the optimistic VAT effect).

With the four measures planned for 2011, the package is close to fiscal neutrality in static terms, but it produces a negative impact on employment as the phase-out of the wage tax credit has a detrimental effect on employment. The added incentives provide further improvement, due to the phase-out of super-grossing. Thus, the stimulating effect of the entire package on GDP is half a percentage

⁷ Taxation of income and consumption over the "very long term", that is, over the entire lifecycle, has an identical incentive effect, as the result of both is that less consumption is possible with the same amount of work.

Table 3
Effect of combined tax packages

	2010–2011 PIT changes		In addition: phase-out of the wage tax credit and super-grossing, VAT and contribution increase		In addition: reduction of corporate tax in 2010	
	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		2.6%		3.2%		3.4%
Employment		0.1%		-0.8%		-0.5%
Capital stock		2.1%		2.3%		5.8%
GDP		2.4%		2.9%		4.2%
Average gross wage		-0.3%		-0.5%		1.1%
Disposable income		5.3%		2.4%		3.7%
Personal income tax	-422	-376	-397	-356	-397	-328
Employee contributions	50	87	151	197	151	230
Employer contributions	0	62	20	89	20	139
VAT	74	106	216	259	216	289
Taxes on capital	0	16	0	18	-104	-69
Local business tax	0	11	0	13	0	19
Transfers	0	2	0	-7	0	-3
Total	-297	-93	-10	212	-114	277

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

point higher (2.9%) than that of measures coming into force in 2011.

In addition to all of these measures, the last two columns in the table show the easing of the tax burden on businesses implemented in 2010 and 2011 (that is, the phase-out of the extraordinary tax, the setting of the main corporate income tax (CIT) rate at 19% and the extension of the lower CIT rate of 10%). We also took into account two measures that are still in the planning phase in 2011: modification of the loss carry-forward rules and the corporate car tax. We included in the calculations that part of the sectoral taxes enacted in 2010 that can be assumed to be made permanent (i.e. one part of the present extra tax on the financial sector). Since we did not model the heterogeneity of the corporate sector, we integrated these changes as an approximately 15% cut of the effective tax rate levied on the profit of the corporate sector. An increase in the return on capital in a small, open economy results in substantial capital inflows: in our estimation, the long-term increase of capital stock amounts to about 3.5%, causing a quarter-percent increase in employment. The static cost of measures affecting the burden on capital is about HUF 100 billion, but dynamic effects (primarily the increasing corporate tax base resulting from capital inflows) turn the fiscal effect into savings.

Table 4 shows the measures of the so-called “Széll Kálmán Plan” and the government’s Convergence Program which affect transfers: cuts in unemployment and disability benefits. Our model is unable to quantify the effect of various other measures transforming the institutional framework of the labour market (e.g. Labour Code, community service program).

The first two columns of the table show the effect of changes in unemployment benefits (e.g. a shortening of the maximum benefit period from nine months to three months, tightening the eligibility criteria, a cut in the maximum amount of the benefit to the minimum wage, and the phase-out of the job-seeking benefits extended to active job-seeking individuals). The measures are estimated to increase employment by approximately 1% over the long term, primarily among lower income groups. We regard this estimate to be an upper limit, as it only takes into account the direct incentive effect of the measures: that job-seekers will have an incentive to search harder for employment. We might underestimate the frictional imperfections of the labour market (i.e. whether it is possible to find a job in three months). Also, we do not take into account that a shorter job-search period may impair the quality of employee-employer matches. The model takes into account only the incentive effect that losing the

Table 4
Effect of the planned change of transfers

	Unemployment benefits		Disability benefits		Total	
	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		0.7%		0.8%		1.4%
Employment		1.1%		1.1%		2.2%
Capital stock		0.6%		0.6%		1.1%
GDP		0.6%		0.7%		1.3%
Average gross wage		-0.1%		-0.1%		-0.1%
Disposable income		-0.2%		-0.3%		-0.5%
Personal income tax	0	4	0	9	0	12
Employee contributions	-14	-5	0	13	-13	7
Employer contributions	0	16	0	17	0	31
VAT	-12	-3	-17	-6	-28	-9
Taxes on capital	0	4	0	5	0	8
Local business tax	0	3	0	3	0	6
Transfers	72	81	83	85	153	163
Total	47	100	67	126	112	219

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

benefit earlier makes the individual want to find a job earlier. The estimated direct fiscal effect is about HUF 50 billion annually, while the dynamic, long-term effect is about HUF 100 billion annually.⁸ For our calculations, we took into account that individuals losing unemployment benefits may become eligible for other benefits (e.g. wage supplement benefits); this effect, however, did not exceed HUF 5 billion.

The second two columns of Table 4 show the effects of the planned cuts in disability benefits. These cuts have been planned in the Széll Kálmán Plan and the Convergence Program upon review of the disability status of a great number of individuals: according to the plan, about 100,000 beneficiaries of disability pension under the age of 57 and 84,000 beneficiaries of the so-called reduced-ability benefit are expected to lose their benefits. These account for approximately 30% of current beneficiaries. According to our calculations, the measure will cause an increase in employment by 1% (approximately 40,000 people). In this case, the effect is not relevant for the “very long term”, as the number of long-term beneficiaries depends solely on how many new people are added. A one-time review of the disability status of individuals has only a transitory effect; those losing their benefits would, in the “long run” reach the pension age anyway. We nevertheless quantified the effect of the measure, given that part of its effect is expected to be present after ten years; we considered this

to be a “long-term” effect. As was the case with cuts in unemployment benefits, we cannot quantify if, and to what extent, frictional imperfections or mismatched skills affect this group differently than other workers. It is quite possible that former recipients of disability benefits are less likely to find jobs than other workers of similar age and qualification. The static fiscal saving from the measure is estimated to be HUF 70 billion annually (taking into account that some of those who lose benefits may be eligible for other transfers), while the long-term fiscal effect is estimated to be HUF 130 billion. The last two columns of the table indicate the combined effect of the two sets of measures. We note that the effects roughly correspond to the sum of the effect of the two sets.

Table 5 shows the analysis of the entire 2010–2011 economic policy package; that is, it takes into account the 2011 PIT and corporate tax changes, measures of the Széll Kálmán Plan that affect unemployment and disability benefits, as well as SSC, VAT and PIT changes planned for the next two years (phase-out of super-grossing and the wage tax credit). The middle three columns of the table examine how the results change if the risk premium of Hungarian capital investments increases. Finally, the last two columns do not involve an increased risk premium, but analyse a scenario in which sectoral taxes that are now considered temporary become permanent (their effect was not taken into account in the calculations of Table 3).

⁸ For the calculation we took into account the fact that the state pays employer contributions for the recipients of unemployment benefits, thus a decrease in benefits affects the budget on both the revenue and expenditure side.

Table 5
Hypothetical increase of risk premia and effect of sectoral taxes

Changes in the tax and transfer system					
Hypothetical shock affecting the risk premium		0	0.5	1	"current status"
	static	dynamic	dynamic	dynamic	dynamic
Effective labour supply		4.7%	4.0%	3.1%	2.8%
Employment		1.5%	0.6%	-0.5%	-0.2%
Capital stock		6.8%	-4.6%	-16.6%	-2.5%
GDP		5.5%	1.0%	-3.8%	0.9%
Average gross wage		1.0%	-4.3%	-9.9%	-2.7%
Disposable income		3.2%	-1.2%	-5.8%	-0.8%
Personal income tax	-405	-318	-413	-511	-313
Employee contributions	136	236	128	13	136
Employer contributions	20	168	0	-174	17
VAT	188	278	181	79	188
Taxes on capital	-104	-61	-120	-181	135
Local business tax	0	24	4	-17	4
Transfers	152	157	147	139	64
Total	-13	484	-72	-652	230

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

The first two columns of the table show the combined effect of all previously analysed government measures.⁹ This entire economic policy package increases employment by 1.5% (approximately 60,000 people) in the long term, entirely as a result of the cuts in benefits (the effect of tax changes is dominated by the negative effect of the phase-out of the wage tax credit). Effective labour supply may increase by a more substantial amount (4.7%) in the long term, as a result of the improved incentives of individuals with higher income. The complete package has a roughly neutral fiscal effect in static terms, but a substantial positive dynamic effect.

The third and fourth columns in the table show scenarios in which the risk premium on Hungarian capital investments increases by 50 and 100 basis points on top of the policy package analysed above.¹⁰ The risk premium may increase to compensate for policy uncertainty perceived by investors if they interpret sectoral extra taxes, the forced exit of private pension fund members or retroactive taxation as a sign of growing uncertainty in the long term, or if they believe that their tax burden may rise again in the medium term in the course of a possible fiscal adjustment. In this

scenario we did not quantify adverse effects of a possibly excessive minimum wage increase.

The results indicate that increases in the risk premium of Hungarian capital investments affect capital stock – and thereby output, wage levels and consumption to a large degree – with a limited effect on the labour market. Effective labour supply decreases only by three-fourths of a percentage point in reaction to a 50 basis point increase in the expected return, while capital stock decreases by over ten percent. According to our calculations, the persistent rise of the required return on capital investments levies a significant impact on the budget: a permanent 50 basis point increase involves a long-term annual fiscal cost of about HUF 550 billion.

In the last scenario of Table 5, there is no risk premium change, but the policy package differs from the other scenarios above in three ways. This scenario basically assumes that current policy – as opposed to the planned policy – will continue over the long term. First, in this hypothetical scenario the current level of sectoral taxes (including the one on financial institutions) remains

⁹ Here we took into account an additional measure: extension of child care aid up to age 3 of the youngest child (as opposed to age 2). The long-term effect of the measure is small; therefore it is not shown separately.

¹⁰ The risk premium on investments is not equivalent to popular country risk indicators, such as the CDS spreads related to government bonds: the risk premium relevant to us is related to the required rate of return on investments in the private sector, while the CDS spread relates to government solvency.

unchanged. This means that the effective tax burden on capital increases (rather than decreases) relative to 2010. Secondly, this scenario does not include any re-evaluation of eligibility for disability benefits. Finally, in this scenario, super-grossing remains in effect above the average wage; that is, the effective PIT rate remains about $1.27 * 16 = 20.3$ per cent for higher income groups.

The effect of the resulting economic policy package significantly differs from the one shown in the first column of Table 5. In this case, too, the additional burden on capital has only a limited effect on the labour market, but it affects capital stock, wages, output and consumption to a larger extent. Keeping the super-grossing in the upper income segment improves the fiscal position of the government, but reduces the positive intensive- and extensive-margin labour market effects of the package. Finally, in this scenario, cuts in disability benefits do not contribute to employment by one per cent or to the budget revenue by HUF 120 billion. Overall, this hypothetical package stimulates the economy by approximately one per cent, but has a moderately negative effect on employment.

SUMMARY

In this study, with the help of the new behavioural microsimulation model of Benczúr, Kátay and Kiss (2011), we analysed the tax and transfer changes enacted in 2010 and planned in the Széll Kálmán Plan and the Convergence Programme. According to our estimates, in the event of full implementation of the planned measures, the level of long-term GDP is increased by over five percent while employment is increased by only one and a half percent, i.e. by approximately 60,000 workers (the planned cuts in unemployment and disability benefits may increase long-run employment by 1 per cent each). The positive employment effect is entirely attributable to cuts in unemployment and disability benefits. The reduction of capital taxes under the current government – assuming the subsequent phase-out of extraordinary sectoral taxes and the reduction of credit institution taxes – may result in substantial capital inflows, potentially resulting in roughly a 0.3 per cent increase in employment.

The changes affecting labour taxes, however, negatively contribute to the employment effect of the policy package. While the effective and planned PIT cuts improve the incentives of high-income earners to increase their work intensity and hours worked, and therefore have a stimulating effect on the economy, their overall effect on employment is estimated to be negative. The complete phase-out of super-grossing may increase long-term employment by 0.8

per cent, while the phase-out of the wage tax credit and the planned increase of the health insurance contribution may decrease employment by approximately two per cent and 0.3 per cent, respectively.

The dynamic effects reduce the fiscal cost of stimulative measures in the long term. However, we note that prudent fiscal planning must always be based on a conservative estimate of dynamic effects.

The results are significantly altered if the country's risk perception deteriorates as a side-effect of certain measures; in such a case, it is easily possible that growing risks completely offset the stimulating effect of tax and transfer changes on the economy through the required returns of Hungarian capital investments. Results may also be affected by possible measures aimed at compensating those who are negatively affected by the tax changes. If compensatory measures are enacted within the tax system, the fiscal and incentive effects may differ from those analysed in this study. If compensatory measures are enacted by an increased minimum wage (or mandatory wage increases), these measures may have a substantial negative employment effect of their own.

In terms of distribution effects, the changes in the tax system that have already been implemented and those that are currently planned significantly increase the disposable income of households with high income, while the phase-out of the wage tax credit means major losses for households with lower incomes. According to our calculations, the GINI index – measuring income concentration – may rise from 0.264 to 0.304; that is, the income distribution of Hungary among the 27 EU Member States may fall from the sixth most equal distribution to the fourteenth.

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APPENDIX

Tax and transfer changes analysed, and parameters used for simulation

PIT and contribution changes coming into effect in 2011

- Flat PIT rate of 16% (applied to super-gross tax base, i.e. tax base multiplied by 1.27)
- Reduction of the wage tax credit from HUF 15,100 to HUF 12,100 monthly; the wage tax credit is withdrawn starting at yearly income of HUF 2.75 million (as opposed to HUF 3.188 million).
- Expanded child tax credit
- Increase in employee pension contribution from 9.5% to 10%

Planned PIT and contribution changes

- Complete phase-out of super-grossing
- Complete phase-out of the wage tax credit
- Increase in employee health insurance contribution by one percentage point
- Employer health insurance contribution has to be paid on at least 1.5 times the minimum wage

Changes affecting transfers

- Abolishment of the second phase of unemployment benefits, tightening of eligibility. (Before the change, benefit for one day was provided for every 5 days of prior employment. After the change, one day of benefit is provided for every 10 days of prior employment.)
- Reduction of the maximum amount of unemployment benefit from 120% to 100% of the minimum wage.
- Abolishment of the so-called "unemployment aid" (the "third phase" of unemployment benefits).
- Partial review of individuals receiving disability benefits. We assumed that in accordance with government plans, 100 thousand recipients of disability pension under the age of 57, and 84 thousand recipients of so-called reduced working ability benefit will lose their eligibility; they account for approximately 30 percent of those currently receiving benefits.
- Extension of child care aid (gyes) up to a three years of age for children.

Changes in taxes on capital

- Abolishment of the extraordinary tax on corporations (+4%), increase in the corporate income tax (CIT) from 16% to 19%.
- Extension of the upper limit of the 10% CIT rate from a tax base of HUF 50 million to HUF 500 million.
- On the basis of information currently provided by the government, we assumed that among the extraordinary

sectoral taxes only approximately one-third of the extraordinary tax of financial institutions will remain in effect in the long-term; we regarded the extraordinary tax of other sectors to be transitory and excluded it from our calculations.

- Planned modification of loss carry-forwards and the corporate car tax.
- Overall, we assumed that the effective tax burden on capital will decrease by 15% (from 7.3% to 6.2%) compared to 2010. The effective tax rate on capital increases to 8.8% in the scenario where all current extra taxes are assumed to be made permanent (Table 5).