

EFFECTS OF PAST AND FUTURE VAT REFORMS IN FINLAND

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Abstract

This paper presents an overview of the Finnish VAT system, and effects of its recent reforms. In addition, we present what effects hypothetical reforms that have been under discussion may have. We analyze the effects of the recent and future reforms with the recursive-dynamic VATTAGE model of the Finnish economy.

According to our results, the recent reforms with lower VAT for food products and restaurant services have stimulated the economy somewhat – with a consequence of increased public deficit - but in the long run the effects are limited. On the other hand, if the lower VAT rates were abolished, the state deficit would decrease by almost two percentage points (of GDP) by year 2025, but that would also reduce the disposable income of consumers markedly. However, it would not lead to almost any changes in the income distribution.

Abolishing the lower VAT rates and simultaneously reducing the general VAT rate so that the state deficit would be unaffected would lead to increased productivity and GDP growth. Thus our results give support to earlier literature that favors usage of one VAT rate. Income distribution would not be affected considerably, as the different changes would more or less offset each other. In other words, our analysis does support using differentiated VAT rates for redistributive reasons.

If abolishing of the lower VAT rates would be compensated by lower income taxes, GDP and employment would temporarily increase. Lower income taxation would, however, lead to increased income disparities. It would also restructure the economy more towards labor-intensive services, which would decrease the productivity of the economy as a whole. The magnitude of these effects is dependent on the characteristics of the labor market, as well as on the price sensitivity of exports, as well as on the workings of the domestic product market.

1. INTRODUCTION

Having lower VAT rates leads to improving the conditions of the entitled firms on the cost of others. If the subsidies are directed to sectors with typically unskilled labor, employment outcomes may be favorable. There is a risk, though, that the resources are shifted from sectors with high productivity to those with lower productivity. This would have consequences on the overall growth patterns of the economy in the long run.

The arguments for lower VAT rates can be grouped as follows:

- (i) Lower VAT rates could in certain cases improve the structure of demand and increase economic efficiency. The most efficient could be tax subsidies for services in the production of which a lot of do-it-yourself and black market work is done (local services, touristic and restaurant services). The case for lower VAT rates is stronger in countries with higher tax wedge in income taxation.
- (ii) Some low earnings services like services for households, child care and care of elderly, cleaning and washing services could be target for lower VAT rates. Due to inflexibilities in the labor market, unskilled labor may encounter employment problems more often than skilled labor. With increased demand for unskilled labor, structural unemployment could decrease.
- (iii) In countries with considerable and permanent differences in consumption patterns, lower VAT rates for commodities that are used more by low income earners could improve distribution of welfare. In practice, foodstuff is the only commodity group that the low income earners use relatively more than the high income earners.
- (iv) Commodities with small negative, no or even positive external effects could be granted lower VAT. This argument has been used for cultural commodities like performing arts, book, education, museums, etc. Even goods with favorable environmental effects like low-energy washing machines or electric cars are covered by this argument.

One of central principles of taxation is horizontal equity. This is obtained when people of same income level are taxed equally. If some commodities are subsidized through lower tax rates, the equity outcome depends on the existence of differences in the consumption patterns. In the worst case, this could lead to discrimination of certain age groups or to gender discrimination (Mirrlees Review 2010).

Differentiated VAT rates can, according to the theory of optimal taxation, alleviate the harmful effects of income taxation. In order to allocate the taxation correctly, one needs accurate information on the price and cross elasticities of different goods. Typically, this information is not available. Using lower VAT rates can be expensive and inefficient, because high income earners accrue most of the benefits. Differing VAT rates are especially inefficient in countries with progressive income taxation and social security system. In addition, having different VAT rates creates classification problems, increased administrative costs and make more vulnerable for misuse (Ebrill ym. 2001). Varying tax rates also increase the political pressure for new exceptions. Due to these reasons, Sørensen (2010) argues for a flat VAT rate for all the goods.

In the public finance literature, a number of reasons for differentiated VAT rates are proposed. According to Ramsey (1927), products with lower prices elasticity should be taxed harder, as it would lead to lesser distortions as for products with higher elasticity. However, this argument seems to have been overridden by other motives, such as assumed effects on income distribution. In several countries within EU, e.g. food is being taxed less, although it is usually considered to belong to good with inelastic demand.

Another argument for differentiated taxation of good takes into account their complementariness with leisure. Goods that are complement with leisure should be taxed harder (golf equipment, sailing boats) as it would increase the attractiveness of work compared to leisure (Corlett and Hague, 1953). Existence of shadow markets has also been proposed as an argument for lower taxation for such goods (Boeters et a, 2006).

Diamond and Mirrlees (1971) address the efficiency and equity aspects of taxation, trying to balance between the two. They looked for answer to question whether uniform indirect taxation was preferable. According to Atkinson and Stiglitz (1976) it is crucial whether consumption taxation can be designed in a way that lessens to efficiency loss due to income taxation. There would be no reason for differentiation of VAT rates if progressive income taxation is applied and if demand for goods is independent from work effort and ability of the workers. Blundell (1993) came, however, to conclusion that this is not the case in reality. In other words, amount of labor supply affects consumption.

Numeric analyses in the issue of several VAT (or other indirect tax) rates tend to point in favor of not using indirect taxation as a means for redistribution. Boeters et al (2006) pose questions very similar to our paper in the German context. Their analysis with a static AGE model with three households grouped by income level (terciles) shows that the abolition of the reduced VAT rate in

itself has only a small redistributive effect towards more inequality. Therefore they argue that VAT differentiation can hardly be considered as a suitable means of redistribution policy. While the distributional effects of VAT reforms were within a relatively narrow range, the sectoral effects (in terms of variation in sectoral output) were much more pronounced. Boeters et al (2006) argue that the VAT rate differentiation should be viewed primarily as a sectoral subsidy rather than an instrument of redistribution.

Ballard, Scholz and Shoven (1987) analyze VAT in the USA as a possibility to increase the dynamic efficiency of the tax system. They find that the introduction of a VAT and an equal yield reduction in the personal income tax would improve the efficiency of the economy. This is true because those who are made better off by the tax swap would gain more than those who are made worse off. Potentially, the losers could be compensated. The magnitude of the improvement in efficiency is significantly larger for a uniform VAT than for one with a differentiated rate structure.

Another strand of literature studies the transmission of changes in VAT rates to consumer prices. Most of these studies have focused on the food products. Very few studies have extended the study questions to cover even the effects of VAT rates changes on the demand of products and on labor demand.

In 2001, the VAT for food products was halved from 24 to 12 per cent in Norway. According to Johansen (2003), 92 per cent of the tax rebate was passed on to consumer prices during the first month. According to Østmoe (2002) after six months, the price effect was 75–85 per cent of tax rebate.

In Sweden, the VAT rate was during 1990–1991 a uniform 25 per cent. In 1992, VAT rate for foodstuff and some services was lowered to 18 per cent. In 1993, the VAT for foodstuff was again raised, now to 21 per cent. The actual 12 per cent rate was first applied in 1996. According to Bergman (2004), the lowering of VAT rates in 1992 and 1996 was clearly shown in the consumer price index of food products, which normally follows the general price development.

In France, VAT rebate for restaurants in 2009 seemed to be transmitted to consumer prices only partly (Ministry for the Economy 2010). VAT rate for restaurant services was lowered from 19.6 per cent to 5.5 per cent. According to the study, the prices went down only by 1.4 per cent.

Peltoniemi and Varjonen (2010) studied the lowering of VAT rate of food products in Finland. The VAT was lowered from 17 to 12 per cent in October 2009. They studied the prices by means of price survey, gathered from different parts of the country, and by following prices through a longer

time period. They concluded that VAT change had been fully transmitted to consumer prices. In October 2009, food products were 5.7 per cent lower than in September. The price fall was actually higher than the full transmission of VAT rebate (4.3 %). The authors pointed that the prices of seasonal products, like vegetables and fruit were exceptionally low at the moment.

We would like to point out that by comparing the Finnish and Swedish consumer indices during 2005 - 2010, we can see that the price rise from 2005 was 4.2 per cent higher in Sweden than in Finland in October 2009, which is very close to the tax rebate. However, this price difference decreased to 2.4 per cent by the end of year 2010. What is more, the Finnish food prices rose 3 per cent higher during the year before tax rebate – when the tax rebate was publicly discussed and decided upon. Although it is not possible for us to confirm, one is tempted to conclude that the Finnish groceries may have acted strategically in setting the prices before and after the VAT reform.¹

Kosonen (2010) evaluated the consequences of VAT rebate for the Finnish hairdressers and other labor-intensive small businesses providing services such as repairing bicycles, shoes etc. He studied the effect of 14 percentage point VAT rebate from 22 to 8 per cent on hairdresser services. According to his results, hairdressers lowered their prices by about half of the VAT rebate, but it had no effect on the demand for services. As there was no demand effect, the changed did not seem to have any effect on hairdressers' labor demand.

Kosonen and Harju (2010) studied the effect of VAT rebate for restaurant services in Finland. The VAT rate of food eaten in restaurants was lowered from 22 to 13 per cent in July 2010. According to their results, prices declined by 5.2 per cent (when observations were weighed by turnover), as the full transmission would have meant a decline by 7.4 per cent. Smaller restaurants and restaurants outside bigger chains lowered their prices by much less, as the non-weighted average prices decline was only 2.1 per cent.

To sum up, our reading of the public finance literature is that in the discussion of having differentiated VAT rates or not, economists have presented different views on the matter. Whether one should one at all differentiate the tax rates at all, and if yes, which commodities should be favored. Another point of discussion has been whether changes in VAT rates are really being passed through to consumer prices. The empirical studies on this issue tend to point to less than perfect pass-through to consumer prices. Certainly, the demand and supply conditions play a rule for the

¹ The price indices were downloaded from the following web sites in February 2011:
http://www.scb.se/Pages/ProductTables_33793.aspx and from http://www.stat.fi/til/khi/tau_en.html.

outcome. Finally, as the theoretical literature has not been able to settle the matter of VAT rates decisively, use of methods based on real-world data, simulations and empirics is well grounded.

The remainder of this paper is organized in the following manner. Chapter 2 discusses the Finnish policy setting, providing a quick view on the role of taxation in the Finnish economy, as well as on the future challenges of public finance in Finland. Chapter 3 provides a short description of our model, including some presentation of some new add-ons. Chapter 4 presents our simulation results and chapter 5 concludes.

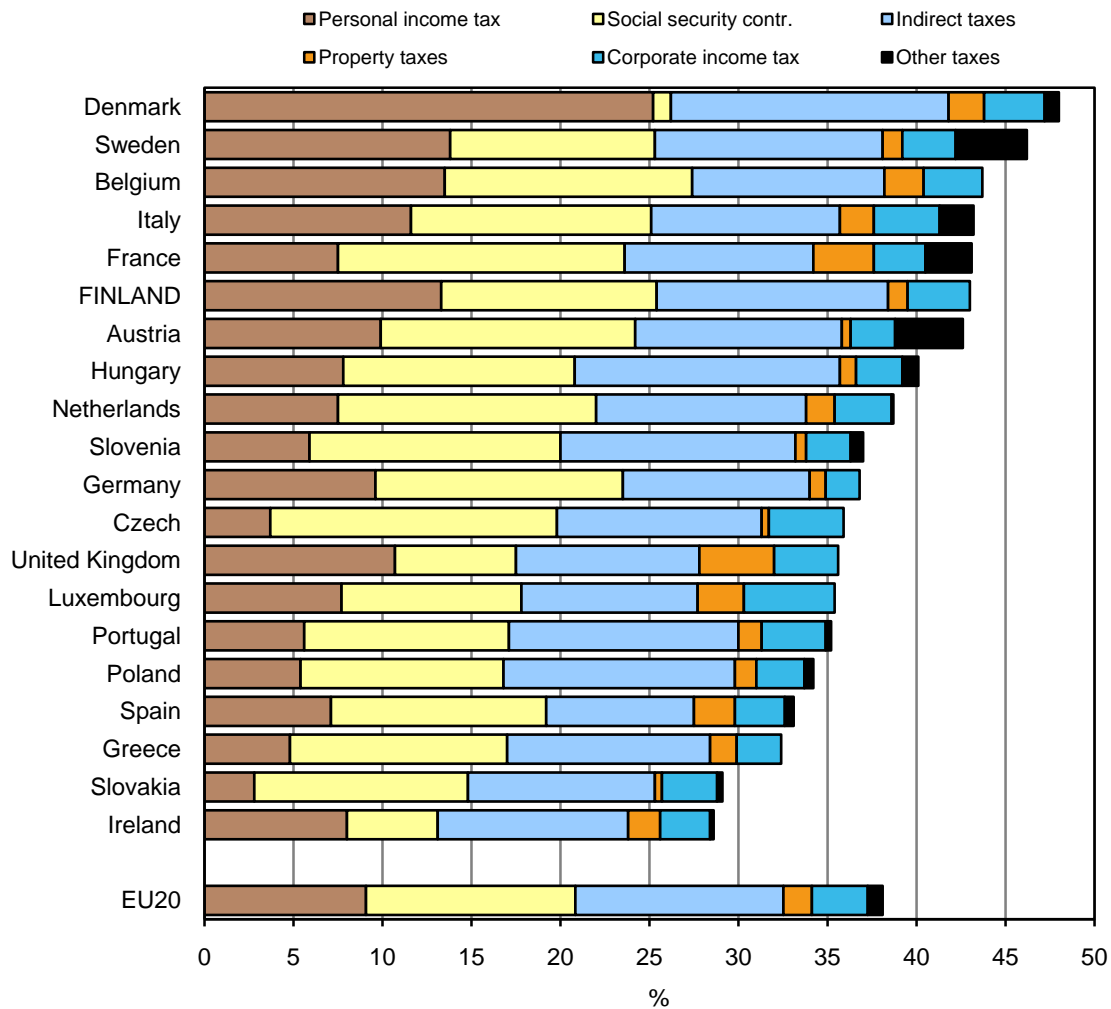
2. THE FINNISH POLICY SETTING

The share of taxes of GDP in Finland was 43.1 per cent in 2009. It has risen by 6.5 percentage points from 1975, which is roughly as much as in OECD and EU countries on average. At its highest the aggregate tax rate was 47,2 per cent in year 2000, when it was the third highest among EU and OECD countries. The decline of tax rate by 4,1 percentage points since then is among the largest decreases during the last decade (Kröger, 2011).

Compared to other EU countries, Finland gathers a rather large share of tax income through indirect taxation, including other commodity-specific excise taxes together with VAT. Finland ranks fourth highest among the 20 EU countries (of figure 1), together with Poland, after Denmark, Hungary and Slovenia. Even regarding the GDP share of personal income taxation, the Finnish tax rate ranks fourth highest, after Denmark, Sweden and Belgium.

The European Union requires Member States to have a consumption tax system based on VAT. A certain degree of harmonization is required of individual Member States in setting their VAT rates through minimum rates for the general and lowered VAT rates. There is a quite a variation in the tax rates being applied, but the average VAT rates have increased by a percentage point during the first decade of 21 century (European commission 2010). The non-weighted average normal VAT rate of the EU countries was 20.5 per cent in year 2010, and the average for the lower VAT rate was 8.3 per cent. Especially during the financial crisis of 2009-2010, many countries have raised their VAT rates in order to finance their public sector deficits.

Figure 1. Comparison tax structure within EU20



Source: Kröger, 2011.

The Finnish Ministry of Finance (2010a) has studied the sustainability of public finances and came to conclusion that the balance between public revenue and expenditure should be adjusted by a sum equivalent to 5% of GDP. The factors leading to such a large imbalance is the ongoing global financial and public finance crisis that affected severely the Finnish exports and public finances. In addition, the foreseen considerable changes in age structure lead to increased public spending health and social care due to fast increase in the number of aged persons. Several alternative estimates and methods have been proposed, stating that the Finnish public finances suffer from a structural deficit amounting to 3-8 per cent of GDP (Ministry of Finance, 2010b).

Finland lowered from 1st October 2009 the VAT rate of food products from 17 to 12 per cent, which meant that Finland applied from then on non-zero tax rates of 8, 12, and 22 percent. On 1st of July 2010, all the VAT rates were raised by a percentage point. In addition, the VAT rate of restaurant services was lowered to the same rate as that of food products, i.e. to 13 per cent (appendix 1 lists the current VAT rates). As the changes were carried out in the middle of the calendar years, we assume in the model that the new VAT rates are introduced gradually within a period two years, which means that the new rates are fully introduced from year 2011 on.²

3. VATTAGE MODEL

VATTAGE is a dynamic applied general equilibrium (AGE) model of Finland. It is based on a dynamic model developed at the Centre of Policy Studies in Monash University. MONASH-type model are used in countries ranging from China and South Africa to United States (Dixon – Rimmer). In Europe, models based on Monash are being used in Denmark, Finland, and more recently in Poland and Netherlands.

The VATTAGE database contains detailed information about commodity and income taxes as well as the expenditures and transfers of the public sector and thus covers most policy instruments available to the government. The current database has 91 products and 82 industries.

Several factors explain the popularity of MONASH. The main ones are the advanced and user-friendly software packages that facilitate data handling and the set-up for complicated policy simulations that also allow a very detailed post-simulation analysis of the simulation results. MONASH-type models are also very adaptable to the analyses of different types of policies and different time frames. In forward-looking policy analysis, MONASH-type models offer a disciplined way to forecast the baseline development of the economy. Last, but not least, they also allow the user to replicate and explain the historical development of an economy in great detail, which is not the case for most AGE models.

VATTAGE contains many advanced, dynamic features. There are three types of inter-temporal links connecting the consecutive periods in the model: (1) accumulation of fixed capital; (2) accumulation of financial claims; and (3) lagged adjustment mechanisms, notably in the labor

² We decided to omit from the study the temporary (2007-2011) lowering of VAT for hairdressers and small businesses providing services such as repairing bicycles, shoes etc due to its reduced economic importance.

markets. Different fiscal rules for the balancing of the public sector budgets can also be specified. The model can be run either in a recursive mode or under forward-looking (rational) expectations.

The dynamics of the model lead to gradual adjustment away from the baseline as due to policies or external shocks to the baseline development of the economy. The speed of this adjustment depends on several parameters: 1) the rates of depreciation of capital at the industry level; 2) the rate of adjustment of returns to capital; and 3) the rate of adjustment of real wages (when sluggish wage adjustment is assumed). These parameters can be derived from national accounts data and econometric studies of, notably, the labor markets. Policies can also affect the rate of adjustment. For example, if it is assumed that the government is willing to run deficits during the adjustment period of the economy to, say, an external shock to raw material prices, the parameter controlling this adjustment process will affect the speed at which the economy converges to a new equilibrium growth path.

VATTAGE has been documented by Honkatukia (2009), including a major part of coding in TABLO. Honkatukia, Kinnunen and Marttila (2010) presented an income distribution module based on socio-economic grouping of households. In the current version, a similar top-down module has been constructed for income deciles. This means that in our model, the aggregate, representative consumer resides in the core model, whereas the consumption modules with socio-economic and income decile groupings are forced to sum up to the aggregate level. This applies to both to each good and each income item. Thus, in a way, our model is not a genuinely having several households, but something giving a first look for the distributional effects. However, in creating the disaggregation of households, we have used Statistics Finland household survey data, as well as data from income distribution statistics in order to make as goods possible description of the income and consumption differences. Consumption parameters have been estimated using the household survey data.

VATTAGE allows for different treatments of the labor markets. The labor market equations relate population and population of working age, and define unemployment rates in terms of demand and supply of labor. In dynamic simulations, labor supply is typically taken as exogenous, while wages adjust only gradually and unemployment is determined endogenously. However, in this version we assume that even labor supply is flexible through endogenous participation rate (which is discussed below).

VATTAGE allows for different specifications of the labor markets. In a dynamic setting, it is not unreasonable to assume that there is an element of sluggishness in real wage adjustment. In Finland,

this was very much the case until very recently, when wage setting has become more decentralized. The basic set-up of VATTAGE captures the idea that wage setting may be centralized.

Specifically, we assume that real, after tax wages are sticky in the short run and flexible in the long run. In this labor market specification, policy shocks generate short-run changes in aggregate employment and long-run changes in real wages. Algebraically, we assume that

$$\left(\frac{W_t}{W_{t,old}} - 1\right) = \alpha_1 \left[\left(\frac{W_{t-1}}{W_{t-1,old}} - 1\right) - \left(\frac{LS_t}{LS_{t,old}} - 1\right)^{\alpha_2} - \left(\frac{E_t}{E_{t,old}} - 1\right)^{\alpha_2} \right] \quad (1)$$

In this equation, *old* indicates a base case forecast value. $W_{t,old}$, $LS_{t,old}$ and $E_{t,old}$ are the real wage rate, labor supply and the level of employment in year t in the base case forecasts, and W_t , LS_t and E_t are the real wage rate, labor supply and the level of employment in year t in the policy simulation. Under this specification, the adjustment of the real wage rate depends on deviations from the expected real wage development and on the deviation of labor supply and employment from the expected labor supply and employment growth. The speed of adjustment is controlled by parameter α_1 , whereas α_2 determines whether unemployment returns to its expected growth path after a policy shock. The real wage equation is close to NAIRU-theories of unemployment, and its parameters have been estimated for Finland in studies such as Alho (2002) and McMorrow and Roeger (2000).

Aging of the Finnish population has been recognized as one of the major future challenges. The coming change of the age structure is built in our model in the following way. First, our model replicates with relatively high accuracy the recent population forecast of Statistics Finland (2009). We keep track of each age cohort between 0 and 95 years by gender, and we calculate fertility and mortality and migration on the basis of age-specific parameters obtained from Statistics Finland.

Having a clear view on the age structure gives us the changes in the population in working age. In the current version we change the standard VATTAGE assumption of exogenous labor supply. We assume that each age cohorts has an initial, specific rate of participation to labor force. The participation rate is affected by changes in net earnings in labor market in following fashion.

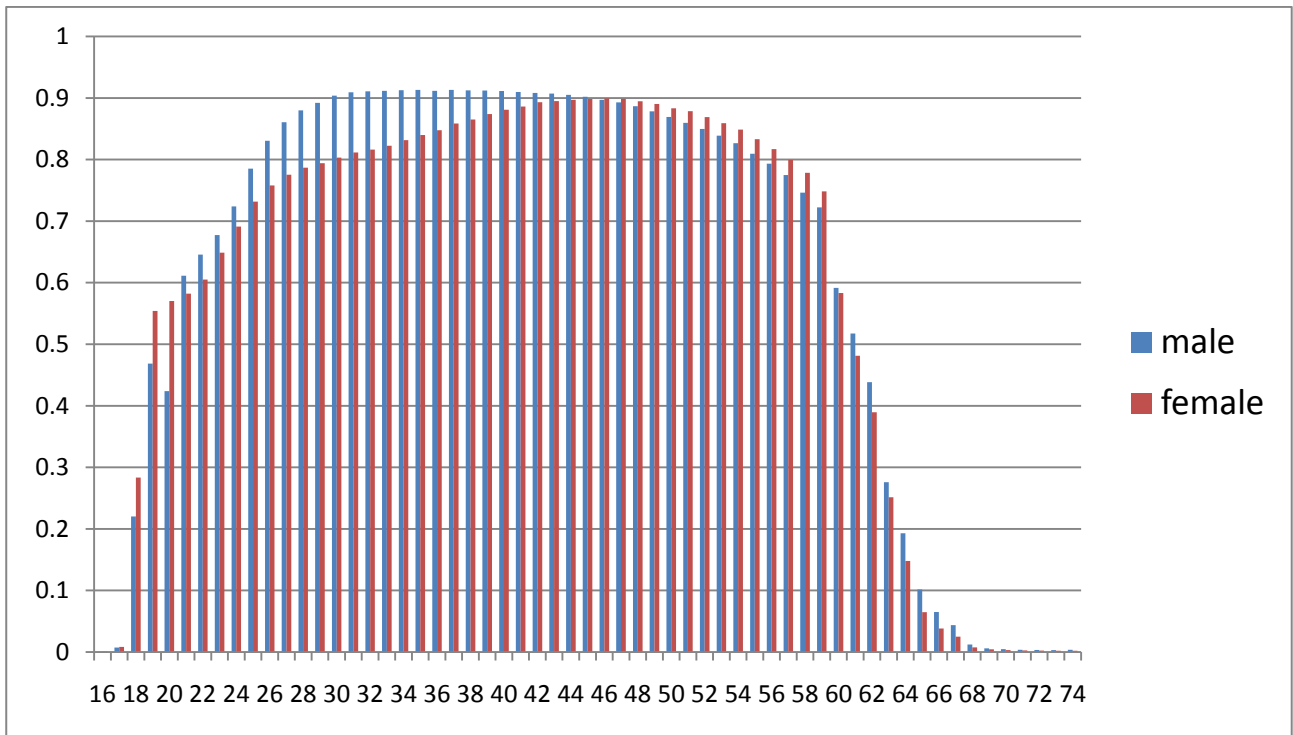
$$pr(t)_{a,g} = \varepsilon_{LS} PE \times \left[\frac{1-PR(t-1)_{a,g}}{1-\overline{PR}_{ag}(t-1)} \right] \times (rw - rw_o) \quad (2)$$

in which

$pr(t)_{a,g}$	Age cohort (a) – and gender (g) specific percentage change in the participation rate during period t
ε_{LS}	Average extensive labor supply elasticity
$PR(t - 1)_{a,g}$	Last period's (t-1) participation rate (theoretical maximum 1)
$\overline{PR}_{ag}(t - 1)$	Average last period participation rate (over a and g)
rw ja rw_o	Percentage change of net wages under current and base scenario

According to this specification, participation elasticity is higher for the age groups whose participation rate is lower – e.g. students and elderly. The same applies in reverse for age groups with high participation rates. We are well aware of the fact that this is a reduced-form way of modeling, as we do not define the exact utility functions for work and leisure. However, the main results from empirical labor supply studies concur with our specification: labor supply of middle-aged men is less elastic than that of women, students and elderly have higher participation elasticity (see e.g. Kleven and Kreiner, 2006; Meghir and Phillips, 2010; an overview in Ministry of Finance, 2010c). In addition, our formulation fills in the gaps in empirical results, stretching one parameter value to both genders and to every age cohort. At the same time, it ensures that the participation rates do not surpass 100 per cent. Participation rates of the Finnish population are depicted in figure 2.

Figure 2. Participation rates in base year 2004



On the demand side, the public demand is affected by the age structure of population. We use our (calibrated) econometric estimates (Honkatukia, Marttila, Kinnunen, 2009) in describing the changes in public demand. We formulate the public demand in the following way:

$$x_{c,z} = \alpha_{c,z} + \sum_g S_{c,z,g} * \varepsilon_{c,z,g} * p_g + f_{c,z} \quad (3)$$

where:

- c Good c
- z Subsector z: central government, local administration, social security funds
- g Age groups 0-6, 7-15, 16-64, 65-74, 75-84 and 85+ years
- $x_{c,z}$ Change (%) in demand volume of public sector good c demanded by subsector z
- $S_{c,z,g}$ Last period's cost share of age group g
- $\varepsilon_{c,z,g}$ Population elasticity of demand volume
- p_g Percentage change of population in age group g
- $\alpha_{c,z}$ Trend growth in the demand volume of good c in subsector z

$f_{c,z}$ Additional shifter, e.g. for changes in productivity growth

Our model picks up the estimated effect of the changing sizes of different age groups, contributing to demand growth of different parts of public demand, both in terms of goods and in terms of government subsectors. Therefore, we are well-equipped in looking how different tax measures change the balance of the public sector as a whole, but the model gives insights also on the balances between different parts of the public sector. In this paper, we report the results for the state finances.

4. SIMULATION RESULTS

We present results for four different model scenarios. First, we study the effects of recent changes in the VAT rates by comparing our “policy run” including these changes to status quo base scenario without them. In the other model runs, the recent reforms are included in our base run. The model is solved for years 2005-2025, 2004 being the year of the model database.

In our first future-oriented scenario, we study the effects of the abolition of reduced VAT rates of 9 and 13 per cent by replacing them with the standard 23 per cent. However, the treatment of goods and services having zero rates remain unchanged. In other words, we do not change the tax base of VAT. This applies to all our scenarios. In our second future policy scenario, we abolish the reduced VAT rates, but simultaneously we decrease the standard VAT rate to a level at which the VAT revenues are at the same level as under base year 2012. In our final scenario, the reduced VAT rates are abolished, but labor income tax is reduced proportionally to kept government deficit unchanged from its base value in 2012.

4.1 Recent reforms

The recent VAT reforms in 2009-2010 seem to have provided a small stimulus to the economy. In comparison with base scenario without VAT reforms, the price level declined by 0.4 per cent³. On the other hand, prices were 0.05 per cent higher in 2011 when all the reforms were in place. Also GDP and employment grew in this scenario, but the macro effects are very small. The most sustained effect is on disposable income, which grew by 0.2-0.3 per cent (see figure 3; the figure

³ In VATTAGE, exchange rate is the numeraire.

depicts relative changes of each variable from the base scenario). However, the reforms also lead to an increased state deficit that grew by 0.05-0.1 per cent of GDP towards the end of the study period.

The stimulating effect of the reform is shown in the decomposition of the GDP growth (contribution to the percentage difference between policy and base scenario) into its demand and supply components. We see that increased profitability of firms lead to an increase in the investments and in employment. This contribution to growth is shown in the supply side decomposition of GDP, where value added components, together with increased product taxes stand for the growth impact. Aggregate productivity growth is more or less left intact. We can also see that the private consumption stands for the largest contribution to growth, whereas exports decrease and imports rise, leading to an increased domestic share of total demand (see figures 4 and 5).

Figure 3. Some macro indicators, change from base levels, per cent

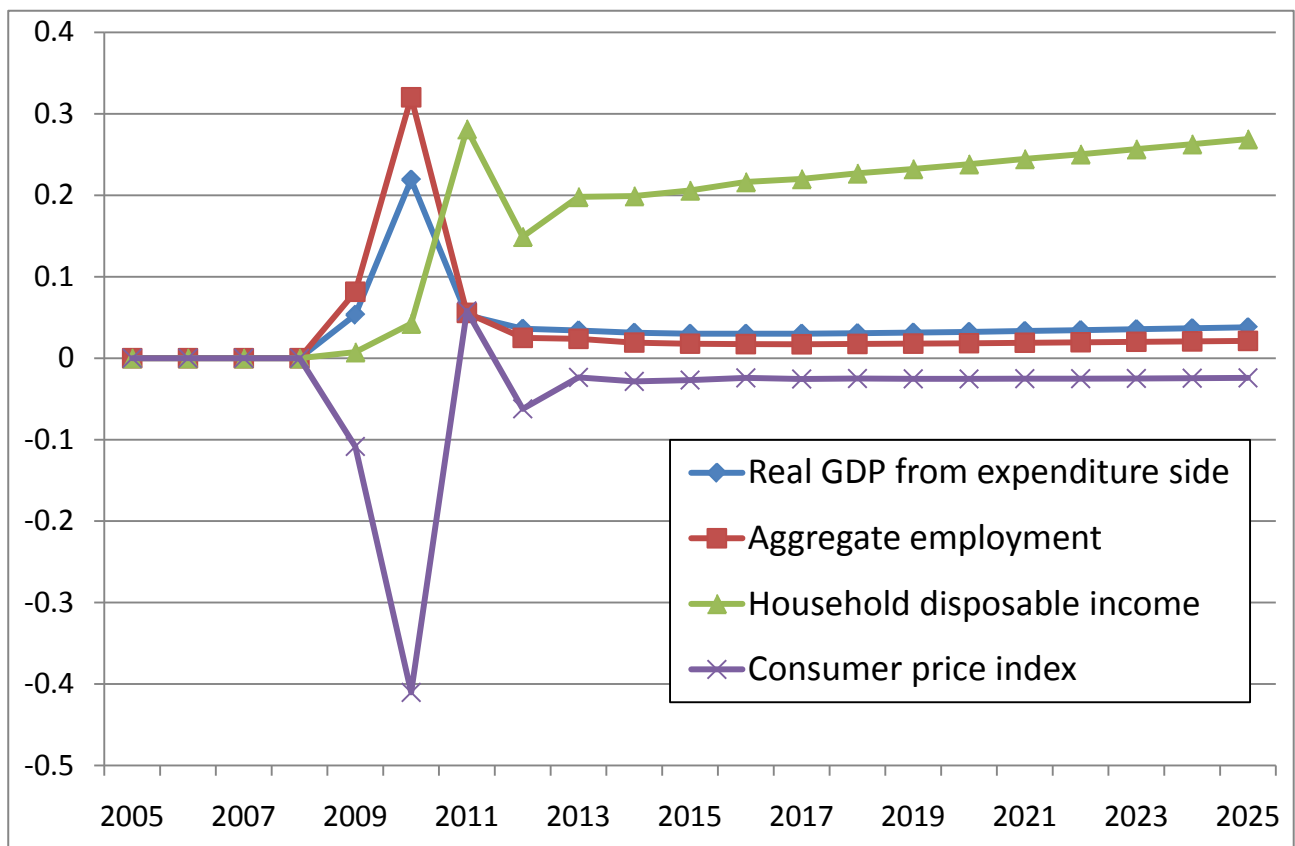


Figure 4. **Contribution** of GDP expenditure items to GDP growth, **percentage points** from base

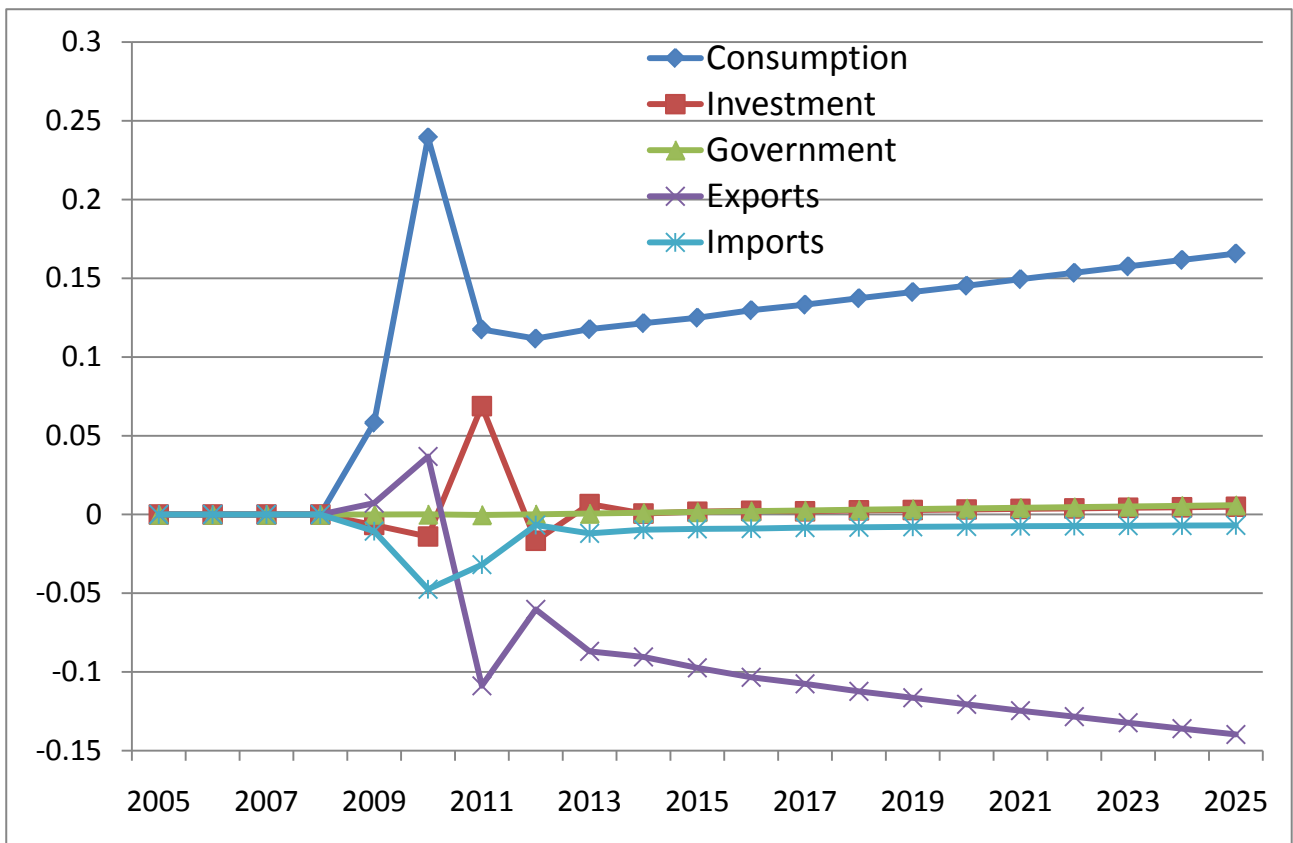
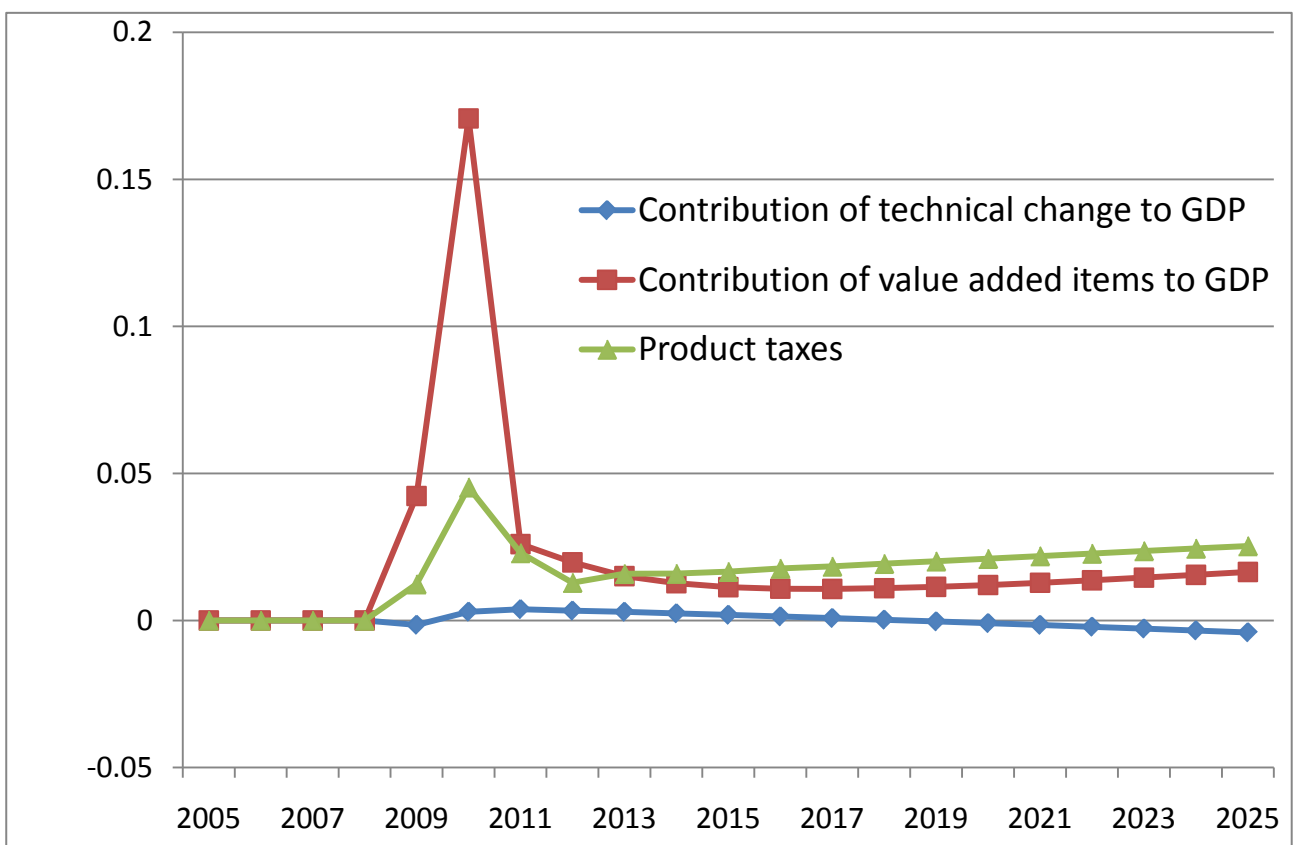


Figure 5. **Contribution** of GDP production items to GDP growth, **percentage points** from base

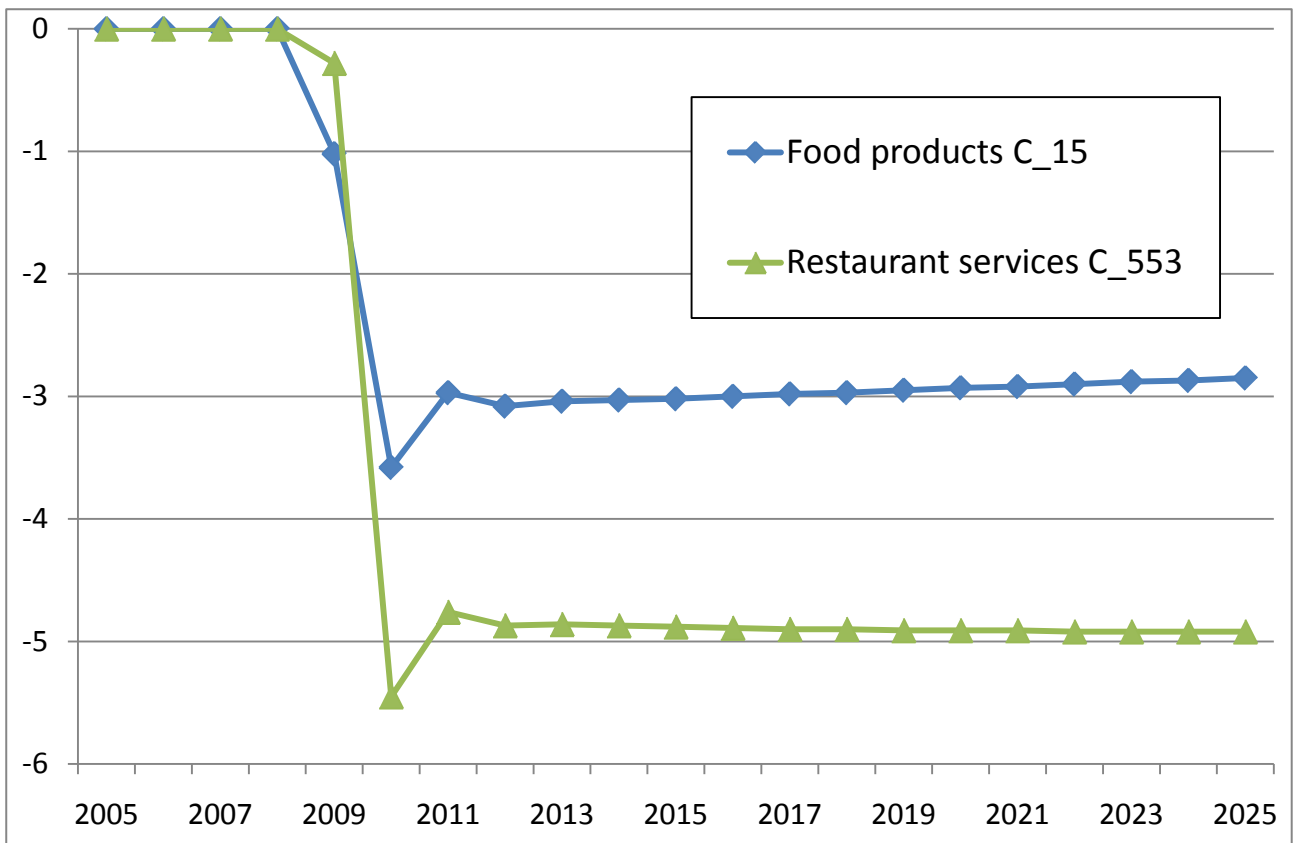


The results above are dependent on our assumptions on the flexibility of labor market. Above we assume that the employment growth is not persistent but that real wages converge to their base path over time bringing employment close to base values. If we assume greater flexibility of labor market than above, then employment growth can endure and the economy enjoys are longer lasting positive contribution even through employment growth⁴.

According to the model results, lower VAT rates for restaurant services led to 5.4 per cent decrease from base scenario in year 2010. The price decrease levels up to - 4.8 - - 4.9 per cent from year 2012 on (see figure 6). The result is rather close to the empirically estimated, weighted result of Kosonen (2010) cited above. National Consumer Research Centre (2010) reported that the price of restaurant services declined immediately by 4.1 per cent. According to the CPI of Statistics Finland, restaurant food was 5.7 per cent cheaper in July than in the previous month. Regarding food products, VATTAGE produces an immediate price decline of 3.6 per cent, which is somewhat less than reported by other sources. However, VATTAGE being a model of perfect competition, we cannot cater for strategic price setting behavior probably present in the Finnish product market (see our remarks in the introduction). While the assumption of perfect competition may not describe the real world with precision, the model still captures other things like effects of the VAT that is being left in the intermediate and investment use, and in the use of margin services (trade, transport), which is overlooked by other methods when the “full transmission” change in prices is calculated on the basis of tax rate alone. All in all, the results of VATTAGE seem to be rather well in line with other sources.

⁴ We report all the results by using values $\alpha_1 = 0.4$ and $\alpha_2 = 0$, and comment how results change with $\alpha_1 = 1.1$ and $\alpha_2 = 0.4$ Honkatukia (2009) discusses the role of these parameters more thoroughly.

Figure 6. Price changes, per cent from base



The largest industry effects are naturally felt where the taxation has changed most. The production of restaurant services had grown by three per cent from base at the end of the study period. Manufacture of food products and beverages (and tobacco) grew by half a per cent. Employment effects were of similar size in these industries. Changes in other industries were marginal.

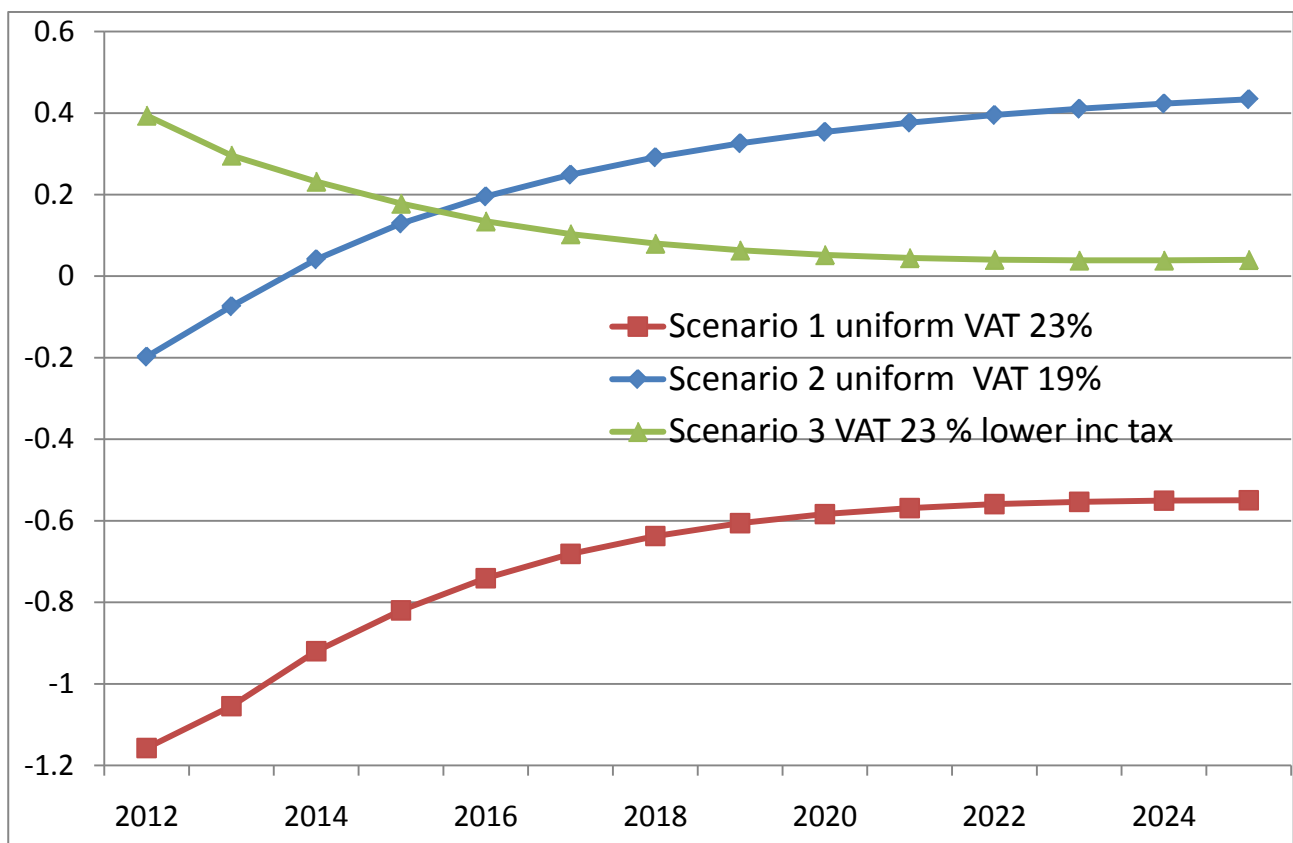
Regarding distributional effects, we measured Gini coefficient for both disposable income and consumption. The changes were minimal, of size 0.01 and less, when Gini was measured under scale of 0-100. The same can be said from the changes in the consumption volume of income deciles, which are so close to each other that one cannot say that greater welfare differences would have been caused by these reforms.

4.2 Scenarios with uniform VAT rates

Macroeconomic consequences of the scenarios differ quite much, as we have opted to enlighten different aspects with the different scenarios. Our scenario 1 provides an answer to the question of contributing to increased sustainability of state finances. Scenario 2 and 3 are more comparable with each other, answering to the questions of efficiency and equity of changing tax structures.

Figures 7 and 8 depict how GDP growth and employment differ under these scenarios. We see that abolishing the lower VAT rates costs a bit over half a per cent of GDP growth, while in the other two scenarios, GDP growth tops that of the base path. Employment declines initially by 1.7 per cent under scenario 1, while it jumps up by 0.8 per cent under scenario 3. According to our model assumptions, these effects are approaching zero under the long run. Under different assumptions on the labor market, the employment effects would linger on, leading to similar movement in GDP. It is noteworthy, that although employment growth of scenario 3 tops that of scenario 2, GDP growth of scenario 2 with a lower uniform VAT rate - of approximately 19 per cent - is greater. This is due to the fact lower income taxes affect the cost of labor, and which redirects the growth towards domestic service industries. In aggregate, this leads to lower productivity growth as can be seen in figure 9.

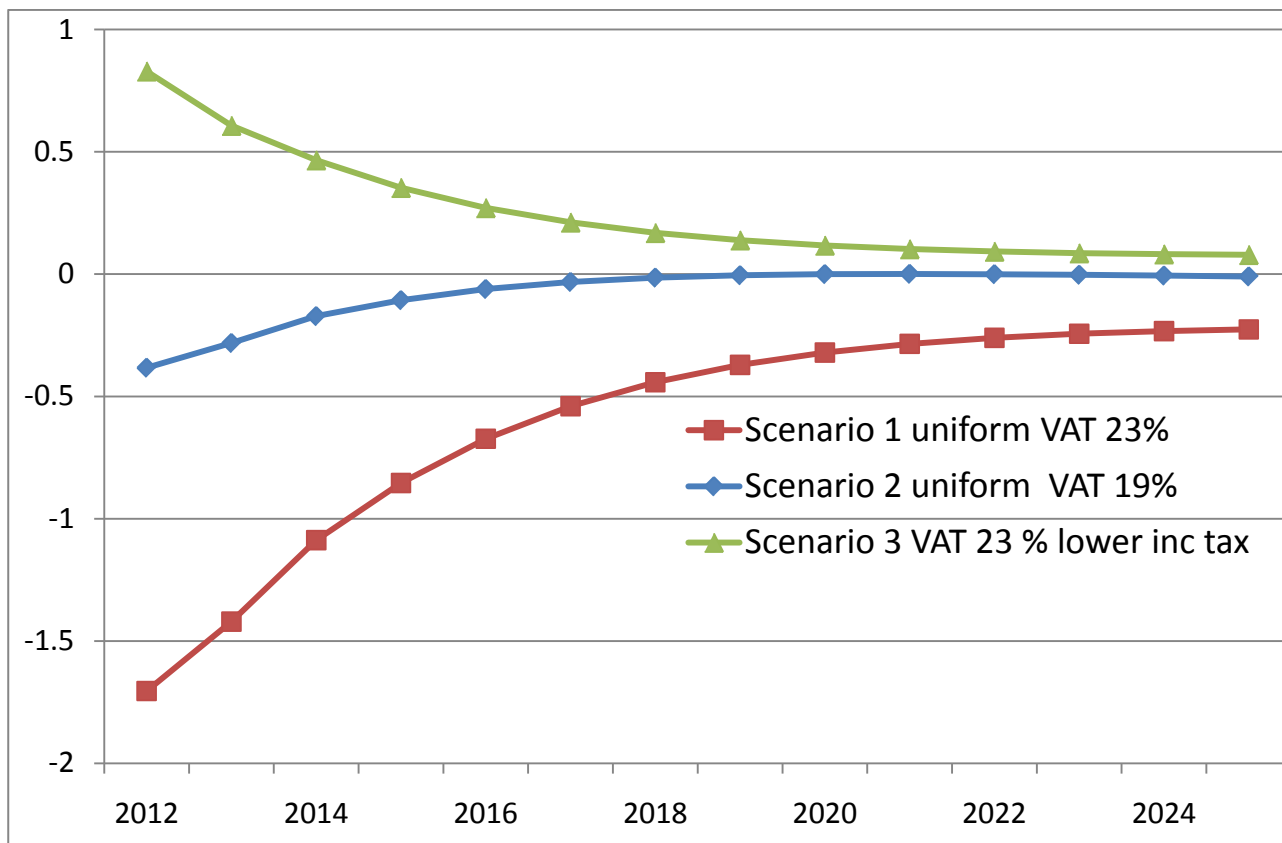
Figure 7. GDP difference from base, per cent



While scenarios 2 and 3 seem appealing from the viewpoint of economic growth, they do not contribute to solving the sustainability problems of the public sector. In contrast, scenario 1 seems to make a significant contribution to closing the future deficits (see figure 10). Interestingly, having lower income taxation produces under our model setting an increased state deficit. Under more optimistic labor market assumptions, this result would naturally turn different, but in order to reach

similar improvement in state finances than under scenario 1 would imply unrealistic assumptions on the responsiveness of labor supply to changes in net earnings.

Figure 8. Employment differences from base, per cent



On the demand side of macro effects, foreign trade contributes considerably to GDP changes both through exports and imports. The largest net effect of foreign trade is recorded under scenario 2 with an uniform VAT rate of 19 per cent. Accordingly, it is also the scenario in which the GDP growth effect is largest.

Industry effects are presented in form of tables 1 and 2. We see that over time, the spread of deviation of industrial effects increases (increased standard deviation). We see also that scenario 1 with sole abolishment of lower VAT rates creates greater deviation in industrial outcomes. In addition, we see clearly how scenario 2 with lower uniform VAT rate of 19 per cent outperforms base at over time increasing rate, while scenario 3 gradually loses its advantage over base.

Under scenario 1, the biggest losers would naturally be the industries that enjoy of the largest tax rebates under the current system, namely trade, restaurants and leisure, cultural and sports services.

Raising VAT would affect other industries as well. For example recycling and selling second-hand products, which is largely exempted from VAT, would gain. Another gainer would be passenger shipping, which through tax-free sales would get an increasing price advantage. Expert services sold to other firms would also gain. These firms could roll over the VAT rise into prices, as majority of their customer would be able to get a tax refund from their intermediate consumption.

Under scenario two with 19% VAT rate, the current industries enjoying of lower VAT rates would be the principal losers. However, the majority of industries would gain after an initial shock. Under scenario 3, the losers would be more or less the same as under scenario 2, but the differences between industries are smaller due to off-setting effect of lower income taxation, which would be important for the labor-intensive service sectors.

Figure 9. Difference in the contribution of productivity to GDP growth, percentage points

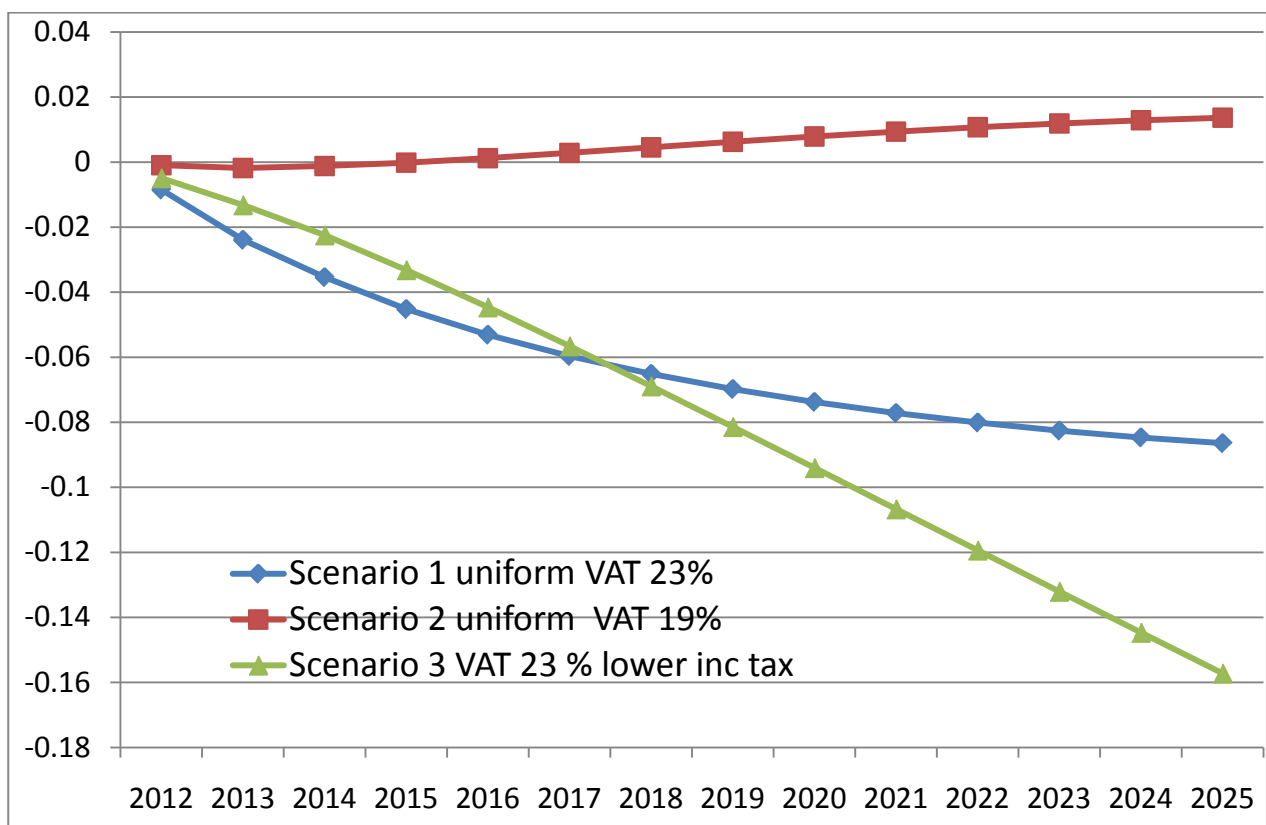


Figure 10. Difference in state deficit from base, percent of GDP

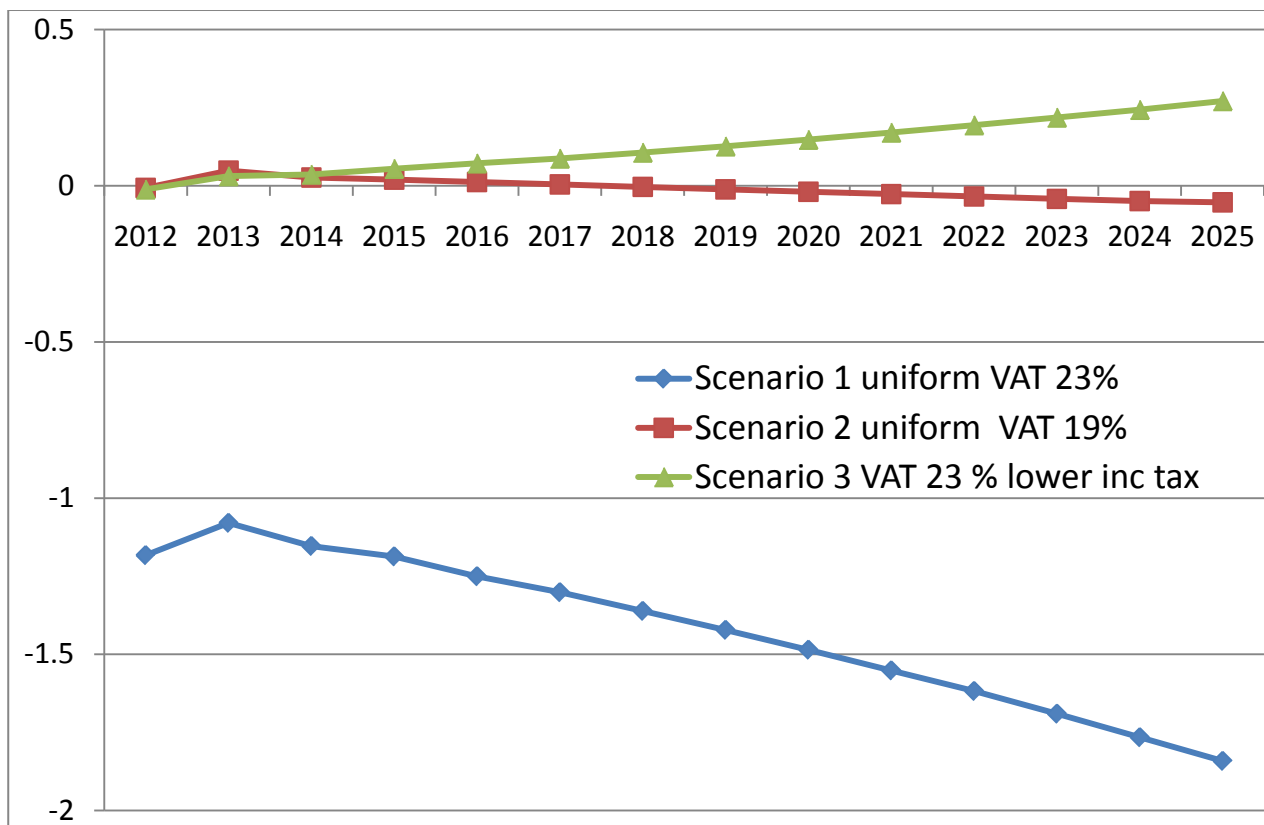


Table 1. Industry-level production effects

Production			2012	2015	2020	2025
Scenario 1	VAT 23%	Average	-1.408	-0.594	-0.097	0.060
Scenario 1	VAT 23%	Standard deviation	1.661	1.379	2.059	2.542
Scenario 1	VAT 23%	Minimum growth	-12.372	-8.469	-9.241	-10.018
Scenario 1	VAT 23%	Maximum growth	0.600	1.304	7.178	10.334
Scenario 1	VAT 23%	10th percentile	-2.150	-1.662	-1.696	-2.308
Scenario 1	VAT 23%	50th percentile, median	-1.178	-0.476	-0.351	-0.328
Scenario 1	VAT 23%	90th percentile	-0.353	0.717	2.213	2.924
			2012	2015	2020	2025
Scenario 2	VAT 19%	Average	-0.321	0.192	0.502	0.632
Scenario 2	VAT 19%	Standard deviation	0.750	0.888	1.448	2.021
Scenario 2	VAT 19%	Minimum growth	-4.55	-4.7	-7.36	-12.24
Scenario 2	VAT 19%	Maximum growth	1.14	3.35	5.19	6.49
Scenario 2	VAT 19%	10th percentile	-0.719	-0.365	-0.321	-0.416
Scenario 2	VAT 19%	50th percentile, median	-0.27	0.3	0.595	0.71
Scenario 2	VAT 19%	90th percentile	0.445	0.828	1.438	1.799
			2012	2015	2020	2025

Scenario 3	VAT 23%, lower inc tax	Average	0.814	0.488	0.271	0.232
Scenario 3	VAT 23%, lower inc tax	Standard deviation	1.601	1.273	1.297	1.383
Scenario 3	VAT 23%, lower inc tax	Minimum growth	-5.836	-6.453	-7.162	-7.699
Scenario 3	VAT 23%, lower inc tax	Maximum growth	9.347	2.659	2.946	3.225
Scenario 3	VAT 23%, lower inc tax	10th percentile	-0.490	-0.564	-0.718	-0.798
Scenario 3	VAT 23%, lower inc tax	50th percentile, median	0.543	0.295	0.145	0.140
Scenario 3	VAT 23%, lower inc tax	90th percentile	2.288	1.978	1.687	1.737

Table 2. Industry-level employment effects

Employment			2012	2015	2020	2025
Scenario 1	VAT 23%	Average	-2.078	-0.717	0.023	0.221
Scenario 1	VAT 23%	Standard deviation	1.977	1.799	2.421	2.839
Scenario 1	VAT 23%	Minimum growth	-13.332	-11.457	-11.788	-12.222
Scenario 1	VAT 23%	Maximum growth	0.662	1.614	7.634	10.888
Scenario 1	VAT 23%	10th percentile	-3.537	-2.210	-2.037	-2.277
Scenario 1	VAT 23%	50th percentile, median	-1.718	-0.590	-0.330	-0.308
Scenario 1	VAT 23%	90th percentile	-0.628	0.944	2.725	3.488
			2012	2015	2020	2025
Scenario 2	VAT 19%	Average	-0.514	0.008	0.229	0.300
Scenario 2	VAT 19%	Standard deviation	1.002	1.083	1.578	2.124
Scenario 2	VAT 19%	Minimum growth	-6.519	-6.516	-7.841	-12.887
Scenario 2	VAT 19%	Maximum growth	1.386	3.577	5.064	6.312
Scenario 2	VAT 19%	10th percentile	-1.203	-0.758	-0.672	-0.845
Scenario 2	VAT 19%	50th percentile, median	-0.460	0.108	0.300	0.396
Scenario 2	VAT 19%	90th percentile	0.468	0.715	1.248	1.516
			2012	2015	2020	2025
Scenario 3	VAT 23%, lower inc tax	Average	1.247	0.684	0.396	0.361
Scenario 3	VAT 23%, lower inc tax	Standard deviation	2.005	1.599	1.550	1.593
Scenario 3	VAT 23%, lower inc tax	Minimum growth	-8.220	-8.723	-9.147	-9.394
Scenario 3	VAT 23%, lower inc tax	Maximum growth	10.201	3.289	3.316	3.541
Scenario 3	VAT 23%, lower inc tax	10th percentile	-0.513	-0.648	-0.734	-0.834
Scenario 3	VAT 23%, lower inc tax	50th percentile, median	1.103	0.672	0.380	0.388
Scenario 3	VAT 23%, lower inc tax	90th percentile	3.091	2.448	1.987	1.974

The development of consumption volume mimics that of real disposable income as saving is in our model a fixed share of income. We use consumption volume here as a proxy for equivalent variation, as they should be very closely interrelated. Measure at face value, none of our scenarios would seem to be welfare increasing. However, this would be a deceptive way of analyzing the situation, as during the whole simulation period, we expect state budget to be on deficit under the base scenario. Therefore, invisible in the numbers is the inevitably coming need of tightening of the public finances. We saw above that our scenario 1 was the only one contributing to closing the public deficit. Below in table 3 we see that it comes with a cost of 2-3 per cent of the base consumption volume. Even for the other two scenarios, the consumption volume is higher for the one with a larger state deficit. In our setting, having the consumption volume as the guiding rule is not necessarily leading to right direction.

Considering the effect on income (and consumption) distribution, we see that scenarios 1 and 2 are almost identical with very small differences to base scenario, leading to different ratings in studying the distribution of income or consumption. The results of Riihelä, based on micro simulation with household budget survey material point to the same direction: abolishing lower VAT rates would not cause increased inequalities (Riihelä, 2010). Scenario 3, in turn with a proportional cut in the income tax rate, leads to clearly increasing differences. When measured by consumption, the increases in inequality are attenuated to around half compared to increases in income inequality.

Table 3. Welfare distribution indicators

Real household consumption				
	2012	2015	2020	2025
Scenario 1 uniform VAT 23%	-2.161	-2.540	-2.928	-3.245
Scenario 2 uniform VAT 19%	-0.487	-0.387	-0.279	-0.251
Scenario 3 VAT 23 % lower inc tax	-0.973	-0.916	-0.960	-0.974
Gini disposable income				
	2012	2015	2020	2025
Scenario 1 uniform VAT 23%	-0.084	-0.019	0.012	0.019
Scenario 2 uniform VAT 19%	-0.024	-0.003	0.002	0.003
Scenario 3 VAT 23 % lower inc tax	0.370	0.394	0.463	0.549
Gini consumption volume				
	2012	2015	2020	2025
Scenario 1 uniform VAT 23%	-0.037	-0.048	-0.051	-0.055
Scenario 2 uniform VAT 19%	-0.007	-0.008	-0.005	-0.005
Scenario 3 VAT 23 % lower inc tax	0.176	0.209	0.259	0.311

Let us have a closer look on the income and consumption changes under scenario 3. By using consumption volume, we capture both the differences in the income and consumption structure. Figure 11 presents the changes in consumption volume by decile and figure 12 by socio-economic group. We see that the magnitude of negative changes in consumption volume is greater, the lower is the income level of the household group (decile 7 being exception from the rule). Clearly, it should be possible to construct such an income tax reform which would distribute the welfare effect more evenly. However, we have opted not go further into detail in this matter, as we would severely then stretch (even more) beyond the domain of application of our top-down module. As labor supply is modeled through the representative consumer, differences in it among the household groups cannot be taken into consideration in this context.

Figure 11. Change in consumption in scenario 3 by income decile, per cent from base

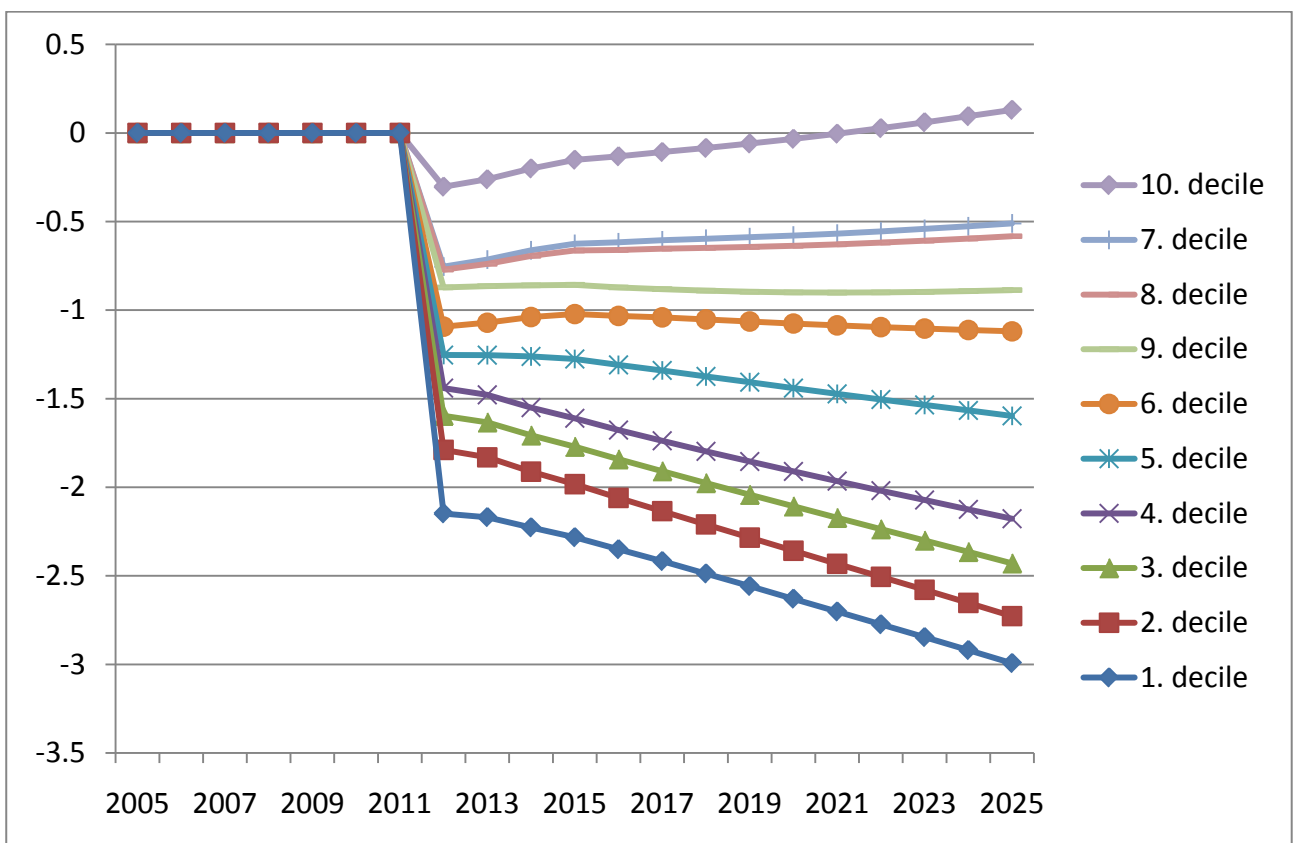


Figure 12. Change in consumption in scenario 3 by socio economic group, per cent from base

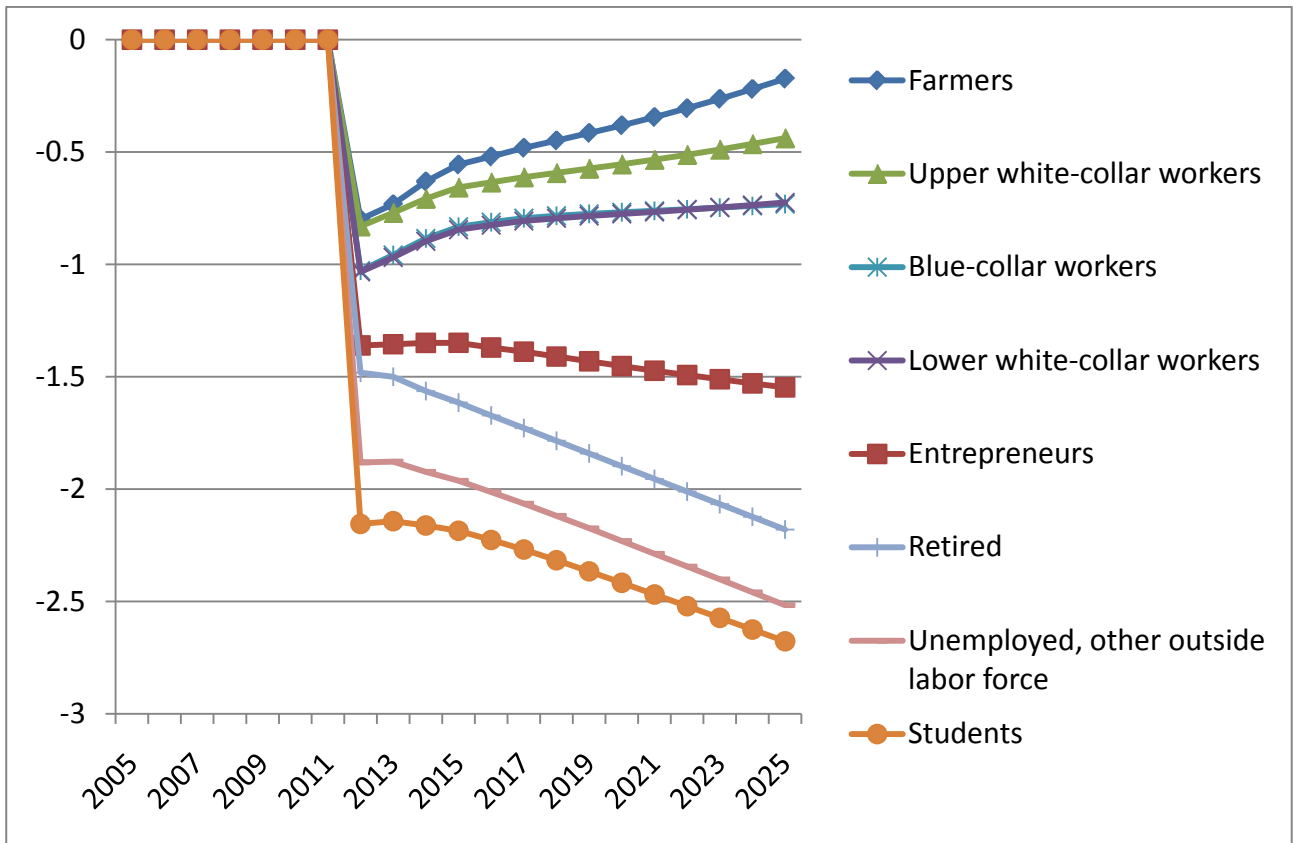


Figure 12 shows clearly that a proportional lowering of income tax rate coupled with higher VAT rate would incur higher losses for the most vulnerable groups in the society. In order to maintain current level of inequality, progressivity of income taxation needs to be maintained more or at its current level.

5. CONCLUSIONS

We have seen that the recent reforms in the Finnish indirect taxation have given a small stimulus to the Finnish economy, on the cost of marginally increased budget deficits. The changes caused to distribution of welfare are small, when studied with our low-grid approach of ten income and eight socio-economic groups. Changes incurred to individual families are certainly larger. We have also studied the price effects of VAT reforms in our model and compared them with econometric results as well as official statistics. In general, our model seems to generate results that are roughly in line with other evidence, probably due to each-other offsetting error sources in our and in other studies.

Regarding the future reforms, which we have picked up from the on-going political discussions, and from the preparatory work of the Finnish ministry of finance, our results point to the fact that industry-level changes seem to be larger than the ones incurred on household groups. However, the number of industries included in our analysis is about ten times higher than the number of household types, which may blur our vision for inequalities among the households.

One answer provided by our analysis is that by abolishing the lower VAT rates, public finances would be improved by a rough two per cent of GDP. The cost of the policy change would be rather equally born by the different household groups, and the fear of increased welfare differences does not get support from our analysis.

From our more or less budget-neutral scenarios the one with a uniform, but lower VAT rate of 19 per cent would lead to faster GDP growth than in the base case. In this scenario, the aggregate productivity of the economy is also higher than in the other case, where higher aggregate VAT is compensated by lower income taxation. This result deserves a comment or two. The role of labor supply as a source of (increased) economic growth is limited in our model, as by assumption, the tax-induced behavioral changes dilute over time. Armed with alternative (but still plausible) assumptions, the results change, though only marginally. Foreign trade has a considerable role as a source of economic growth. If the exports are not as price sensitive as assumed in the model, it would lead to smaller changes. And if the price changes induced by VAT reforms are not channeled into prices, not much of second-order effects would take place within the economy. All in all, our results support using less differentiated VAT system, if we take the efficiency (GDP growth) as the guiding principle. In addition, we do not find evidence for increased inequalities among households from abolishing lower VAT rates.

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APPENDIX 1: VAT rates in Finland as of 1.7.2010

23 %

- General VAT rate

13 %

- Food products, restaurant and catering services, animal feeds (not animals, drinking water, alcoholic beverages and tobacco)

9 %

- Passenger transportation
- Books
- Physical exercise services
- Medicine
- Lodging
- Entrance fees to cultural, circus and sports events, movies, amusement parks
- public service TV license fee
- 2007–2011: hairdressers, small businesses providing services such as repairing bicycles, shoes and leather goods and clothing and household linen

0 %

- Exports
- Goods transport from Finland abroad
- Newspaper and magazine subscriptions,
- Sales of air planes and vessels, and work around these

Exempted from VAT

- Health care, Social services, Education
- Financial and insurance services
- Lotteries and money games
- Fees for performing arts
- Sales of real estate
- Public funeral services